

Electricity with the Modular System

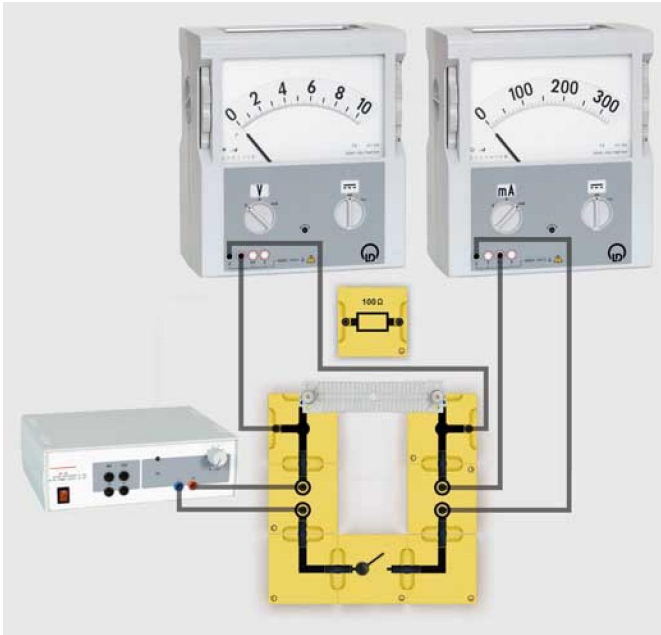
Ohm's Law

Basic Electric Circuits
Electrical resistance

Objective of the experiment

To investigate the relationship between current and voltage in an electrical conductor.

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	539 009	Resistor, 100 Ω , BST
1	539 025	Toggle switch, BST
2	539 003	Connector blocks BST, straight, 2 sockets
2	539 004	Connector blocks BST, 90° angle
2	539 006	Connector blocks BST, T branch
8	539 000	Bridging plug, BST
2	531 905	Demo multimeter, passive
1	521 49	Power supply, 12 V DC, 230 V
6	500 644	Safety connection lead, 100 cm
1	301 300	Demonstration experiment frame
1	301 301	Adhesive magnetic board

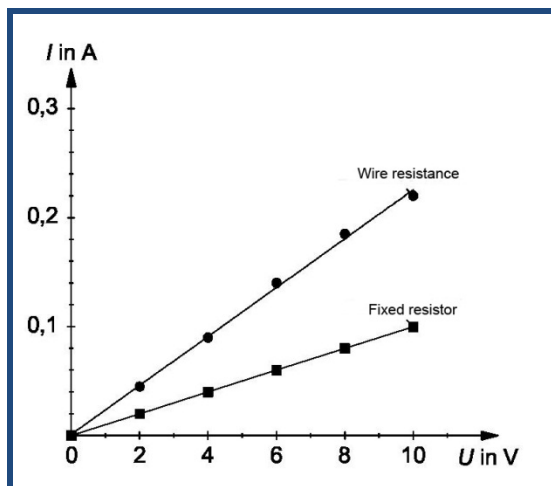
Carrying out the experiment

- Wind the chrome-nickel wire ($d = 0.25 \text{ mm}$) around the wire wrapping plate and clamp the ends of the wire used for contacting under the clamping screws.
- Insert the wire wrapping plate into the adapter plug and close the switch.
- Adjust voltages U of 2 V, 4 V, 6 V, 8 V and 10 V at the power supply and read the current I on the amperemeter for each value.
- Replace the wire resistance with a fixed resistor and repeat the experiment.

Measuring example

Voltage U / V	Current I / A		$\frac{U}{I} / \frac{\text{V}}{\text{A}}$	
	Wire resistance	Fixed resistor	Wire resistance	Fixed resistor
2	0.045	0.02	44	100
4	0.09	0.04	44	100
6	0.14	0.06	43	100
8	0.18	0.08	43	100
10	0.22	0.1	43	100

Evaluation



In an electrical conductor, current and voltage are proportional to one another:
 $I \sim U$ (Ohm's Law).

The quotient of the current and the voltage across the electrical conductor is constant and is designated as electrical conductance G :

$$\frac{I}{U} = G = \text{constant.}$$

The electrical conductance G is the reciprocal value

of the electrical resistance R :

$$G = \frac{1}{R}.$$

It follows for the calculation of the electrical resistance R :

$$R = \frac{U}{I}.$$

Note: Ohm's Law applies only when the temperature of the electrical conductor remains constant.