

Electricity with the Modular System

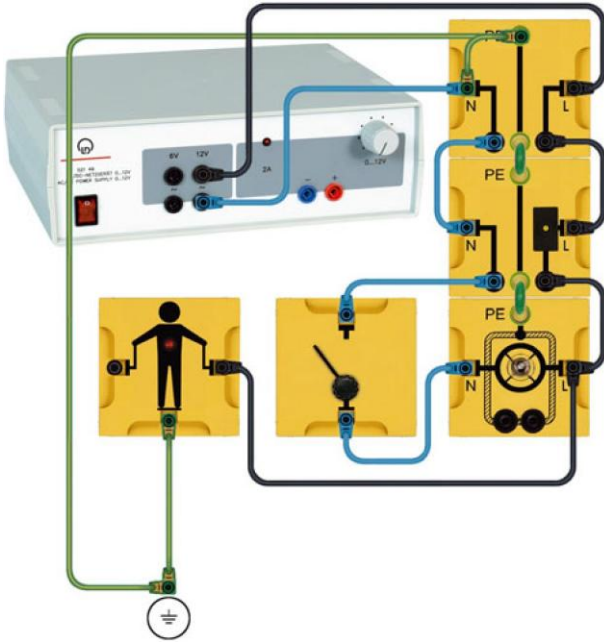
Electrical Safety in the Household
Household installations and electrical safety

Light switch in the household circuit

Objective of the experiment

To investigate electrical safety when installing a switch in the circuit.

Setup



Apparatus

1	539 087	Model fuse, BST
1	539 088	Load with housing, BST
1	539 089	Model person, BST
1	539 090	Lead component PE, N, L; BST
1	539 025	Toggle switch, BST
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	500 600	Safety connection lead, 10 cm, yellow/green
2	500 591	Safety bridging plugs, yellow/green
1	500 622	Safety connection lead, 50 cm, blue
2	500 624	Safety connection lead, 50 cm, black
2	500 640	Safety connection lead, 1 m, yellow/green
Recommended		
1	502 04	Distribution box with earthing socket

Carrying out the experiment

- Install the toggle switch in the neutral conductor (N) as shown in the picture.
- Switch on the power supply (12 V, AC).
- Initially, connect one of the model person's hands (keeping their feet earthed) to the phase conductor (L) and then to the load's neutral conductor (N).
- Observe the light emitting diode on the model person.
- Trip the fuse by causing a short circuit on the circuit breaker and repeat the experiment.
- Install the toggle switch in the phase conductor (L) and close the circuit again by pushing the button on the fuse.
- Now repeat the previous step, this time connecting one of the model person's hands first to the phase conductor (L), then to the load's neutral conductor (N) (still keeping their feet earthed).
- Observe the light emitting diode on the model person.

Observation

Toggle switch in the neutral conductor

The lamp can be switched on and off with the toggle switch.

When switched on, a current flows through the human body when touching the phase conductor.

When switched off, a current flow is observed when touching both the neutral and phase conductors.

After triggering the fuse, it is possible to safely touch the neutral and phase conductors when the toggle switch is both on and off.

Toggle switch in the phase conductor

The lamp can be switched on and off with the toggle switch.

When switched on, a current flows through the human body when touching the phase conductor.

When switched off, there is no current flow when touching the phase conductor or the neutral conductor.

Evaluation

When an electrical installation in the household is properly carried out, the electrical switch is always on the phase conductor. This also complies with current regulations.

When the switch is off, it is not dangerous (for example, a lamp change would be harmless to people).

One should not count on a professionally carried out electrical installation, particularly in old buildings.

In the event of a switch incorrectly mounted on the neutral conductor, contact with the phase or neutral conductor when the switch is off would cause a fatally dangerous current flow through the human body. Therefore, even in the event of a lamp change, the circuit should be interrupted at the circuit breaker and repairs on the domestic electrical installation should be made only by a professional.