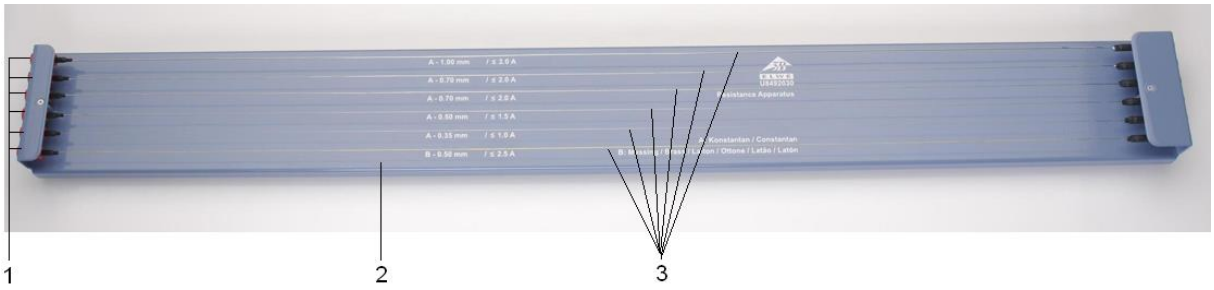
Resistance Apparatus 1009949

Instruction sheet

10/15 ADP BJK



1 4-mm connectors
2 Base plate
3 Resistance wires

1. Safety instructions

If the current is too high, it can lead to the resistance wires becoming destroyed.

- Do not exceed the stated values for current.

The resistance wires are thin and can stretch or snap.

- Always carry the device by the base plate, never try to lift the wires.

2. Description

The resistance measurement bridge is a useful tool for exploring the factors that contribute to a wire's overall resistance. It is used to investigate the dependency of electrical resistance on conductor length, conductor cross-section and material.

The resistance measurement bridge is made up of six wires laid out side by side on a base plate with both ends connected to 4-mm sockets.

3. Technical data

Material	Diameter	Current
Constantan	1 mm	2 A max.
Constantan 2x	0.7 mm	2 A max.
Constantan	0.5 mm	1.5 A max.
Constantan	0.35 mm	1 A max.
Brass	0.5 mm	2.5 A max.

Dimensions:	1085 x 70 x 55 mm^3
Length of wires:	1000 mm
Weight:	approx. 1.5 kg

4. Sample experiments

It is recommended to use the analogue multimeter AM51 (1003074) to determine the resistance of the wires.

To avoid measuring errors, it is necessary to take account of the resistance of cables.

- The multimeter leads should be shorted together so that only their resistance is measured and the meter should then be calibrated to register that resistance as zero.

4.1 Resistance as a function of cross-sectional area

- Connect the LCR meter to the sockets of the Constantan wire with the smallest diameter (refer to fig. 1).
- Measure its resistance R and fill it in a table.
- Calculate the cross sectional area A of the wire by using the equation

$$A = \pi \cdot \left(\frac{d}{2}\right)$$

- Be sure to convert the diameter d into meters before substituting.
- Repeat the procedure with the other Constantan wires.
- Plot the graph of the resitance vs. cross sectional area (refer to fig. 2).

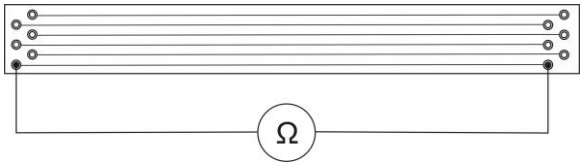


Fig. 1 Experimental set-up

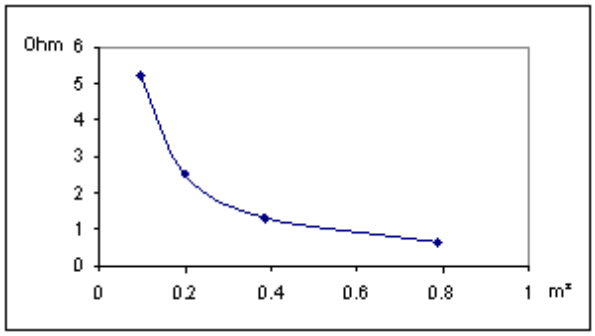


Fig. 2 Resistance as a function of the cross sectional area

4.2 Calculating the resistivity ρ of a wire

The equation for resistance *R* of a wire is given by

$$R = \rho \cdot \frac{L}{A}$$

with *L* = length of the wire, *A* = cross sectional area of the wire and ρ = resistivity of the material

Solving our equation of resistance for ρ, we get:

$$\rho = R \cdot \frac{A}{L}$$

- Set up the experiment according to fig. 1.
- Connect the LCR to any of the constantan wires and determine its resistance.
- Calculate the resistivity of Constantan.
- Repeat the experiment with the brass wire and compare the resistivity of Constantan and Brass.