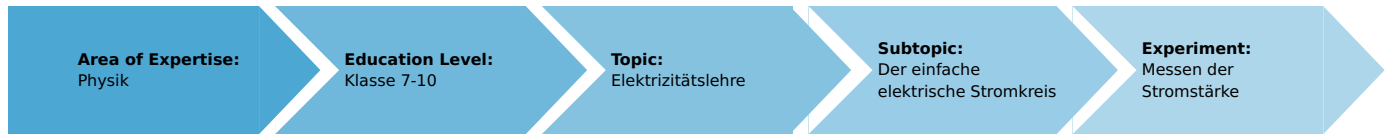


Measurement of current (Item No.: P1371800)

Curricular Relevance



Difficulty



Easy

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional information

A simple circuit is examined to introduce the measurement of the strength of an electric current. It is assumed that the students understand the term current and its unit.

When they know that electric current is defined as the number of freely moving electrons which pass a cross-section of a conductor in a unit of time, they will easily understand that in this case the measuring instrument must be connected in series.

Notes on setup and procedure

As the students are not yet practiced in handling the multi range meter, they should not start with the experimental procedure until the teacher has controlled the connections they have made.

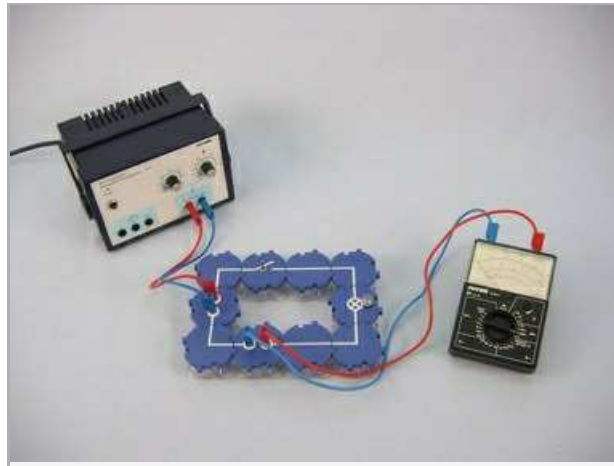
Measurement of current (Item No.: P1371800)

Task and equipment

Task

Task How is electric current measured?

Set up a simple circuit incorporating a filament lamp and familiarise yourself with the way the strength of an electric current is measured.



Equipment



Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	2
2	Angled connector module, SB	05601-02	4
3	Interrupted connector module, SB	05601-04	2
4	On-off switch module, SB	05602-01	1
5	Socket module for incandescent lamp E10, SB	05604-00	1
6	Connecting cord, 32 A, 250 mm, blue	07360-04	1
7	Connecting cord, 32 A, 250 mm, red	07360-01	1
8	Connecting cord, 32 A, 500 mm, red	07361-01	1
9	Connecting cord, 32 A, 500 mm, blue	07361-04	1
10	Filament lamps 4V/0.04A, E10, 10	06154-03	(1)
10	Filament lamp 6 V/3 W, E10, 10 pcs.	35673-03	(1)
10	Filament lamps 12V/0.1A, E10, 10	07505-03	(1)
11	Multi-range meter, analogue	07028-01	1
14	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1

Set-up and procedure

Set-up

- Set up the circuit as shown in Fig. 1.

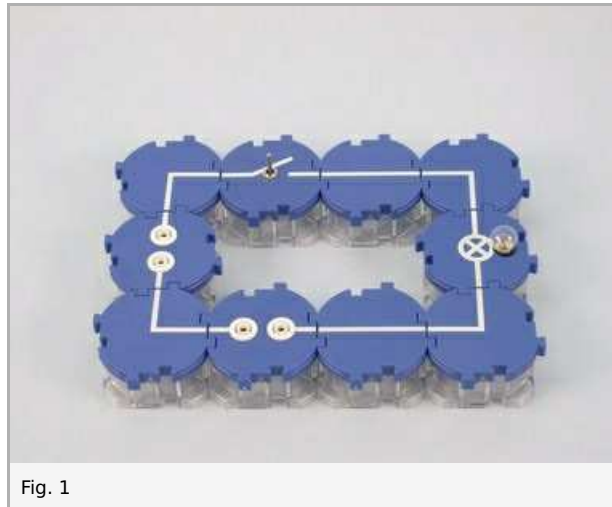


Fig. 1

- Select the 300 mA measurement range (type of current: direct current; A-) (Fig. 2). Connect a red and blue cord to the A+ and ground sockets of the amperemeter as seen in Fig. 3.



