

## **MELDE'S APPARATUS – vibrator for strings**

**Cat: SW4220-001 4-8V.AC. with cord, clamp pulley & pan**

---

**DESCRIPTION:** Kit contains:

- Melde's Apparatus vibrator.
- 3m Length of strong white cord.
- Bench clamp and pulley for attachment to the edge of a bench.
- Plastic scale pan with hook to carry weights for tensioning the cord.

This compact and robust instrument can be free standing on the bench, clamped to a bench, or supported horizontally or vertically from a retort stand. It is used for the lateral vibration of a cord at 50Hz or 60Hz frequency for experiments in standing waves and resonance. When used normally, the cord is tensioned by passing it over a pulley mounted at the edge of the bench and attaching the cord to a scale pan. Adding weights to the pan increases the tension in the cord and the active length of the cord is adjusted by moving the instrument on the bench relative to the position of the pulley clamped to the edge of the bench.

If the unit is supported on a retort stand so the cord hangs vertically from the vibrator, a pulley is not required and a normal weight hanger can be attached directly to the end of the cord. Mounting the unit vertically makes adjustment of the cord length more difficult, but it demonstrates the various reactions at the weight end of the cord.

Depending on how the unit is supported (see the illustrations), the cord can be made to vibrate in any plane and therefore can be viewed by students from various directions.

### **SW4220-001 Melde's apparatus**



**Physical size: 176x57x60mm LxWxH**

**Weight: 0.84 kg**

---

**INDUSTRIAL EQUIPMENT & CONTROL PTY.LTD.**  
 61-65 McClure St. Thornbury. 3071 Melbourne. Australia  
 Tel: 61 (0)3 9497 2555 Fax: 61 (0)3 9497 2166  
s w 4 2 2 0 - 0 0 1 . d o c 2 9 - J u n - 0 6

**OPERATION:**

One end of a 2.5mm diameter steel rod is formed into a strong hook and the other end is firmly clamped by a thumb screw to a heavy metal base. The rod passes through the centre of a solenoid and between the poles of a permanent magnet. The rod is firmly clamped at one end by the thumb screw provided. When AC power is applied to the coil, the rod is magnetised and it vibrates laterally between the magnets when the vibrating length of the rod is set and locked to the correct resonant length.

One end of the cord is tied in a loop to attach to the hook at the end of the vibrator rod and the cord is then passed over a vertical pulley clamped to the edge of the bench say 1 or 2 metres away. A weight carrier or a scale pan is attached to the end of the cord to hang vertically. When the pan is loaded with weights, known tension is applied to the cord.

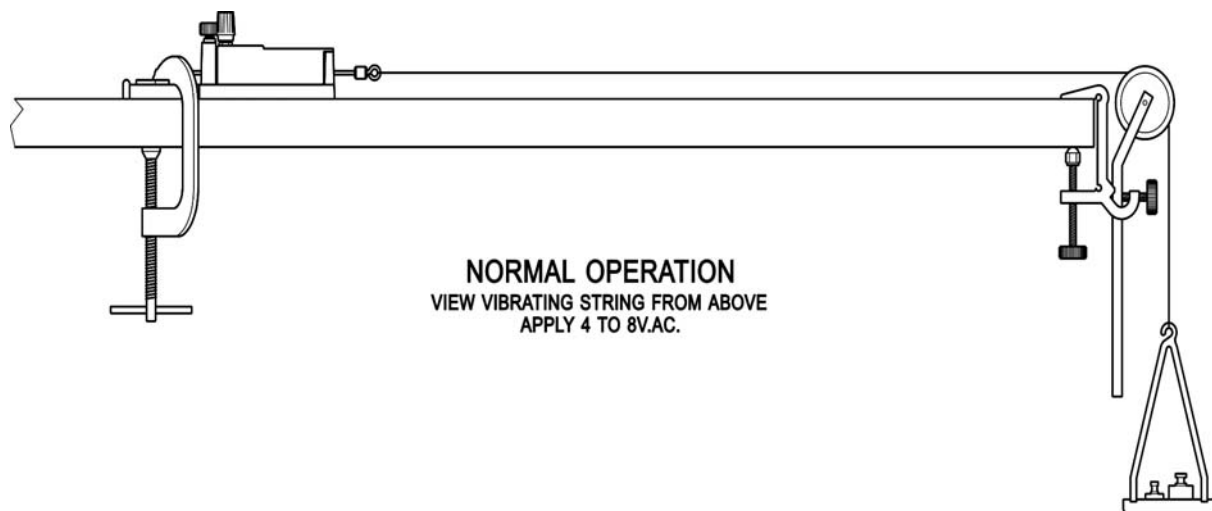
As the rod vibrates, the taut cord can be seen to vibrate and standing waves can easily be examined and measured at different cord tensions and lengths. Active cord lengths exceeding 2 metres long can be used.

**MOUNTING METHODS:**

The unit can be either rested on a bench or clamped to the bench by the special stem provided. When the string is being tensioned by weights, it is normal for the unit to be clamped to the bench so that the unit is not dragged by the tension. This special stem permits the vibrator to be held also by a retort stand either horizontally or vertically.

