Basic Electric Circuits
Electric Resistance

Correlation between resistance and the cross-sectional area of a wire
Set-up with the apparatus for resistance measurements

Objects of the experiment

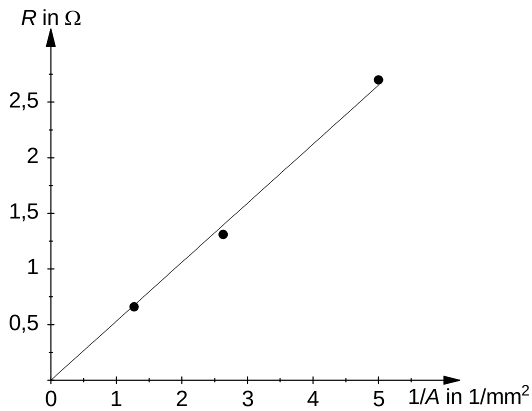
1. Investigating the correlation between resistance and cross-sectional area of a wire.

Set-up

Measuring example

Voltage U in V	0,5	0,5	0,5
Current I in A	0,18	0,38	0,75
Resistance R in Ω	2,77	1,31	0,66
Diameter d in mm	0,50	0,70	1,0
Cross-sectional area A in mm²	0,2	0,38	0,78
$\frac{1}{A}$ in $\frac{1}{\text{mm}^2}$	5,0	2,63	1,27

Evaluation



The resistance R of a wire increases inverse proportionally with its cross-sectional area A: $R \sim \frac{1}{A}$.

Apparatus

1 Apparatus for resistance measurements	550 57
2 Demo-Multimeter, passive	531 906
1 Power supply, 12 V, DC, 230 V	521 49
5 Connecting leads, 100 cm	500 444
2 Stand base, V-shape	300 02
2 Stand rods, 250 mm	300 41
2 Leybold multiclamp	301 01
2 Metal plate	from 686 50 ET5

Carrying out the experiment

- Connect the constantan-wire (d = 0,5 mm).
- Set a voltage of 0,5 V on the power supply.
- Read current and voltage and write it into the table.
- Repeat the measurement with Constantan-wires of identical length but diameters of d = 0,7 mm and d = 1,0 mm.
- Calculate the cross-sectional area A of the wires with diameter d ($A = \pi r^2$).
- Calculate the resistances ($R = \frac{U}{I}$) of the wires using voltages U and currents I.

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