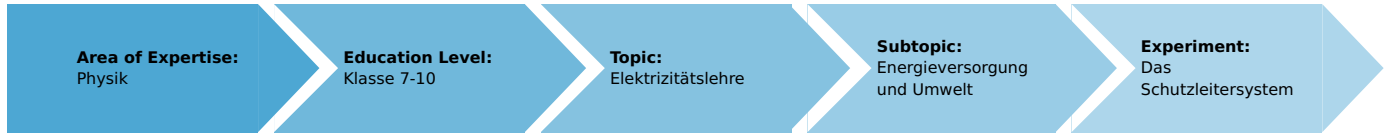


The safety lead system (Item No.: P1377400)

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

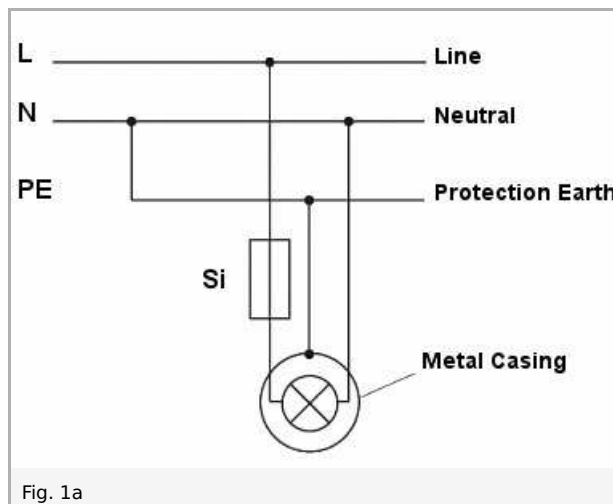
Information for teachers

Additional information

Faulty insulation can result in voltages on parts of appliances that are not intended to carry current. Dangerous voltages occur most frequently on metal casings of electrical appliances. To exclude the possibility of danger to people using such appliances, a safety lead is installed that is connected to the N-lead of the household electric circuit. A short circuit then results when, for example, there is a voltage on the metal casing of an appliance. The safety fuse is triggered.

Notes on setup and procedure

In this setup, the upper lead represents the L-lead and the lower lead the N-lead. The earthing of the N-lead is achieved with a connecting cord. The building block with the lamp socket is so inserted in the circuit, that the thread is connected to the upper lead. A short circuit can then be effected between the socket thread (conductor) and the bell gong (casing). Only iron wire of $d = 2 \text{ mm}$ is to be clamped in as safety fuse model! Suitable precautions must be taken to avoid glowing parts of melted wire causing damage. A small piece of cardboard underneath the wire is generally sufficient. The schematic about the informations above are represented in Fig. 1a.



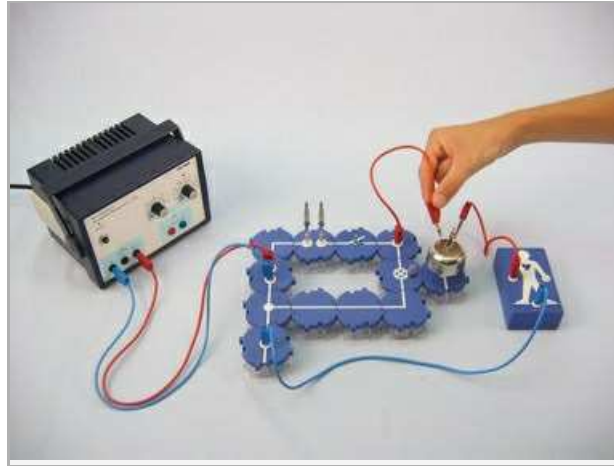
The safety lead system (Item No.: P1377400)

Task and equipment

Task

How is it possible to prevent dangerous voltages from occurring on conductive casings of electrical appliances?

Set up an electric circuit with a safety fuse, switch, filament lamp and casing. Use the person model to examine the function of a safety lead.



