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BOYLE'S LAW APPARATUS

CAT NO. PH0150A/BG



Instruction Manual

BOYLE'S LAW APPARATUS

INTRODUCTION :

This apparatus is designed for class-demonstration use. It provides means of

- Enclosing volumes of air over a coloured non-volatile liquid
- Connections for compressing this air with a pump (not provided)
- Means of recording pressures and volumes

These facilities enable Boyle's law, $pV = \text{a constant}$ (under isothermal conditions), to be investigated and validated.

CONSTRUCTION :

The air is trapped in a long vertical tube backed by a graduated scale on a white background.

This scale is in arbitrary units. These can be taken as indicating the volume of the trapped air.

Pressure is applied by using a bicycle pump (or similar) and can be read off from the gauge provided. This gauge is calibrated in both kg/cm^2 and p.s.i. A reservoir under the gauge ensures that the pressure reaching the trapped air does not fluctuate too violently.

USE :

The vertical tube is part-filled (say, to the 40 mark) with the coloured liquid / water and sealed. The trapped air is then compressed progressively, with pressure (p) and volume (V) readings taken at each stage. Before each pair of readings is taken, the liquid should be allowed to settle so that the heat caused by the compressions is dissipated.

Alternatively, the demonstration can start with the air compressed to the highest pressure used. Pressure can then be released by opening the valve on top of the reservoir. This approach has the advantage that it is easier to manipulate this valve than, repeatedly, the pump.

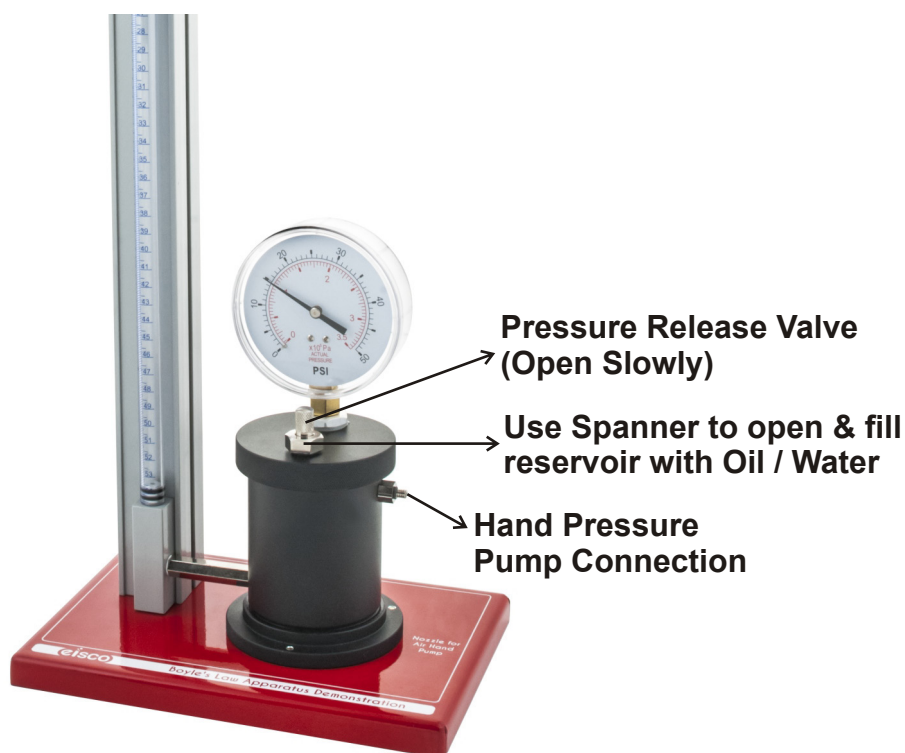
ANALYSIS :

Verification of Boyle's law can be obtained by plotting a graph of p against $1/V$. A linear graph should result, but this graph does not pass through the origin unless atmospheric pressure is added to the pressure readings used.

LIMITATIONS AND DANGERS :

The vertical tube will withstand the pressures required for the demonstration. However replacement of the bicycle pump with a foot pump might result in pressures greater than the apparatus can stand. The use of a safety screen can provide a safeguard.

KEY COMPONENTS :



Note- Please use minimum 200 ml of coloured water or oil.

CONNECTING PUMP



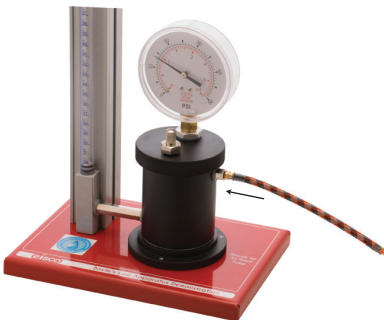
1. Take out the nozzle connector.



2. Place the pump tube's mouth at the valve.



3. Screw the pump tube in.

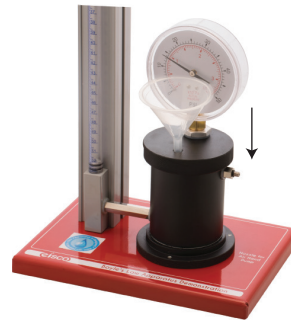


4. Push the cap back on the pump tube's mouth & pump is ready to use

FILLING WATER



1. Unscrew the water change valve.



2. Place the funnel in the hole.



3. Put in the minimum 200ml of water/or oil.



4. Tighten the screw on the valve.

Manufactured by :

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