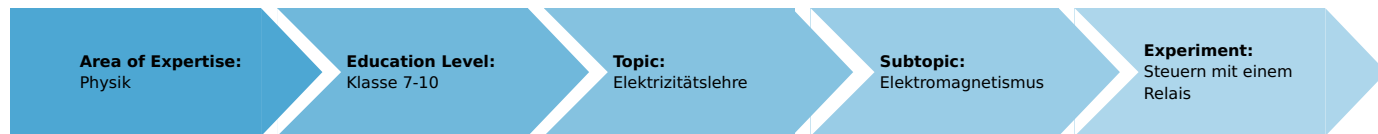


# Relays (Item No.: P1375900)

## 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

The students are familiar with the construction and functioning of electromagnets and, generally, are also aware of their use in a simple relay.

The changeover relay used in this experiment is more complicated. It is therefore recommended that the instructor go over the introductory information with the students. This makes it easier for the students to gain an understanding of the relatively intricate circuitry in the experiment.

### Notes on setup and procedure

In order to arrange the circuitry relatively easy to follow, the students should use 25 cm connecting cords to make the connections to the switching contacts on the relay (shown in Fig. 3 as the contact points B and C).

### Remarks

One of the advantages of using relays is that they can be used to switch high-power operating currents with weak control currents. Such relays are called magnetic contactors or switches. Relays can also switch high operating voltages at a low control voltage.

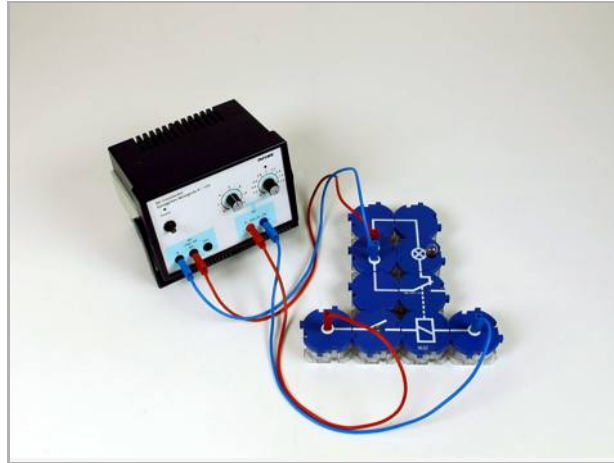
# Relays (Item No.: P1375900)

## Task and equipment

### Task

#### How does a relay trigger a switching process?

Show that an electromagnetic relay can be used to switch circuits (operating current circuits) on and off and as a changeover switch.



Equipment



Position No.	Material	Order No.	Quantity
1	Angled connector module, SB	05601-02	4
2	T-shaped connector module, SB	05601-03	1
3	Interrupted connector module, SB	05601-04	1
4	Junction module, SB	05601-10	2
5	On-off switch module, SB	05602-01	1
6	Socket module for incandescent lamp E10, SB	05604-00	2
7	Relais module 6 V, SB	05674-00	1
8	Connecting cord, 32 A, 500 mm, red	07361-01	2
9	Connecting cord, 32 A, 500 mm, blue	07361-04	2
10	Filament lamps 12V/0.1A, E10, 10	07505-03	2 pieces
11	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 experiment as shown in Fig. 1 and Fig. 2 with the filament lamp L1 in the operating circuit. The On/off switch should be off. Set the direct voltage for the control circuit to  $6\text{ V}^{\text{DC}}$  and connect the operating circuit with the alternating voltage of  $12\text{ V}^{\sim}$ .

