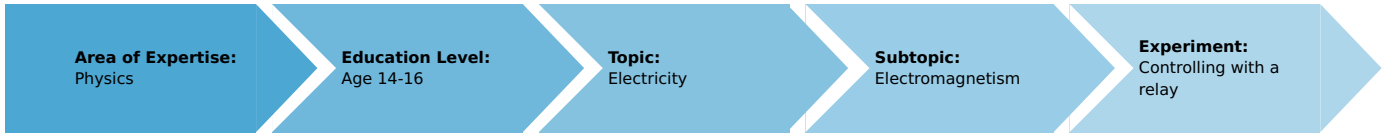


# Controlling with a relay (Item No.: P1398100)

## Curricular Relevance



**Difficulty**



Easy

**Preparation Time**



10 Minutes

**Execution Time**



10 Minutes

**Recommended Group Size**



2 Students

**Additional Requirements:**

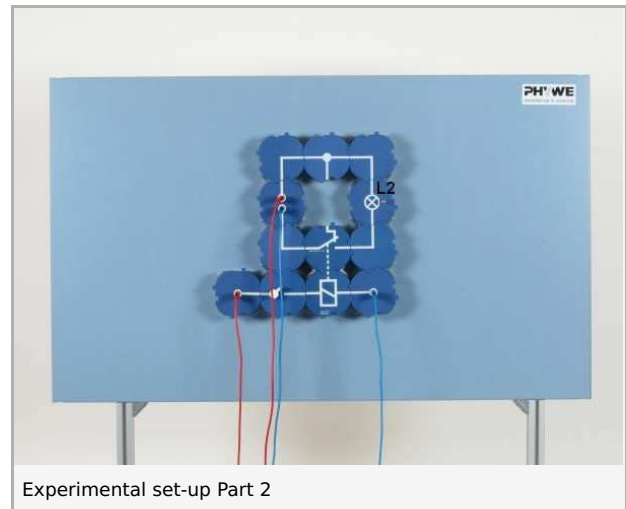
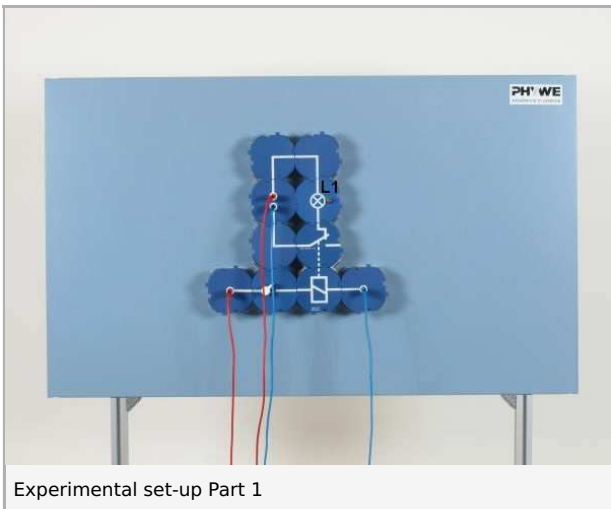
**Experiment Variations:**

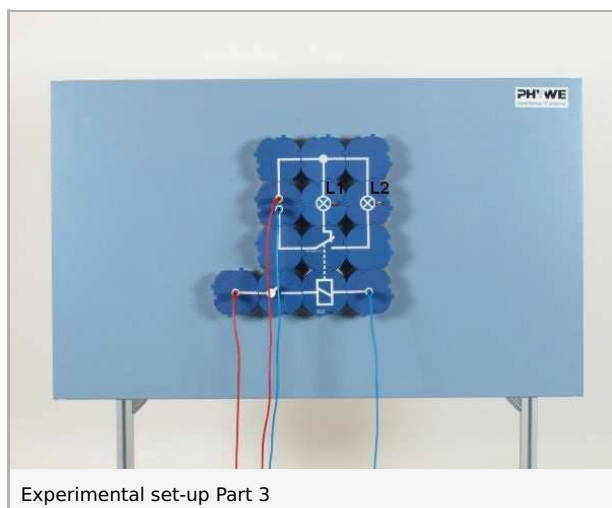
**Keywords:**

## Principle and equipment

### Principle

A demonstration is to be made to show that an electromagnetic relay can be used to open, close and reverse circuits (working circuits).



