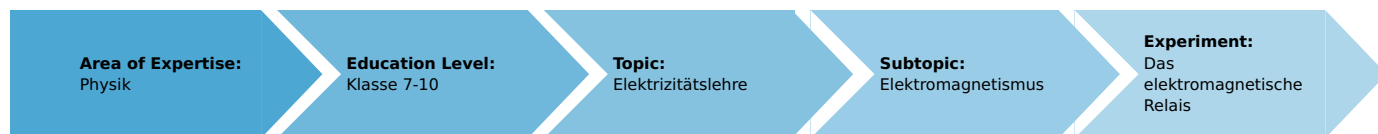


Electromagnetic relays (Item No.: P1375800)

Curricular Relevance



Difficulty



Intermediate

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

Variouly constructed relays are frequently used in circuitry, e.g. to open or close very distant elctric circuits or such which are difficult to access.

In this experiment the students should learn to understand the working principle of an electromagnetic relay.

Notes on setup and procedure

The advantage of the setup which is recommended is that very little expenditure is required to change from the first to the second experiment. With this setup, a change over can be shown, when two contact components are available or when a second contact can be prepared, e.g. with the help of a connecting plug and crocodile clip.

The setting of the current limitation to 1 A is merely a safety precaution for the coil's protection. When the power supply used does not have an adjustable electronic current limitation, then the students should be advised not to exceed a voltage of 3 V on the coil (although the coil can hold up to a higher load for a short-term only).

Remark

Relays which can control high performance working circuits with a weak control current are called protectors.

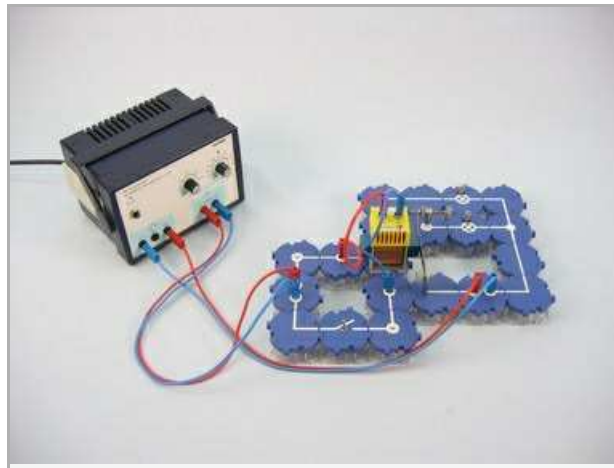
Electromagnetic relays (Item No.: P1375800)

Task and equipment

Task

How can electromagnets be used to carry out switching functions?

Close and open a circuit by means of an electromagnetic switch.



Equipment



Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	2
2	Angled connector module, SB	05601-02	4
3	T-shaped connector module, SB	05601-03	1
4	Interrupted connector module, SB	05601-04	2
5	Junction module, SB	05601-10	2
6	Straight connector module with socket, SB	05601-11	2
7	Angled connector module with socket, SB	05601-12	2
8	On-off switch module, SB	05602-01	1
9	Universal holder module, SB	05603-00	1
10	Socket module for incandescent lamp E10, SB	05604-00	2
11	Coil holder module, SB	05672-00	1
12	Contact spring with armature	05673-00	1
13	Contact element on 4-mm-plug	05673-01	1
14	Coil, 400 turns	07829-01	1
15	Yoke	07833-00	1
16	Connecting cord, 32 A, 250 mm, red	07360-01	1
17	Connecting cord, 32 A, 250 mm, blue	07360-04	1
18	Connecting cord, 32 A, 500 mm, red	07361-01	2
19	Connecting cord, 32 A, 500 mm, blue	07361-04	2
20	Connecting plug, 2 pcs.	07278-05	2 pieces
21	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
22	Filament lamps 12V/0.1A, E10, 10	07505-03	2 pieces

Set-up and procedure

Set-up

First experiment

- Set up the experiment as shown in Fig. 1 and Fig. 2.
- Fit the coil in the coil holder, insert the iron core (yoke), use the connectors to connect the coil to the building blocks alongside and below the coil as shown in Fig. 3.
- Fit the contact component first in connecting building block 1; clamp the contact spring in the universal holder, so that the armature shows towards the contact component. Use the screw on the contact component to ensure that it makes good contact with the armature (remove the milled nut if necessary).

