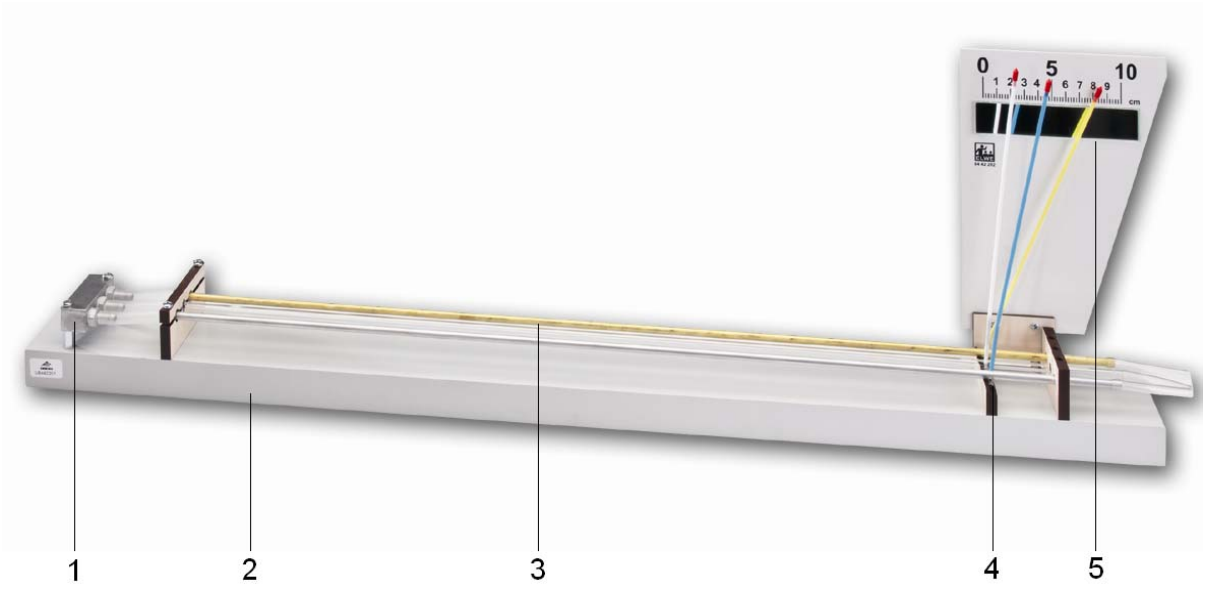
Linear Expansion Apparatus with Three Pointers 1000830

Instruction sheet

02/13SF



1 Steam generator with silicone hose
2 Base strip
3 Sample tubes
4 Pilot bearing with pointers
5 Scale

1. Safety instructions

The glass tube is breakable. Risk of injury!

- Handle the apparatus with care.

Danger of serious burns! It is a property of all the materials that these tubes are made of that they store heat.

- Therefore, allow the tubes to cool after every experiment.

2. Description

The thermal expansion apparatus is used for the simultaneous measurement and comparison of the coefficient of thermal expansion of tubular bodies made of different materials.

Three sample tubes are mounted on an aluminium base strip. The free end of each tube rests on a pilot bearing. The thermal expansion of the tubes is demonstrated by three pointers, each of a different colour, on a mirror scale.

3. Scope of delivery

1 Thermal expansion apparatus
3 Sample tubes (brass, aluminium, glass)
1 Measurement scale with mirror
3 Pointers

4. Technical data

Dimensions:	830 x 80 x 70 mm^3
Weight:	1200 g approx.
Sample tubes:	Brass, aluminium, glass
Dimensions:	700 mm x 6 mm Ø
Tube length:	600 mm

5. Operation

In order to perform the experiment, the following equipment is additionally required:

1 Steam generator (230 V, 50/60 Hz) 1001049
or
1 Steam generator (115 V, 50/60 Hz) 1006769

- Mount the mirror scale onto the base strip.
- Clamp the pointers below the tubes so as to facilitate the measurement of thermal expansion.
- Calibrate all pointers to zero.
- Fill half of the steam generator with water, place it onto the hot plate, insert the cork cover and fasten it shut with the securing clamp.
- Connect the thermal expansion apparatus to the steam generator with a hose.
- Place a dish below the sample tube ends in order to collect condensed water.
- Measure the room temperature *T*.
- Switch on the hot plate.
- Allow the steam to flow for some time through the sample tubes. This should continue till the tubes have attained a temperature equal to the boiling point of water (100°C). Observe the respective pointer deflections
- Read the thermal expansion Δ*l* off the scale (0.1 mm thermal expansion corresponds to 4 cm pointer deflection on the scale).
- Calculate the temperature difference Δ*T* in relation to the room temperature.

The coefficient of linear thermal expansion α of different materials can be determined by the formula:

$$\alpha = \frac{\Delta l}{l \cdot \Delta T}$$

where *l* is the length of the tube measured from its fixed bearing up to the pilot bearing.

Fig. 1 Experimental set-up

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