Electricity with the Modular System

Basic Electric Circuits

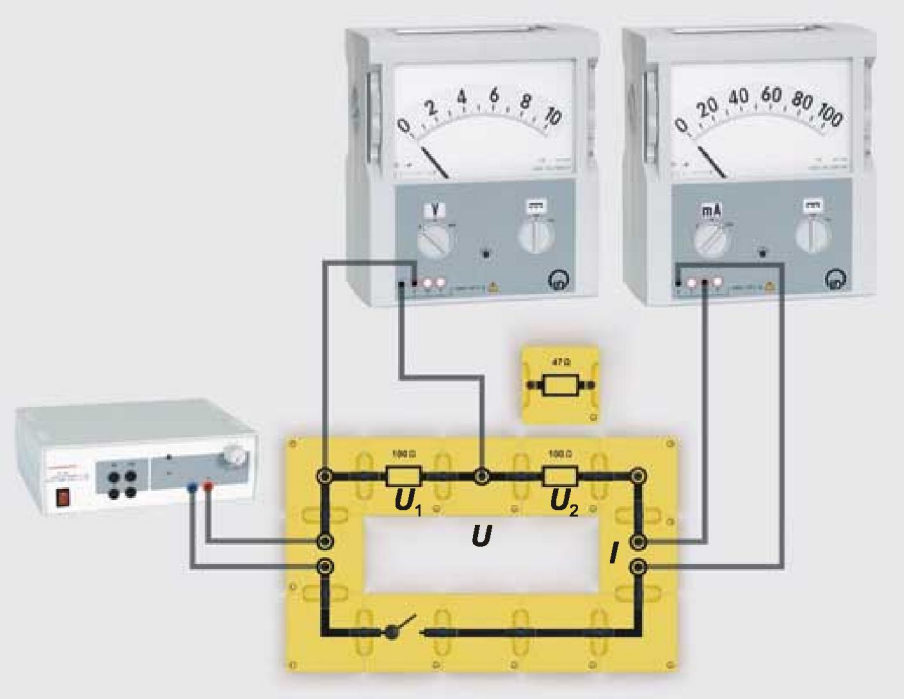
Electrical resistance

Connecting resistors in series

Objective of the experiment

1. To investigate the relationship between the total voltage U and voltages U_1 and U_2.
2. To determine the relationship between the total resistance R and the resistances R_1 and R_2.
3. To determine the relationship between the voltages U_1 and U_2, and the resistances R_1 and R_2.

Setup



Apparatus

1	539 008	Resistor, 47 &, BST
2	539 009	Resistors, 100 &, BST
1	539 025	Toggle switch, BST
2	539 001	Connector blocks BST, straight
1	539 002	Connector block BST, straight, 1 socket
2	539 003	Connector blocks BST, straight, 2 sockets
2	539 004	Connector blocks BST, 90° angle
2	539 005	Connector blocks BST, 90° angle with socket
12	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

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Carrying out the experiment

- Adjust a voltage of approx.10 V at the power supply.
- Measure the voltages U_1, U_2, U and the current I.
- Replace resistor R_2 = 100 © by the 47 © resistor and repeat the measurement.
- Calculate the total resistance R, the sum $R_1 + R_2$, and the quotients $\frac{U_1}{U_2}$ and $\frac{R_1}{R_2}$. Enter the results into the table.

Measuring examples

Resistance R_1 / &	100	100
Resistance R_2 / &	100	47
Voltage U_1 / V	5	6.6
Voltage U_2 / V	5	3.2
Total voltage U / V	10	10
Current I / A	0.050	0.067
Total resistance R / &	200	149
$R_1 + R_2$ / &	200	147
$\frac{U_1}{U_2}$	1.00	2.06
$\frac{R_1}{R_2}$	1.00	2.12

Evaluation

In a series circuit of resistances, the total voltage U is equal to the sum of the voltages U_1 and U_2: $U = U_1 + U_2$.

The total resistance R is equal to the sum of the resistances R_1 and R_2: $R = R_1 + R_2$.

The voltages U_1 and U_2 relate to each other the same as the resistances R_1 and R_2:
$\frac{U_1}{U_2} = \frac{R_1}{R_2}$