The galvanometer (Item No.: P1376100)

Curricular Relevance

Area of Expertise: Physik
Education Level: Klasse 7-10
Topic: Elektrizitätslehre
Subtopic: Elektromagnetismus
Experiment: Das Galvanometer

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Intermediate	10 Minutes	10 Minutes	2 Students

Additional Requirements:

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional information

The students have already learned how to handle ammeters and voltmeters, without knowing how they function.
Now, in this experiment, they are to work out the construction and working principles of a galvanometer.

Notes on setup and procedure

To save time, the needle of the galvanometer should be pre-adjusted in the preparation for the experiment so that the students must only slightly readjust it when they set up the experiment.

Remarks

In actual measuring instruments, the permanent magnet is mostly fixed and the current-carrying coil arranged movably in the field of this permanent magnet. This has the advantage, that the moment of inertia of the measuring mechanism can be kept low, whereby the pointer more quickly reaches the position for the reading and can be more easily damped.
To complete this experiment, the students could additionally connect a multi-range meter in the circuit in order to determine the relationship between current strength and the deflection of the pointer. With galvanometers based on a coil with 400 turns, 10 scale divisions correspond to 10 mA.

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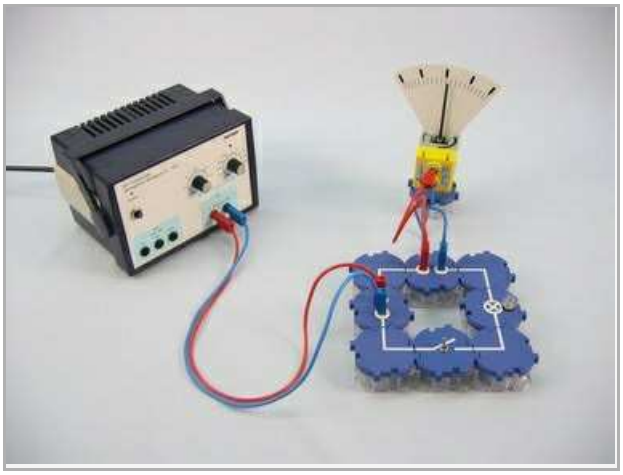
Task and equipment

Task

How does an instrument for measuring current function?

Construct a model of a galvanometer (current measuring instrument) and use it to investigate how a galvanometer works.



Equipment

Position No.	Material	Order No.	Quantity
1	Angled connector module, SB	05601-02	4
2	Interrupted connector module, SB	05601-04	2
3	Straight connector module with socket, SB	05601-11	1
4	On-off switch module, SB	05602-01	1
5	Socket module for incandescent lamp E10, SB	05604-00	1
6	Coil, 400 turns	07829-01	1
7	Galvanometer movement	07875-00	1
8	Galvanometer scale	07876-00	1
9	Notch bearing with plug	07877-00	1
10	Connecting cord, 32 A, 500 mm, red	07361-01	2
11	Connecting cord, 32 A, 500 mm, blue	07361-04	2
12	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
13	Filament lamps 4V/0.04A, E10, 10	06154-03	1 piece

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Set-up and procedure

Set-up

Assemble the galvanometer model as shown in Fig. 1 to Fig. 3:

1. Attach the coil to the notch bearing.
2. Attach the galvanometer-scale.
3. Position the pointer in the notch bearing; ensure that the axis of the pointer is exactly positioned in the notch bearing, and that the pointer is at the centre of the scale (should this not be the case, readjust the compensating weight).

Fit the notch bearing of the galvanometer on the connector with socket building block and set up the circuit as shown in Fig. 4 and Fig. 5.