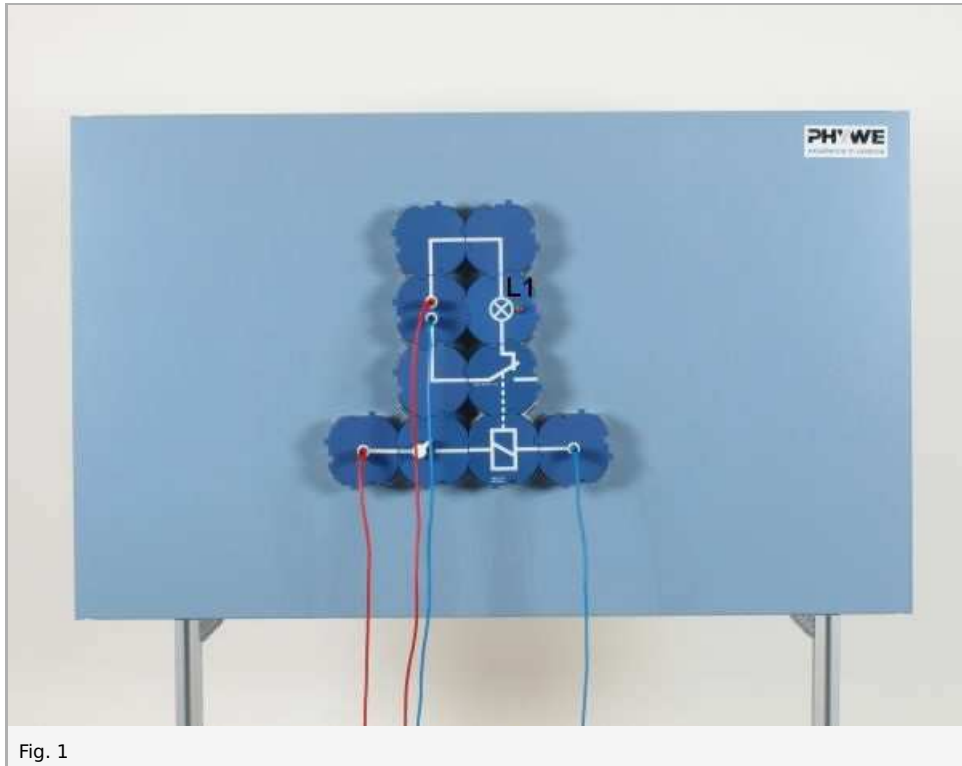


## Equipment

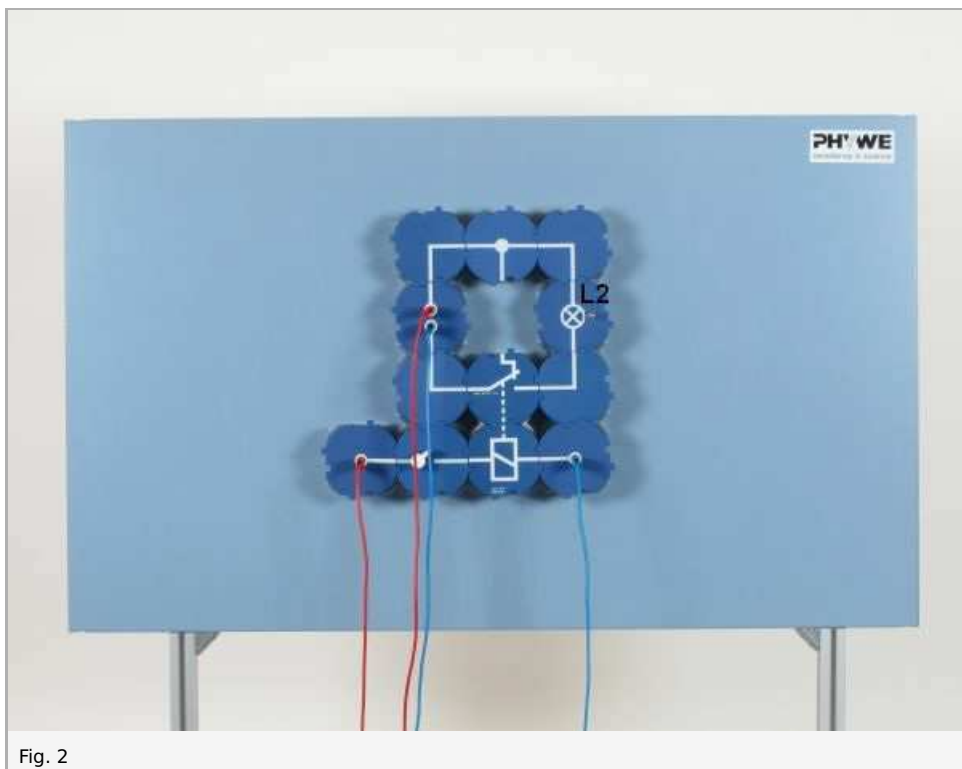
Position No.	Material	Order No.	Quantity
1	PHYWE power supply, universal DC: 0...18 V, 0...5 A / AC: 2/4/6/8/10/12/15 V, 5 A	13500-93	1
2	Demo Physics board with stand	02150-00	1
3	Relay 6 V, module DB	09474-00	1
4	Switch on/off, module DB	09402-01	1
5	Socket for incandescent lamp E10 ,module DB	09404-00	2
6	Connector interrupted, module DB	09401-04	1
7	Junction, module DB	09401-10	2
8	Electr.symbols f.demo-board,12pcs	02154-03	1
9	Connector, angled, module DB	09401-02	4
10	Connector, T-shaped, module DB	09401-03	1
11	Filament lamp 6 V/3 W, E10, 10 pcs.	35673-03	1
12	Connecting cord, 32 A, 1000 mm, red	07363-01	2
13	Connecting cord, 32 A, 1000 mm, blue	07363-04	2

## Set-up and procedure

- Set up the experiment as shown in Fig. 1 with only one working circuit (with filament lamp L 1); set 6 V- for the control circuit and 6 V- for the working circuit



- Switch on the power supply
- Repeatedly close and open the control circuit while observing filament lamp L 1 (1)
- Interrupt control circuit 1 by removing filament lamp L 1; set up working circuit 2 with filament lamp L2 (see Fig. 2)



- Repeatedly close and open the control circuit while observing filament lamp L2 (2)
- Complement the set-up as in Fig. 3

