

Electricity with the Modular System

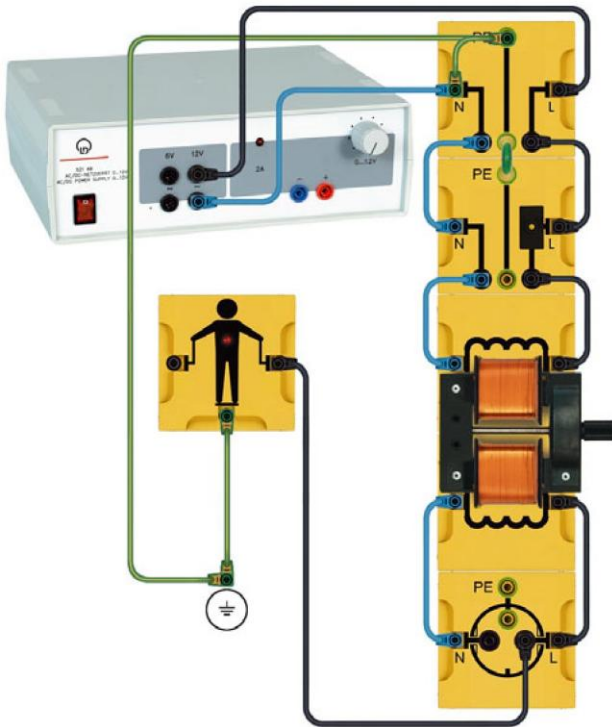
Electrical Safety in the Household
Protective measures

Protective separation

Objective of the experiment

To demonstrate the effect of a protective separation in the event of single-pole and double pole contact.

Setup



Apparatus

1	539 087	Model fuse, BST
1	539 086	Model outlet, BST
1	539 089	Model person, BST
1	539 090	Lead component PE, N, L; BST
2	539 052	Coil holder, BST
2	590 83	Coil, 500 turns
1	593 21	Transformer core, demountable
1	521 49	Power supply, 12 V, AC
3	500 602	Safety connection lead, 10 cm, blue
3	500 604	Safety connection lead, 10 cm, black
1	500 601	Safety connection lead, 10 cm, red
1	500 600	Safety connection lead, 10 cm, yellow/green
1	500 591	Safety bridging plug, yellow/green
1	500 622	Safety connection lead, 50 cm, blue
3	500 624	Safety connection lead, 50 cm, black
2	500 640	Safety connection lead, 1 m, yellow/green
Recommended		
1	Distribution box with earthing socket	

Carrying out the experiment

- Switch on the power supply (12 V, AC).
- Initially, connect one of the model person's hands to the phase conductor (L) and their feet to the earth (single-pole contact).
- Observe the light emitting diode on the model person.
- Remove their feet from the earth and connect the model person's hands to the phase (L) and neutral conductors (N) (double pole contact).
- Observe the light emitting diode on the model person again.
- Earth the secondary winding of the protective transformer to the neutral conductor and repeat the experiment.

Observation

When there is single-pole contact, the light emitting diode on the model person doesn't light up. When there is double-pole contact, the light emitting diode does light up and a current flows through the human body.

If the secondary winding is earthed to the neutral conductor, a current flows through the human body with both single-pole and double pole contact.

Evaluation

In the event of a protective separation, electrical equipment and installations are galvanically separated from the household wiring and not earthed on the secondary side.

Single-pole contact to the phase conductor is then possible with no danger to a human being.

However, the double-pole contact between phase and neutral conductors is still lethal.

In the household, a protective separation is used, as is the case in a shaver outlet.

Improper insulation of the phase conductor in an electric shaver would not be fatal.