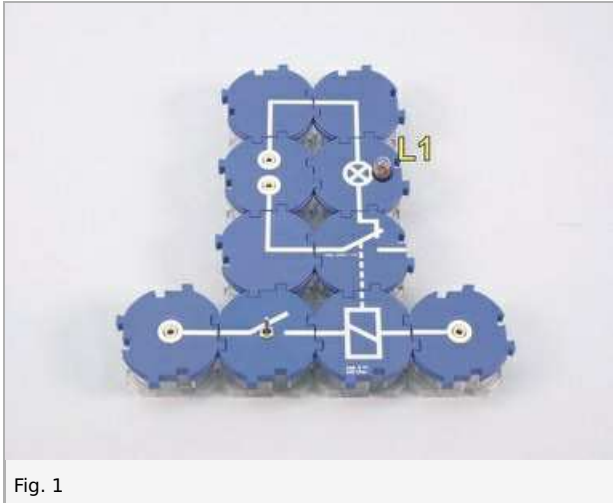


Fig. 1

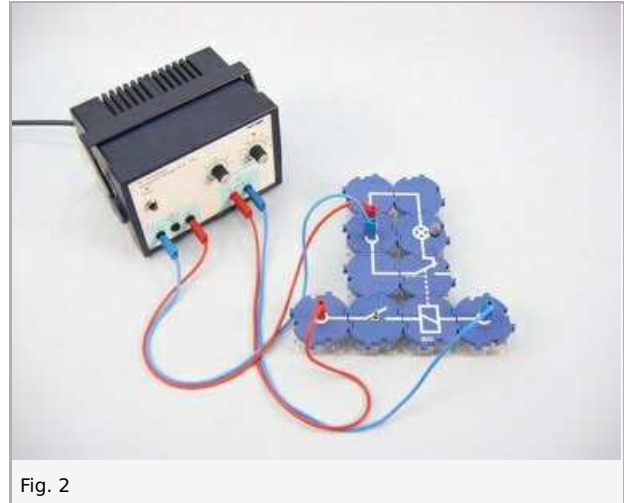


Fig. 2

### Procedure

#### Introductory information

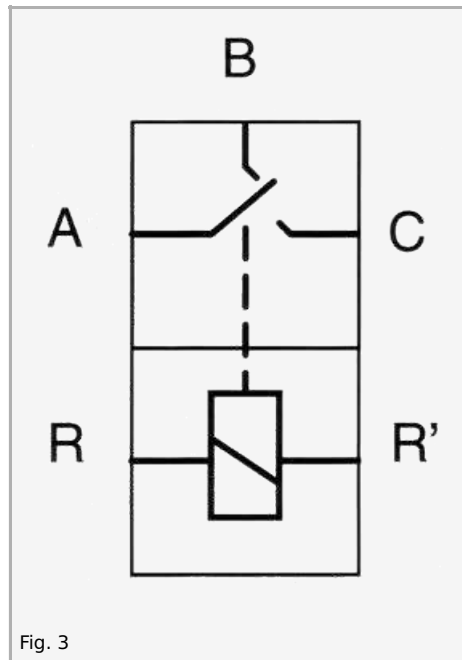
Have a look at the relay being used before starting the experiment.

Two contacts of one relay building block are connected to the coil of the relay (R and R'). The three contacts of the other relay building block relate to the relay switch. If the circuit containing the coil of the magnet (called the **control circuit**) is not switched on, the conductive connections have the same configuration as those printed on the relay casing.

A connection that is switched on while the control circuit is switched off is called a **break contact**. In this case, the relay functions as an **opening contact** in the **operating circuit**.

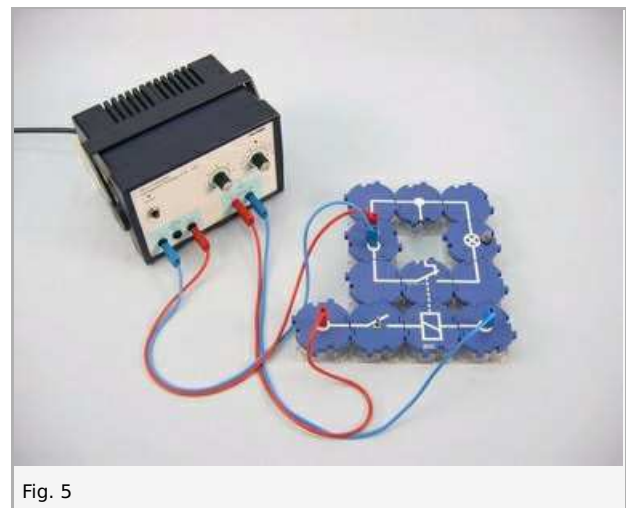
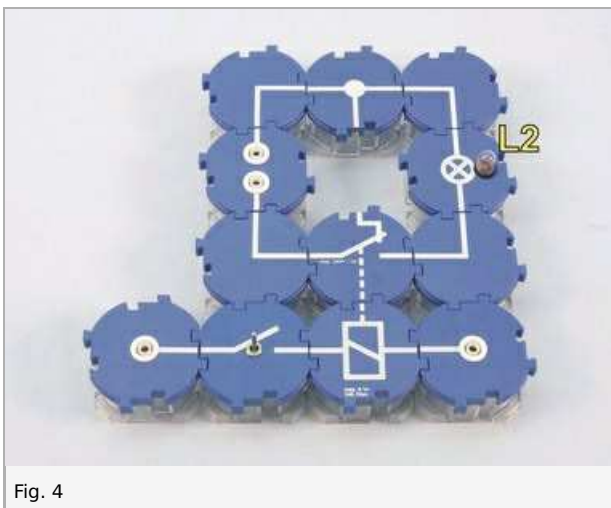
A connection that is switched off while the control circuit is switched on is called a **make contact**. In this case, the relay functions as a **closing contact** in the **operating circuit**.

