

THE *Clifton* RANGE

**BM-1  
Spirometer**

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## About this Manual

This user Manual contains instructions which must be followed to ensure that the product is operated correctly.

## General Notes

1. Always follow good teaching and safety practice. CLEAPSS October 2005 report recommends a Risk Assessment is produced.

**Breathing Monitors should only be used under the direct supervision of a teacher who is experienced in their correct use. Teachers are reminded that they have a special responsibility when pupils are used as the subject of experiments. Investigations involving unusual ventilation of the lungs can be dangerous to epileptics, asthmatics or children suffering from bronchial disorders.**

2. When using Breathing Monitors, be aware of the possible consequences of hyperventilation, re-breathing exhaled air or holding the breath.
3. A Kymograph or Datalogger system can be used to record results. We recommend a Logit, from Griffin Education <http://www.griffinandgeorge.co.uk/> or Data Harvester, from Scientific and Chemical <http://www.sci-chem.co.uk/> or Timstar <http://www.timstar.co.uk/> with a motion sensor fitted to logger. A pen arm is supplied to attach to the float with motion sensor from Dataloggers in mind.

## Amendments

Issue 1	September	2009	Initial issue instruction book [G&G orig].
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## Symbols



Caution refer to Instructions

## Location

The product must be placed on a smooth, level and sturdy work surface and used indoors. Use in a ventilated room. Suitable for use in ambient temperatures 5°C to 40°C with a maximum humidity 80% (temperature 31°C) decreasing to 50% (temperature 40°C). Mains voltage fluctuations are not to exceed  $\pm 10\%$  of the nominal supply. The product is designed for educational use.

## Introduction

The Clifton Breathing Monitor consists of a counterbalanced float, sealed by water. A subject can breathe out, thus causing the float to move up.

The Breathing Monitor enables volume of breaths to be monitored. It has a scale calibrated in litres, which can be read against the water level, enabling readings to be taken directly, or it can be fitted with a pen arm allowing the attachment of a fibre tipped pen or used in conjunction with a Kymograph or electronic datalogger system to record results.

Recommended data loggers: Logit, from Griffin Education <http://www.griffinandgeorge.co.uk/> or Data Harvester, from Scientific and Chemical <http://www.sci-chem.co.uk/> or Timstar <http://www.timstar.co.uk/> with a motion sensor fitted to logger. A pen arm is supplied to attach to the float with motion sensor from Dataloggers in mind.

## Unpacking

Remove the Breathing Monitor from its packaging and check following parts are included:

- \* Breathing Monitor - body
- \* Float assembly
- \* Pen arm assembly
- \* Corrugated tube
- \* Snapper clip
- \* Mouth piece
- \* Nose clip
- \* Instruction manual

If any of the above are missing or damaged, contact your distributor.

## Setting up

1. Place the float in position, ensuring that the pivot pins are correctly located in the dimples (top of the tank).
  2. Screw the counter balance weight fully into the back of the float support, but do not adjust until the float chamber has been filled with water.
  3. Connect the corrugated hose to the ports on the front of Breathing Monitor. When new, these may be a tight fit (they can be fitted more easily lubricated with water). Fit the snapper clips to secure the hoses.
  4. Immerse the mouthpiece in a sterilising solution. Spare mouthpieces are available from your distributor request Stock No. BX0612 "Disposable Mouth piece".
  5. Recording results: options
    - A). If the results are to be recorded on a Kymograph, fit the pen arm and clamp a fine fibre-tipped pen in the holder. Arrange the kymograph so that the pen writes properly over the full height of the chart. If the full capacity of 7 litres is to be used, a chart and drum 200mm is required. When fitted, 10mm vertical movement of the pen corresponds to approximately 500ml change in volume in the Spirometer.
    - B). Alternatively use electronic datalogger system to record results.
    - C). Or simply record exhaled breaths, peak value from float scale with empty value, on a graph.
  6. Fill the tank with water, almost to the very top.
  7. Ensure the float is in the lowest position, no obstruction in corrugated hose, allows it to sink in the water. This corresponds to zero volume and ready for use.
  8. The following can be fitted into the end of the corrugated hose for the subject to breathe into:
    - A). Supplied Mouth piece
    - B). Accessory disposable mouth pieces Stock No. BX0612 are available.
- Additionally accessory disposable Nose clips Stock No. BP0555 are available.