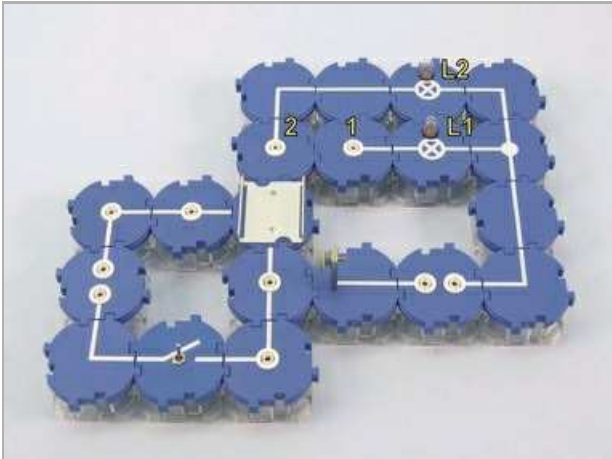


Fig. 1

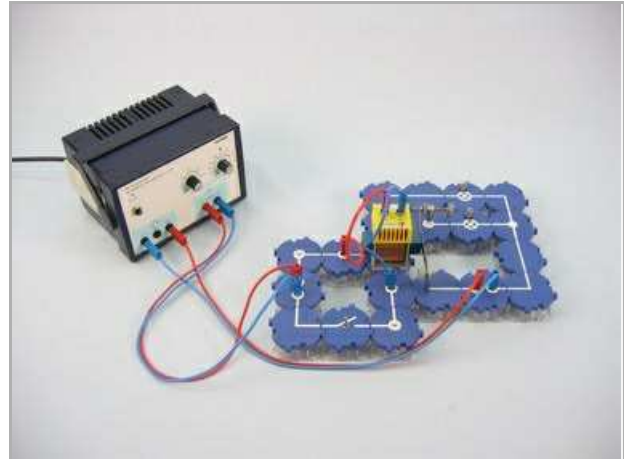


Fig. 2



Fig. 3

Second experiment

- Fit the contact component in connecting building block 2; clamp the contact spring in the universal holder, so that the armature shows towards the contact component. Use the screw on the contact component to ensure that it makes good contact with the armature (see Fig. 4).

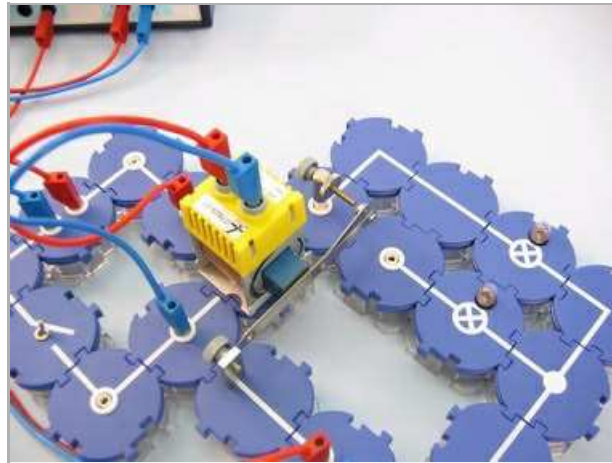


Fig. 4

Procedure

First experiment

- Set the power supply to about 4 V, set the current limitation to 1 A and switch the power supply on.
- Open and close the switch several times and observe the armature spring and the incandescent lamp L1 while doing so.
- Set the power supply to 0 V and switch it off.
- Record your observations under Result - Observations 1 in the report.

Second experiment

- Set the power supply to approx. 5 V and switch it on.
- Open and close the switch several times and observe the armature spring and the incandescent lamp L2 while doing so.
- Set the power supply to 0 V and switch it off.
- Record your observations under Result - Observations 2.

Report: Electromagnetic relays

Result - Observations 1

Note your observations.

.....

.....

.....

.....

Result - Observations 2

Note your observations.

.....

.....

.....

.....

Evaluation - Question 1

The circuit containing the electromagnet is called the control circuit, the one with the filament lamp the working circuit. The arrangement with electromagnet, leaf spring and contacts is called an electromagnetic relay. What can a relay be used for?

.....

.....

.....

.....

Evaluation - Question 2

Name examples of beneficial uses of relays.

.....

.....

.....

.....