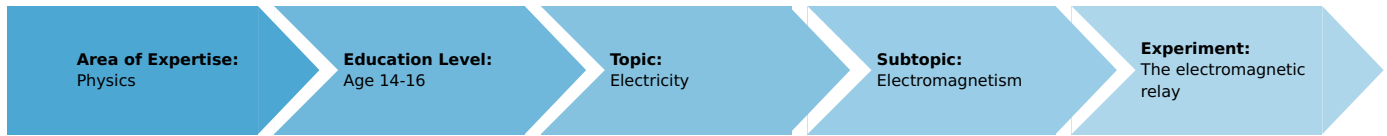


The electromagnetic relay (Item No.: P1398000)

Curricular Relevance



Difficulty



Easy

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

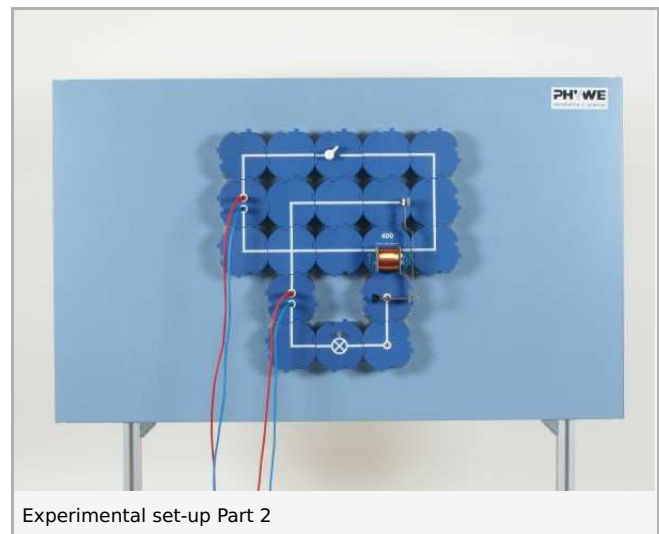
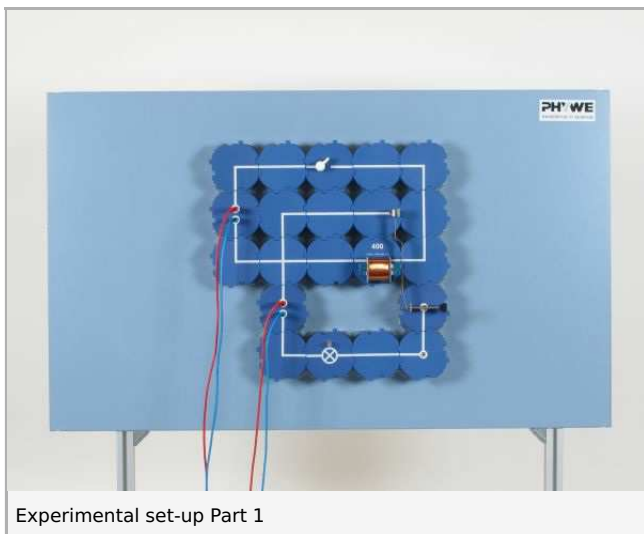
Experiment Variations:

Keywords:

Principle and equipment

Principle

An experimental model of a relay is to be used to demonstrate the construction and mode of action of an electromagnetic relay.



