

The bimetallic switch (Item No.: P1372300)

Curricular Relevance



Difficulty



Easy

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

- Matches

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional information

A bimetallic strip consists of flat strips of two metals with different thermal expansion coefficients fixed together on each other. When the strip is heated, it bends into the direction of the metal which has the lower thermal expansion coefficient. The bimetallic strip is therefore suitable for opening electric circuits, e.g. in cut-outs, or as an overheating safety switch in electric irons or power supply equipment, or for closing them, e.g. in alarm systems, when the temperature of the surrounding air exceeds a maximum permissible value.

Remarks

The bimetallic switch is a temperature dependent switch. It is nowadays still widely used, although temperature dependent semiconductor sensors have taken over its function in many pieces of equipment and systems.

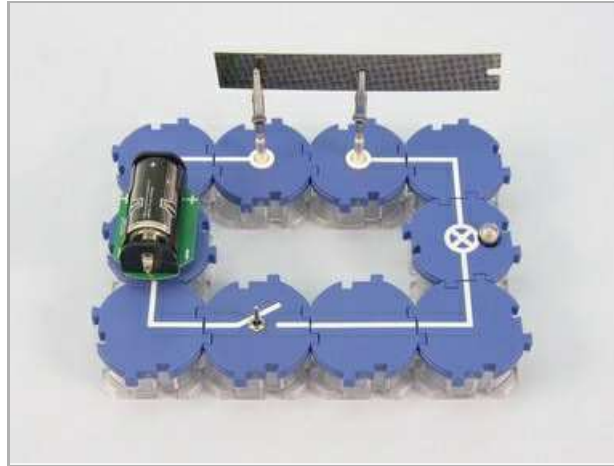
The bimetallic switch (Item No.: P1372300)

Task and equipment

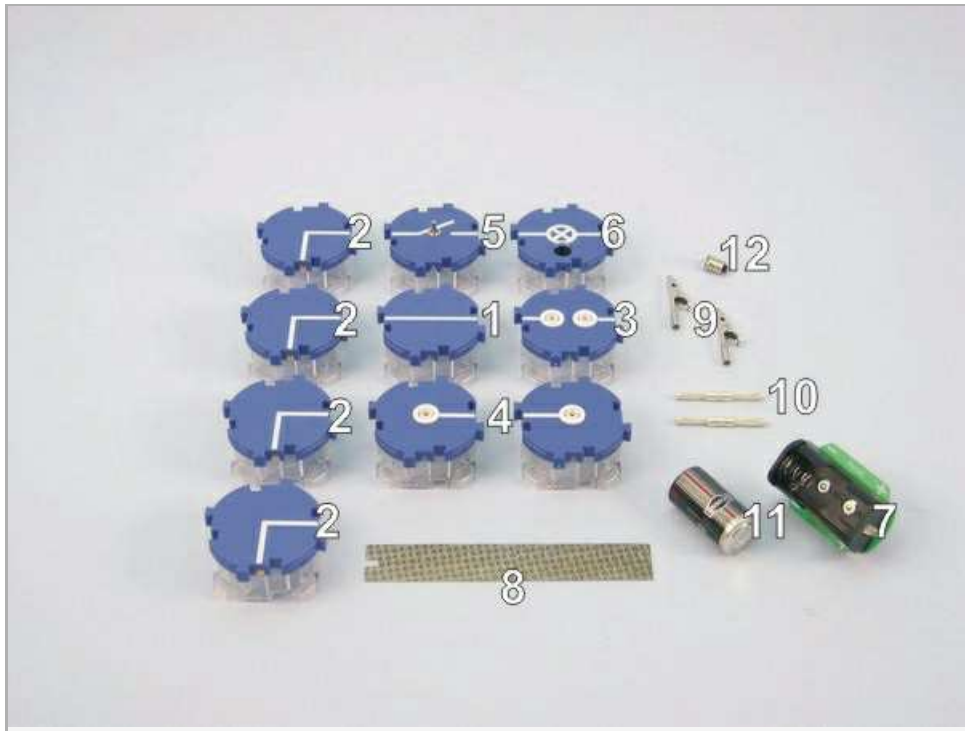
Task

How does a bimetallic switch function?