## Operating Instructions

1. Select a subject. To enable some degree of standardisation the subject should be rested for half an hour and should not have eaten a meal for the previous two hours.
2. Fit a sterilised mouthpiece to the corrugated hose, seat the subject comfortably and place the mouthpiece and nose clip in position.
3. Allow the subject to breathe out, the float will rise.

## Suggested investigations 1

1. **Normal tidal volume:** is given by the amplitude of the trace (see fig. 2).

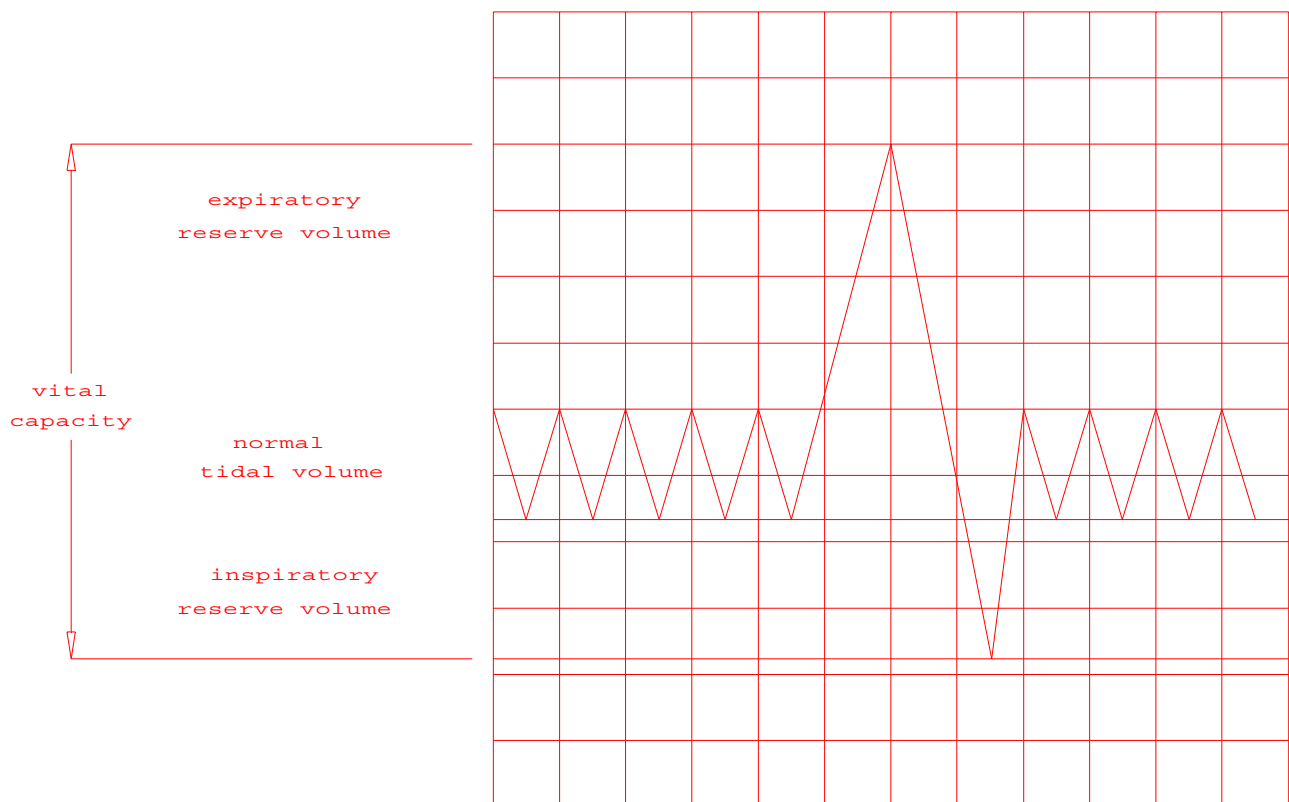


Fig 2.

## Suggested investigations 2

### Reserve volume

1. After normal breathing - not connected to Breathing Monitor - ask the subject to take the deepest possible inward breath and then breathe out the deepest possible outward breath through the mouthpiece.
2. This peak volume gives the **Expiratory Reserve volume**.