Complete Table 1 in the report based on Fig 3.

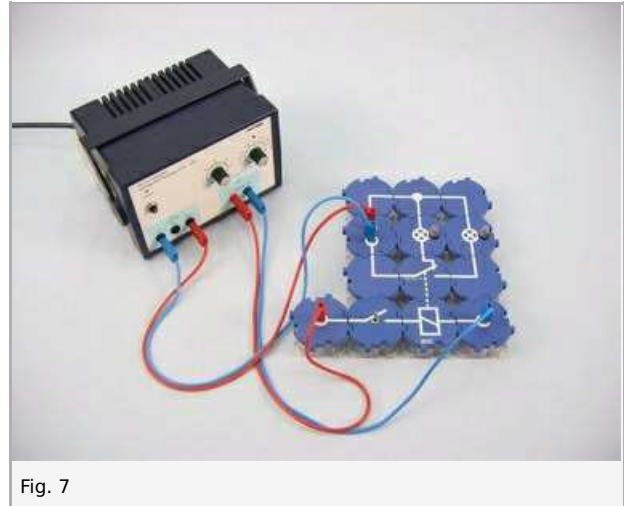
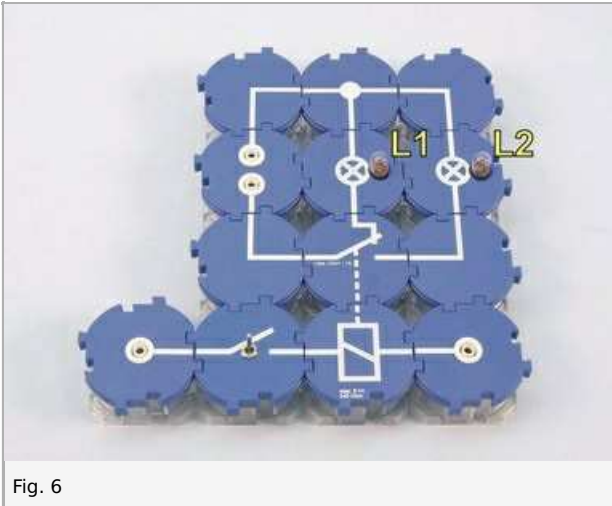


### The experiment

- Switch on the power supply and observe the filament lamp L1.
- Toggle the on/off switch back and forth to turn the control circuit on and off repeatedly. Observe L1 and note your observations under "Result - Observations 1" in the report.
- Interrupt the operating circuit 1 by removing filament lamp L1 and add filament lamp L2 to the operating circuit 2 (Fig. 4 and Fig. 5).
- Switch the control circuit on and off repeatedly. Observe L2 and note your observation under "Result - Observations 2".



- Turn the operating circuit 1 on once again by putting the filament lamp back in circuit (Fig. 6 and Fig. 7). Turn the control circuit on and off repeatedly while observing both filament lamps. Note your observations under "Result - Observations 3".
- Switch off the power supply.



## Report: Relays

### Result - Table 1

Complete Table 1.

Control circuit is	Connection exists between points	Connection is interrupted between points
switched off	1	1
switched on	1	1

### Result - Observations 1

Note your observations.

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## Result - Observations 2

Note your observations.

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## Result - Observations 3

Note your observations.

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### Evaluation - Question 1

Relays can be used as opening contacts (Observation 1), closing contacts (Observation 2), or changeover contacts (Observation 3). List some possible applications for relays.

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### Evaluation - Question 2

What are some of the advantages of using relays as switches?

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