Connect a bimetallic switch so that it can open or close a circuit.



Equipment



Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	1
2	Angled connector module, SB	05601-02	4
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	1
7	Battery holder module (C type), SB	05605-00	1
8	Bimetal strip	05913-00	1
9	Alligator clips, bare, 10 pcs	07274-03	1
10	Connecting plug, 2 pcs.	07278-05	1
11	Battery cell, 1.5 V, baby size, type C	07922-01	1
12	Filament lamps 1.5V/0.15A,E10,10 pieces	06150-03	1
Additional material			
	Matches		

Set-up and procedure

Set-up

Set up the circuit as shown in Fig. 1. Use the connecting plugs to fit the crocodile clips into the junction module sockets.

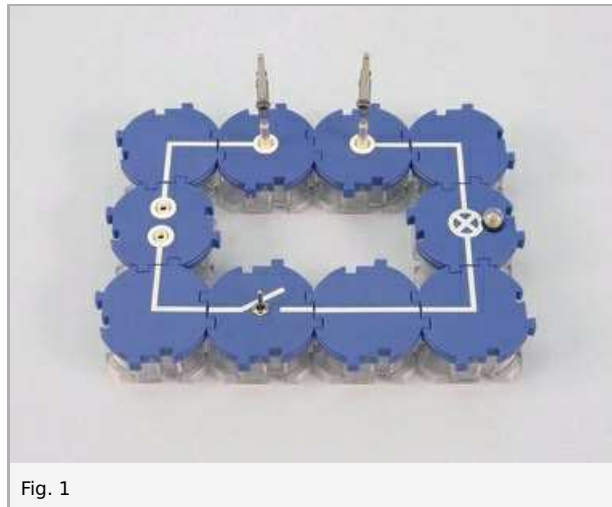


Fig. 1

Hold the bimetallic strip with the right-hand crocodile clip (roughly in the middle of the strip), so that the patterned side is to the front (Fig. 2). The bimetallic strip should touch the left-hand crocodile clamp from behind.

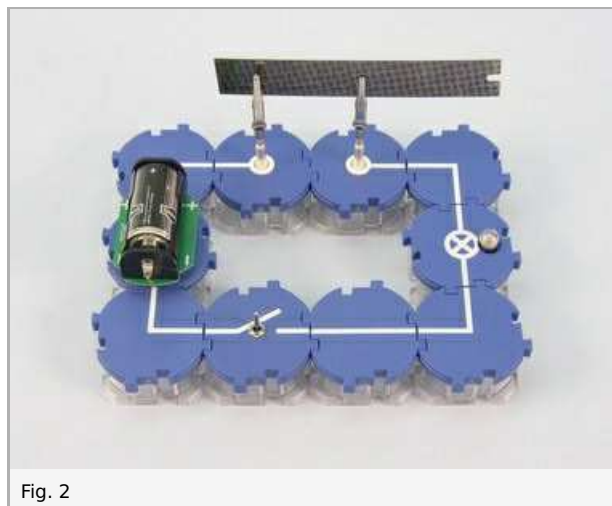


Fig. 2

Plug the battery box with the battery into the socket on the left.

Procedure

First experiment

- Close the switch.
- Use the flame of a match to carefully heat the bimetallic strip in the vicinity of the clamped end, then let it cool.
- Observe the bimetallic strip and the lamp and note your observations in the report.
- If necessary, again heat the bimetallic strip and observe what occurs.

Second experiment

- Open the switch.
- Change the position of the bimetallic strip with respect to the left-hand clip so that the strip is now in front of the left-hand clip, but a distance of about 2 mm away from it (patterned side to the front, as in the first setup).
- Close the switch and carry out the same procedure as previously; note your observations in the report.
- Set the power supply to 0 V and switch it off.

Report: The bimetallic switch

Result - Observations 1

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

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Result - Observations 2

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

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Evaluation - Question 1

The crocodile clips with the bimetallic strip represent a model of a bimetallic switch. What function does the bimetallic strip have in the two parts of the experiment?

- a) In the first part:
- b) In the second part:

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Evaluation - Question 2

Name a practical example for each of the two functions.

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