Fig. 2

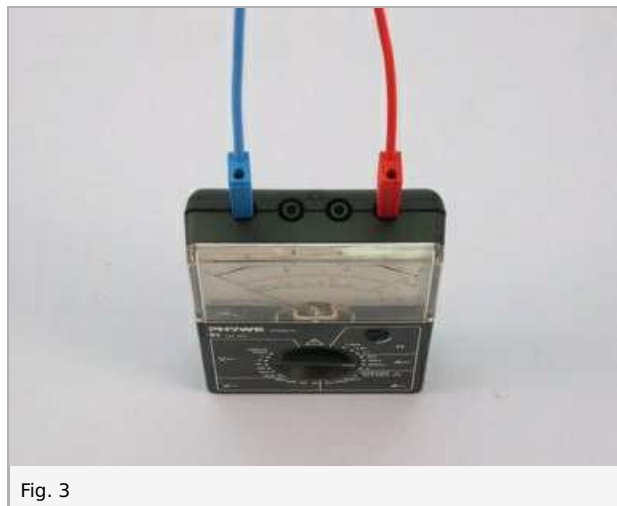


Fig. 3

- Now connect the amperemeter and the power supply to your circuit as you can see in Fig. 4.

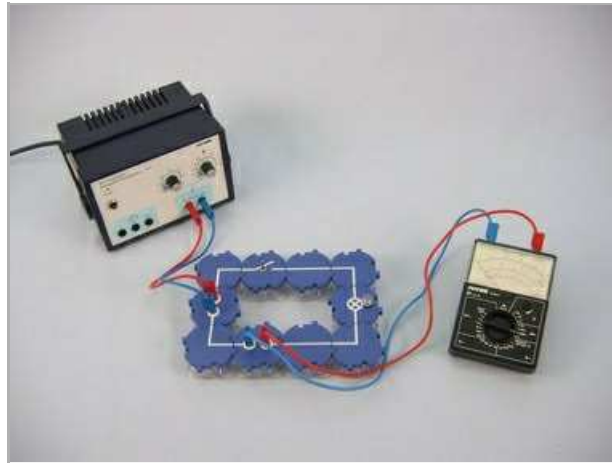


Fig. 4

- Screw in the lamp with a rated voltage of 4 V. Open the switch. Set the power supply to 0 V and turn it on.

Procedure

- Close the circuit with the switch and slowly increase the voltage of the power supply to 4 V.
 - Measure the current I (use the correct scale!) and note the measured value in Table 1 in the report.
-
- Open the switch. Replace the straight connector modules with the interrupted connector module to which the amperemeter is connected. I.e., measure the current at different positions in the circuit. Note what you observe in the report.
-
- Break the circuit and replace the 4 V lamp with the 12 V lamp.
 - Select the 3 A measurement range and close the circuit.
 - Increase the power supply voltage to 12 V, read off the value for the current I (use the correct scale!) and note it in Table 1 (report).
 - Select the 300 mA measurement range and again measure the current. Complete Table 1 with the value.
 - Switch off the power supply.

Report: Measurement of current

Results - Table 1

Record the measured values:

U in V	Measurement	I in A
4	300 mA	1 ± 0
12	3 A	1 ± 0
12	300 mA	1 ± 0

Results - Observation

Write down your observations:

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Evaluation - Question 1

How must an instrument for measuring current be connected? Explain why.

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Evaluation - Question 2

Compare the measured values for the current in the 3rd and 4th lines of Table 1, then answer the following questions:

- a) Why are the measured values different, although nothing in the circuit setup was changed?
- b) Which rule follows from this for the measurement of current - and for the measurement of physical quantities in general?

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Evaluation - Question 3

Summarise everything which must be considered when one is to measure a current.

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