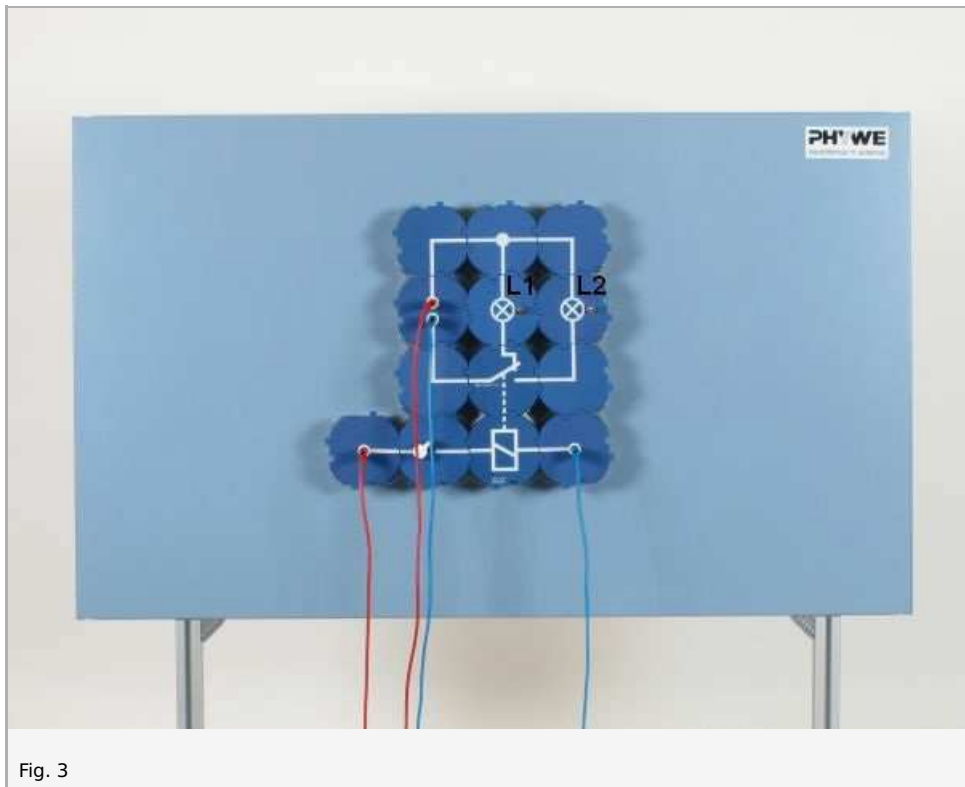


Fig. 3

- Repeatedly close and open the control circuit while observing filament lamps L 1 and L2 (3)

## Observation and evaluation

### Observation

1. Lamp L1 only lights up when the control circuit is open. The working circuit is interrupted when the control circuit is closed and vice versa.
2. Lamp L2 only lights up when the control circuit is closed. Working circuit 2 is interrupted when the control circuit is interrupted and vice versa.
3. Lamps L1 and L2 light up alternately. Closing and opening the control circuit switches from one working circuit to the other.

### Evaluation

A relay can be used to control a circuit, i.e. a working circuit can be opened and closed by a control circuit. Electromagnetic relays are used, for example, in telephone circuits, street lighting and fire alarms. They make the control of distant and not easily accessible working circuits possible, and so save material and costs.

### Remarks

Relays that have the advantage that they enable high-performance working currents to be switched by weak control currents. Such relays are called protectors. Relays can so control high working voltages with low control voltages. In order that the students can better understand the circuits connected up here, and comprehend the mode of functioning of the reversing relay, as well as become accustomed to the technical terms, we recommend the following prior consideration: The coil of the relay lies between the two contacts of a relay module (R and R' in Fig. 4). The three contacts of the other module belong to the reverse switch of the relay with A as centre contact.

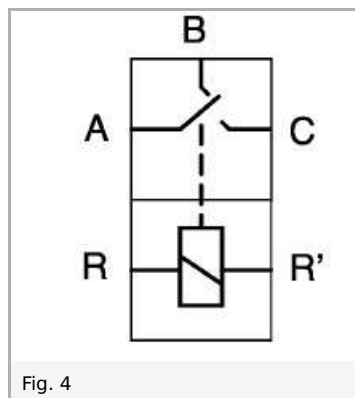


Fig. 4

When the circuit in which the magnet lies - it is called the **CONTROL CIRCUIT**- is not closed, then all connections are so made, as is shown in the print on the relay.

A connection that is closed when the control circuit is open is called an **IDLE CONTACT**; the relay works as **OPENER** of a **WORKING CIRCUIT**.

A connection that is open when the control circuit is open is called a **WORKING CONTACT**; the relay works as **CLOSER** of a **WORKING CIRCUIT**. To further improve the understanding of the functioning of a relay, complete Table 1:

Table 1

The control circuit is	Connection is made between points	Connection is interrupted between points
open	A and B	A and C
closed	A and C	A and B