Electricity with the Modular System

Basic Electric Circuits

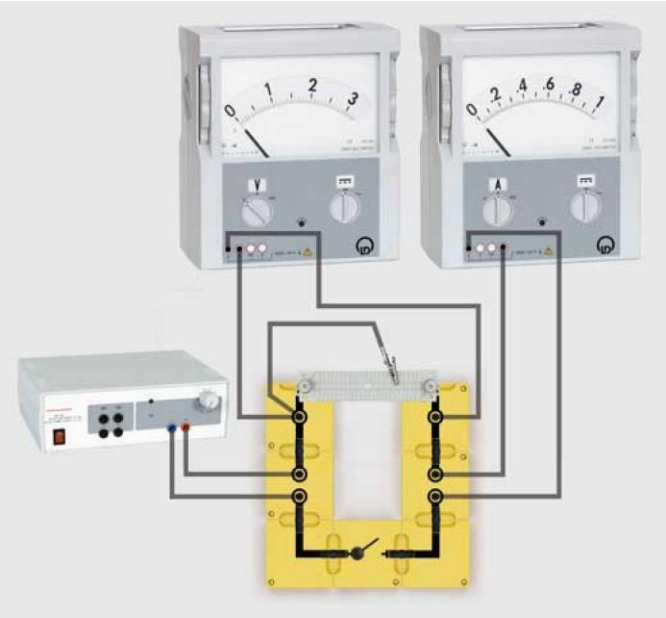
Electrical resistance

Relationship between resistance and length of a wire

Objective of the experiment

To investigate the relationship between resistance and length of a wire.

Setup



Apparatus

1		567 18	Wire wrapping plate
1		550 46	Chrome-nickel wire, *d* = 0,25 mm
2		539 060	Adapter plug, BST
1		539 025	Toggle switch, BST
2		539 002	Connector blocks BST, straight, 1 socket
2		539 003	Connector blocks BST, straight, 2 sockets
2		539 004	Connector blocks BST, 90° angle
6		539 000	Bridging plug, BST
2		531 906	Demo multimeter, passive
1		521 49	Power supply, 12 V DC, 230 V
6		500 644	Safety connection lead, 100 cm
1		500 411	Connection lead, 25 cm
1	from	501 861	Croc-clip
1		301 300	Demonstration experiment frame
1		301 301	Adhesive magnetic board

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Carrying out the experiment

- Wind the chrome-nickel wire around the wire wrapping plate (25 turns) and clamp the ends of the wire used for contacting under the clamping screws.

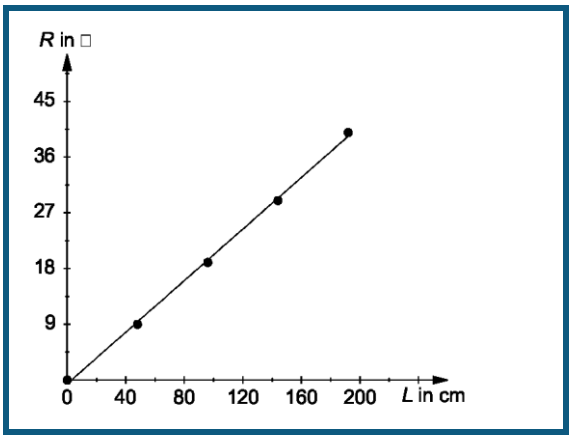
Note: The wire length *L* per turn is about 8 cm.

- Set up the circuit and initially tap 6 turns of the wire wrapping plate with the crocodile clip.
- Close the switch and adjust the power supply to a voltage of approx. 3 V across the wire wrapping plate.
- Read the current and voltage from the multimeter and enter them into the table.
- Repeat the measurement with 12, 18 and 24 turns.
- Calculate the resistances *R* from voltages *U* and currents *I*.

Measuring example

Number of turns	*L* / cm	*U* / V	*I* / A	*R* / Ω
6	48	3	0.330	9
12	96	3	0.160	19
18	144	3	0.105	29
24	192	3	0.075	43

Evaluation



The resistance R of a wire increases proportionally to the length *L* of the wire: $R \sim L$.