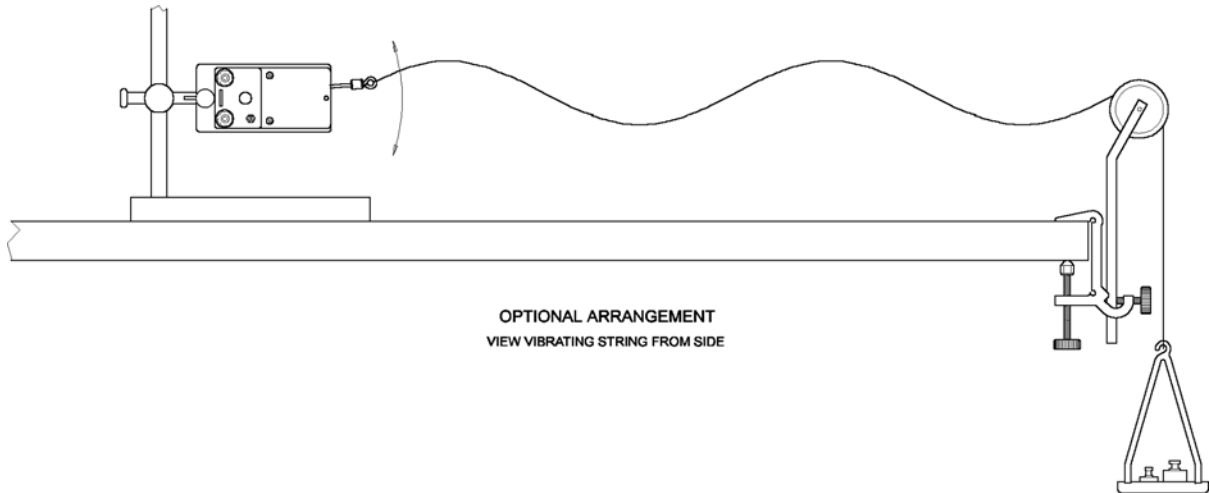
**For safety::** For this instrument to operate and vibrate properly, the body of this instrument must be quite heavy. If the unit should fall on a user it will cause injury, therefore the shape of the stem has been designed so that if the clamping becomes loose, the unit cannot slide through the clamp and fall.

Normal horizontal arrangement:

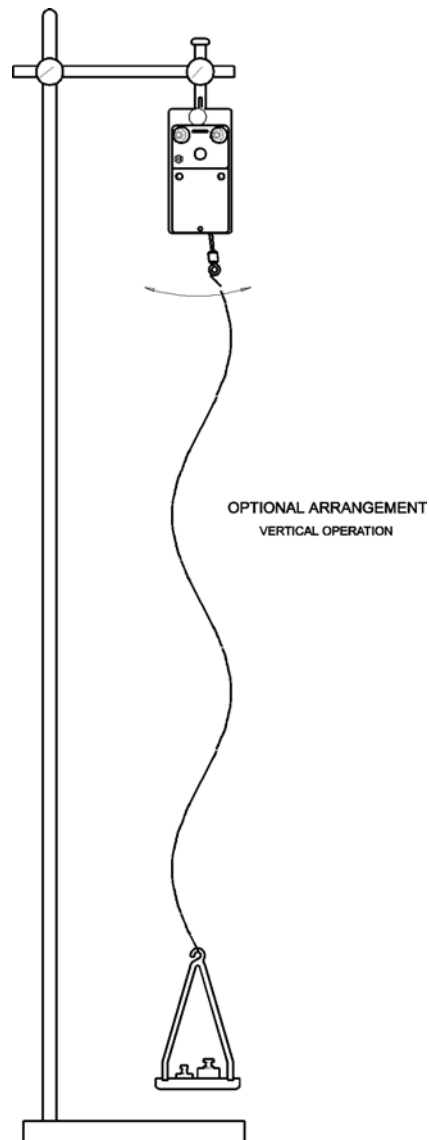




Alternative horizontal arrangement:



Vertical arrangement:





**'TUNING' THE VIBRATING ROD FOR MAXIMUM VIBRATION:**

Connect the unit to a 6V.AC. power source (from 4 to 8V.AC.) and observe the motion at the tip of the rod. **Voltages up to 12V.AC. can be applied but only for short periods of about 30 seconds. DO NOT CONNECT TO HIGHER VOLTAGES.**

To tune the rod for 'resonance', loosen the clamping screw and slide the rod forward or backwards before re-clamping firmly. When the resonance is correct for 50Hz or 60Hz, the hook end of the rod should vibrate laterally approx.12mm. **When the resonance is correct and maximum, the rod will be heard to touch the edge of the hole through which it passes. When this is achieved using say 6V.AC. clamp the rod firmly.**

**NOTE:** Very small changes in the length of the rod alters the tune or the resonance considerably. If a variable frequency AC power source is available (LB3756-101 IEC WaveLab or LB3754-001 IEC High Power Signal Generator) the Vibrator can be made to resonate at different frequencies by setting different frequencies on the generator and by adjusting the vibrating length of the rod to obtain best vibration.

**CAUTION:** Do not apply DC power to this instrument. DC current will NOT cause the rod to vibrate and a larger than normal current may flow. This could cause excess heat and eventual damage to the instrument.

**Designed and manufactured in Australia**