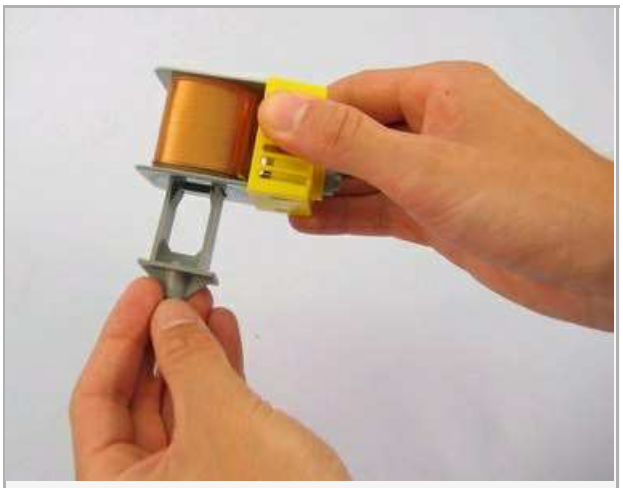

Fig. 1

Fig. 2

Fig. 3

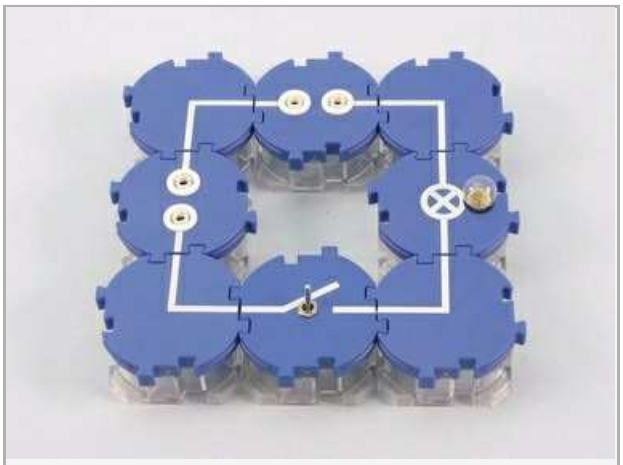

Fig. 4

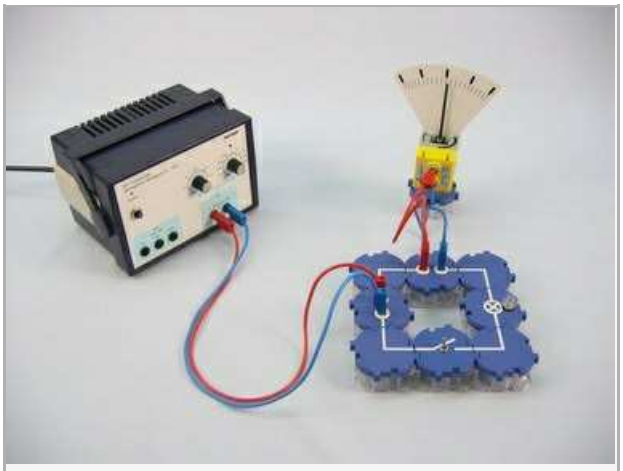

Fig. 5

Procedure

- Set the power supply to 0 V and switch it on.
- Close the switch and very slowly increase the voltage, until the pointer reaches full deflection; following this, increase the voltage further up to a max. of 4 V while observing the filament lamp.
- Reduce the voltage to 0 V, observing the pointer and the filament lamp while doing so; note your observations under Result - Observations 1 in the report.
- Open the switch and change over the connecting cords attached to the coil, i.e. reverse the poles of the model measuring instrument.
- Close the switch and then, as previously, increase the voltage and reduce it to 0 V while observing the pointer deflection and the lamp.
- Note your observations under Result - Observations 2 and switch off the power supply.

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Report: The galvanometer

Result - Observations 1

Note your observations.

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Result - Observations 2

Note your observations.

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Evaluation - Question 1

How can you recognise, during this experiment, if an electric current is flowing?

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Evaluation - Question 2

Which effect of electric current is exploited in this type of galvanometer?

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Evaluation - Question 3

Why not simply use a filament lamp to measure electric current?

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Evaluation - Question 4

Try to describe the construction and functioning of the galvanometer used in this experiment.

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