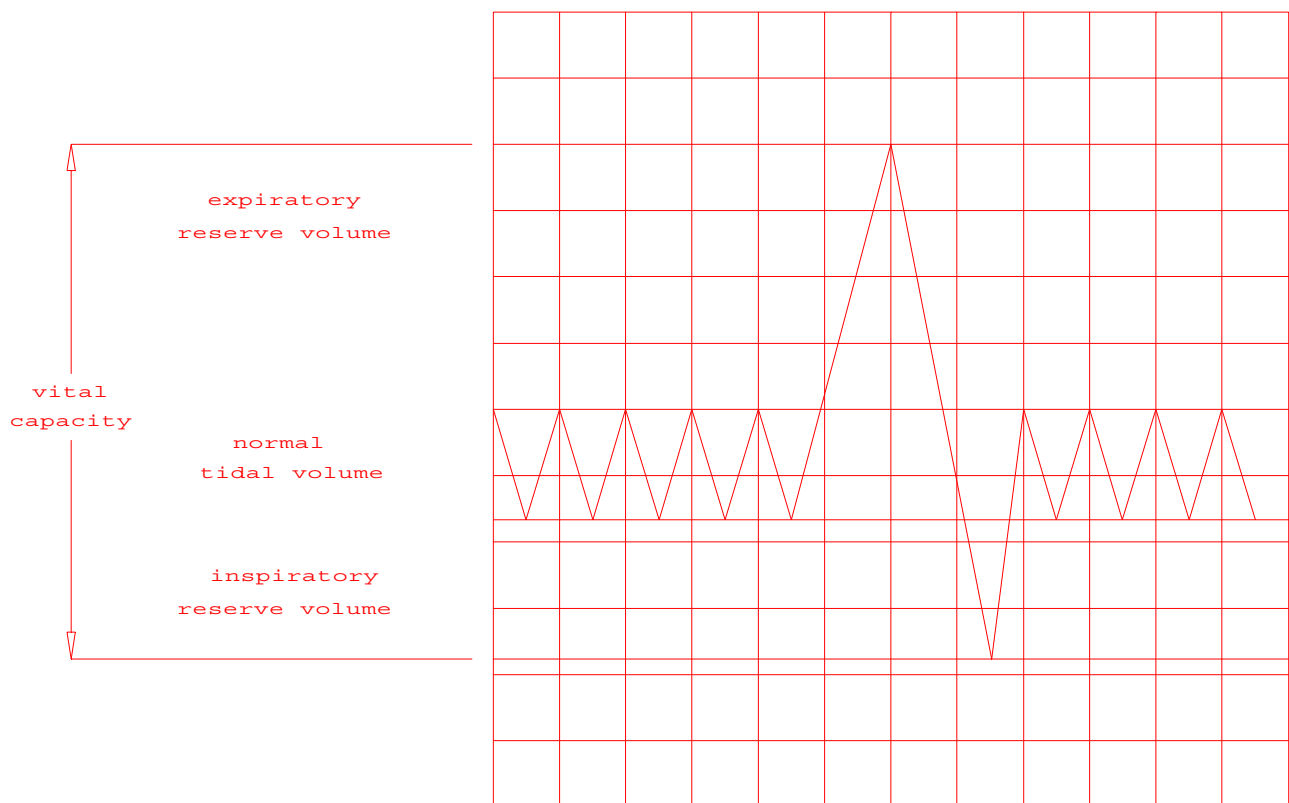


Fig 2.





## Cleaning

1. **Outside surfaces** - wipe with a cloth or sponge soaked in warm soapy water

2. **Inside surfaces** - can be descaled to maintain it in as new condition. Descale by adding 1 litre of vinegar to water and leave for an hour, empty, and brush the lime away. Rinse thoroughly afterwards.

NOTE: Although the stainless steel tank is resistant to chloride containing solutions it is important to avoid high concentrations of halogens - especially chloride. With such a high quality and resistant tank it may show rust, often deposits from external sources. These deposits can be removed with nitric acid (10%) on a cloth. WEAR PROTECTIVE EQUIPMENT!

Where applicable, a medical disinfectant can be used in the water during normal use, we recommend 'Virkon'.

## Warranty

The Breathing Monitor is covered by a One Year Warranty against defects in materials and workmanship. In the case of a problem contact your Dealer for advice or Nickel-Electro Ltd., Service Dept. Tel: 01934 626691

## Accessories

It is recommended that due to the Breathing Monitor being operated by multiple users the following consumables are replaced for each:

BX0612 Disposable Mouth Pieces

BP0555 Disposable Nose Clip

## Maintenance

There are no useable maintainable components.

**Fitting Pen Arm for recording breathing measurements.**



Fit "Z" shaped bracket to Float Assembly, this in conjunction with a motion sensor and data logger can record pulmonary ventilation.