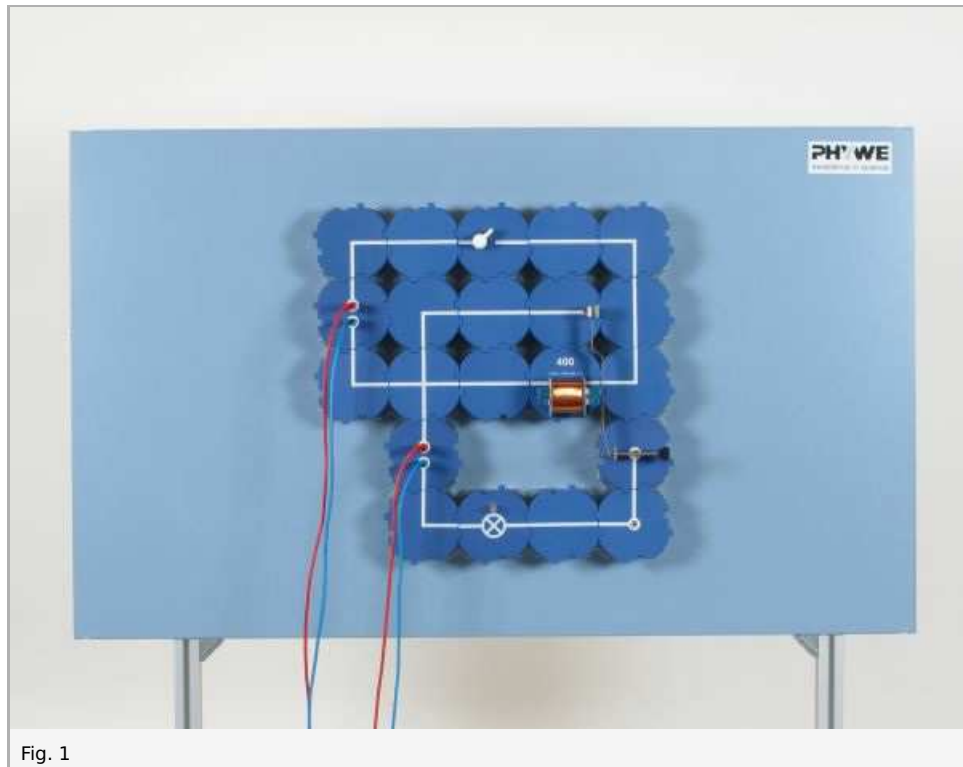
Equipment

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	Coil 400 turns, module DB	09472-01	1
4	Switch on/off, module DB	09402-01	1
5	U-core	07832-00	1
6	Socket for incandescent lamp E10 ,module DB	09404-00	1
7	Connector interrupted, module DB	09401-04	2
8	Junction, module DB	09401-10	1
9	Universal holder,module DB	09403-00	1
10	Contact spring w. armature,mod.DB	09473-00	1
11	Electr.symbols f.demo-board,12pcs	02154-03	1
12	Wire crossing, insulated, module DB	09401-05	1
13	Yoke	07833-00	1
14	Connector, straight, module DB	09401-01	6
15	Connector, angled, module DB	09401-02	6
16	Connect.straight w.socket,mod. DB	09401-11	2
17	Connector, angled with socket, module DB	09401-12	1
18	Contact element,module DB	09473-01	1
19	Filament lamps 12V/0.1A, E10, 10 pieces	07505-03	1
20	Connecting cord, 32 A, 1000 mm, red	07363-01	2
21	Connecting cord, 32 A, 1000 mm, blue	07363-04	2

Set-up and procedure

1st. Experiment

- Set up the experiment as shown in Fig. 1; clamp the armature in the universal holder; push the yoke inside the coil until it is at a distance of about 2 mm from the armature; use the milled screw on the contact element that is attached to the junction building block to make good contact to the contact spring
- Apply about 5 V direct current to the control circuit, and about 12 V alternating voltage to the working circuit
- Switch on the power supply and so close the working circuit
- Repeatedly close and open the switch in the working circuit while observing the contact spring and the filament lamp (1)



2nd. Experiment

- With the switch open and the power supply switched off, change the set-up to that in Fig. 2; leave the armature in the same position and use the milled screw to adjust the contact element so that it is at a distance of approx. 2 mm from the contact spring.
- Switch on the power supply
- Repeatedly close and open the switch (in the control circuit) while observing the contact spring and the filament lamp (2)

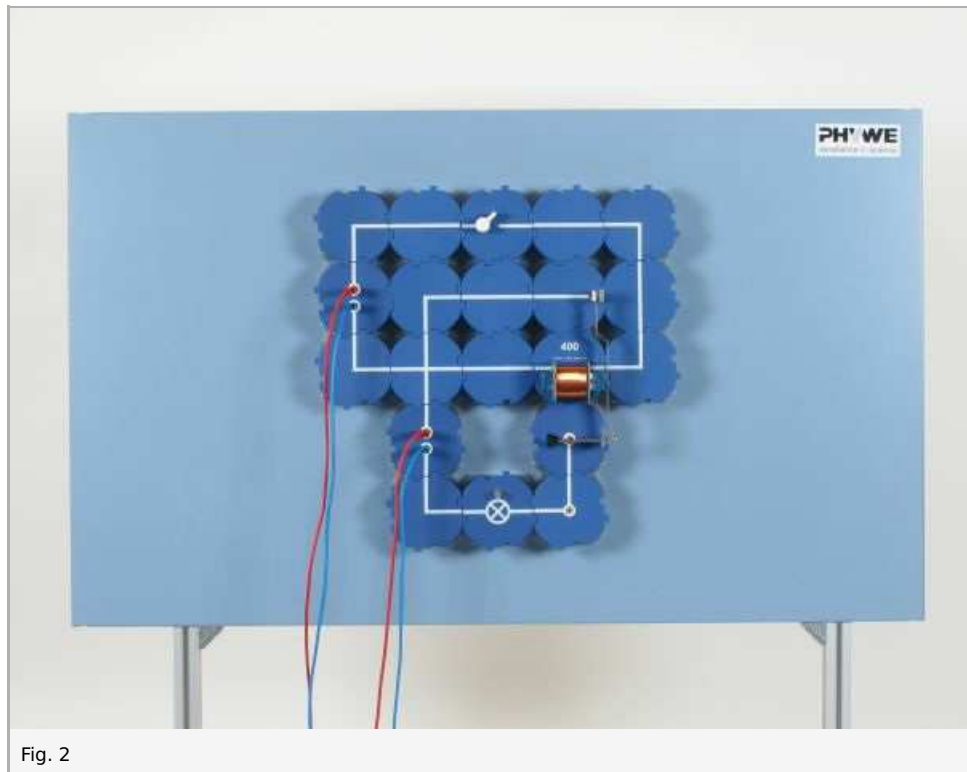


Fig. 2

Observation and evaluation

Observation

1. As long as the switch is closed, the coil attracts the armature and the lamp goes out
2. As long as the switch is closed, the coil attracts the armature and the lamp lights up

Evaluation

One can use a control circuit to open and close a working circuit. Devices that do this are called relays.

Because of their construction and mode of action, the relays used in this experiment are called electromagnetic relays, and the one used in the first case is an idle circuit relay or opener (the contact is the idle contact), and in the second case a working circuit relay or closer (the contact is the working contact).

Relays allow a strong working current to be controlled by a weak control current. This is particularly effective when the working circuit is far away or difficult to access. Advantages of the application of relays are also given by the possibility of switching high working voltages without danger using low control voltages.

Remarks

Relays that are used to switch high working voltages with low control voltages are called protectors. Several working circuits can be simultaneously controlled by correspondingly more complicated relays with several armatures.