Equipment

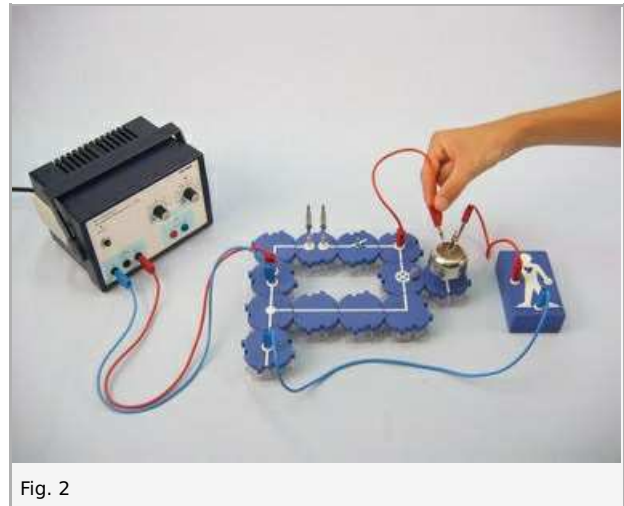
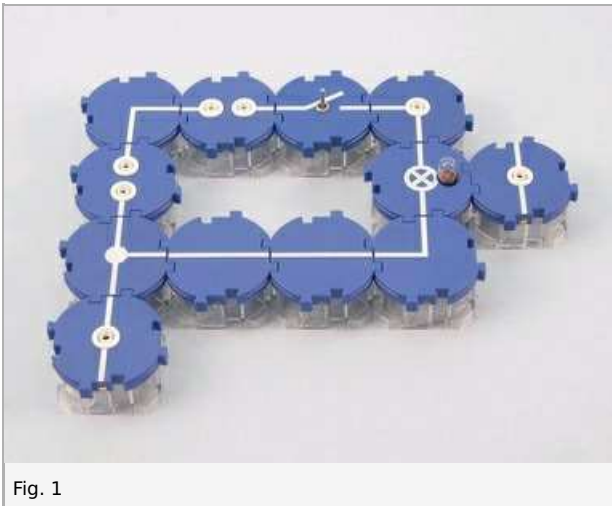


Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	3
2	Angled connector module, SB	05601-02	4
3	T-shaped connector module, SB	05601-03	2
4	Interrupted connector module, SB	05601-04	2
5	Junction module, SB	05601-10	2
6	Angled connector module with socket, SB	05601-12	1
7	On-off switch module, SB	05602-01	1
8	Socket module for incandescent lamp E10, SB	05604-00	1
9	Bell gong on 4-mm-plug	05673-02	1
10	Model person for electrical safety, SB	05680-00	1
11	Alligator clips, bare, 10 pcs	07274-03	(3)
12	Connecting plug, 2 pcs.	07278-05	1
13	Connecting cord, 32 A, 250 mm, blue	07360-04	1
14	Connecting cord, 32 A, 250 mm, red	07360-01	1
15	Connecting cord, 32 A, 500 mm, blue	07361-04	2
16	Connecting cord, 32 A, 500 mm, red	07361-01	1
17	Filament lamps 12V/0.1A, E10, 10	07505-03	(1)
18	Iron wire, d = 0.2 mm, l = 100 m	06104-00	500 mm
19	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. Use crocodile clips to clamp the iron wire (safety fuse) across the double plugs. The crocodile clips must not touch each other.
- Insert the lamp socket so that the socket thread is connected to the upper lead.
- Put the bell gong (metal casing of an electrical appliance) on a connector building block with socket.
- Fix one hand of the person model to the screw on the bell gong with a cord and a crocodile clip.

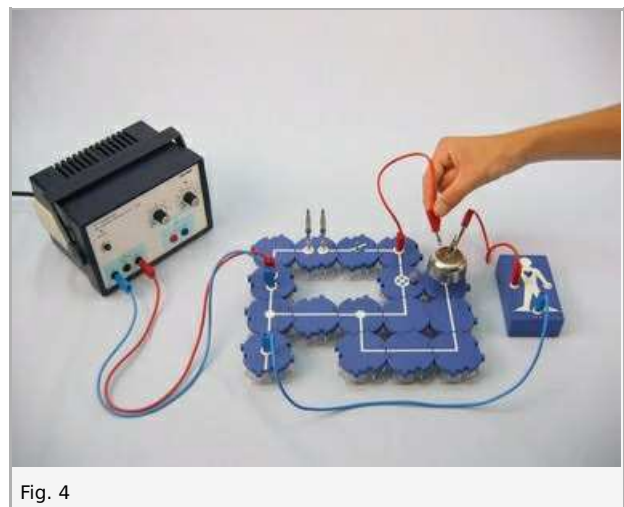


Procedure

- Close the switch.
- Use a lead to briefly connect (short circuit) the lamp socket and the metal casing.
- Observe the person model and the lamp, record your observations in the report.
- Record any change in the iron wire in the report.
- Change the experiment acc. to Fig. 3 and Fig. 4 and repeat the upper experimental procedure.

Caution! During the short circuiting, do not touch the iron wire!

- Observe the person model and the lamp, record your observations in the report.
- Record any change in the iron wire in the report.



Report: The safety lead system

Result - Observations 1

Note down your observations during the first part of the experiment.

- a) person model and filament lamp
- b) iron wire

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Result - Observations 2

Note down your observations during the second part of the experiment.

- a) person model and filament lamp
- b) iron wire

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Evaluation - Question 1

What is the significance of the connection between the person model and the bell gong in this experiment?

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Evaluation - Question 2

What does the brief connection between the person model and the bell gong represent?

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Evaluation - Question 3

Explain your observations (person model, lamp, fuse) in the experiment without safety lead.

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Evaluation - Question 4

Explain your observations (person model, lamp, fuse) in the experiment with safety lead.

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