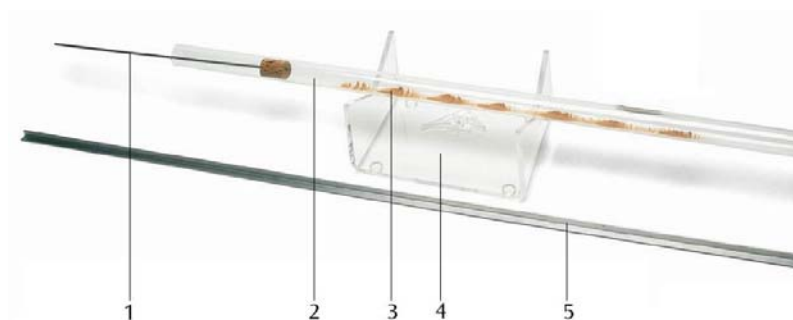


Kundt's tube U8432845

Instruction sheet

05/11 ALF



- 1 Movable plunger
- 2 Kundt's tube
- 3 Cork powder
- 4 Stand (not included)
- 5 Refill rail

1. Safety instructions

- Store the glass tube in a safe place where it cannot be exposed to danger of shocks or breaking.
- Do not expose the glass tube to any mechanical stress or strain.
- Do not bend the movable piston while pushing it in or pulling it out.
- Do not use the apparatus, if the glass tube is damaged.
- Protect the apparatus from humidity and dust.

2. Description

By employing cork dust, a Kundt's tube is used to demonstrate the distribution of nodes and antinodes in a standing sound wave. Using the apparatus, it is also possible to demonstrate that standing waves are formed when a resonance condition is fulfilled for sound wavelength λ and length s of the vibrating air column in the tube such that:

$s = n \lambda/2$ for reflected waves with antinodes at the open end,

$s = (2n+1)\lambda/4$ for reflected waves with nodes ($n = 1, 2, \dots, n$) at the closed end.

The wavelength can be determined from the number of nodes n and the distance a between the first

and last nodes

$$\lambda = 2a/(n - 1).$$

The rod with the cork plunger seals the tube and is used for changing the effective tube length to tune the frequency of the resonant sound waves.

A whistle, a tuning fork or a loudspeaker driven by a function generator can be used as a sound source.

A funnel reduces the wave impedance at the opening of the tube. As a result, more sound energy can be introduced into the tube.

2.1 Scope of delivery

- 1 Glass tube
- 1 Movable piston
- 1 Funnel
- 1 Whistle
- 1 Refill rail

3. Technical data

Tube:	600 mm
Internal diameter:	17 mm
Glass thickness:	1.5 mm
Movable plunger:	280 mm x 3 mm dia.

4. Operation

In order to conduct the experiments, the following apparatus is additionally required:

1 Tuning fork 1700 Hz	U8431020 or
1 Pneumatic loudspeaker	U8432680 with
1 Function generator	U8533510
Cork powder	U8432850
1 Metre scale	U8401550
1 Stand for coils	U8496150

- Use a refill rail to introduce a small quantity of cork dust into the tube.
- Slightly tilt the tube and shake it gently till the cork dust has uniformly spread throughout the length of the tube.
- Position the Kundt's tube on the stand so that the strip of cork dust is at the bottom.
- Slowly rotate the tube along its length in order to spread the cork dust along the walls too.
- For determining the wavelength with the whistle, fit the tube with the funnel.
- For determining resonance conditions, conduct the experiment without a funnel.

It is recommended that a 1700-Hz tuning fork be used. The fork produces a resonant wavelength λ of 0.2 m for the 0.6-m tube. When the wave is reflected at the open end, antinodes are produced at both ends. When the wave is reflected at the closed end, nodes are produced at both ends.

- Position the sound source right at the end of the tube.
- If blowing a whistle, make sure that it is perpendicular to the tube. This is necessary to prevent any air from entering the tube.
- When using a tuning fork, strike it and quickly hold it with its prongs in the direction of vibration in front of the opening of the tube or the funnel.
- When using a loudspeaker, gradually change the frequency on the function generator to identify the resonance frequency. Effective range: between 600 Hz and 8000 Hz.
- To tune a closed tube to the resonant length, gradually move the movable plunger.

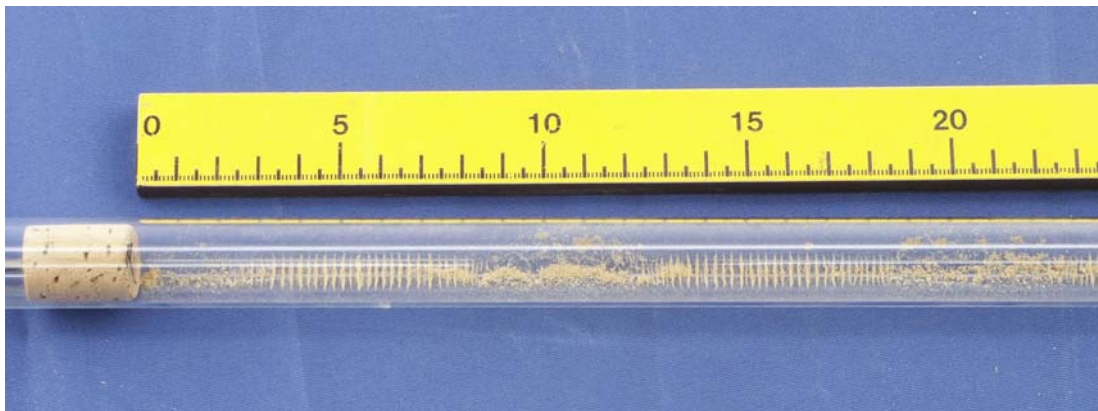


Fig. 1 Determination of the wavelength