

# Electricity with the Modular System

## Single-pole contact

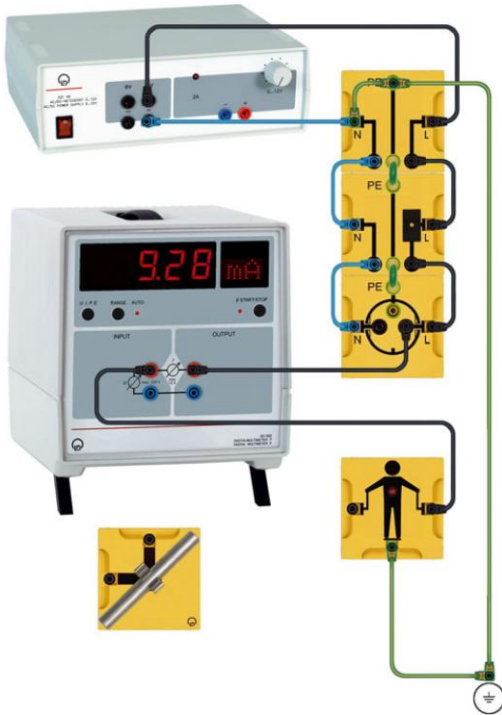
Electrical Safety in the Household

*The human being in an electrical circuit*

### Objective of the experiment

To demonstrate an electric shock in the event of single-pole contact with a wall outlet or water pipe.

### Setup



### Apparatus

1	539 087	Model fuse, BST
1	539 086	Model outlet, BST
1	539 090	Lead component PE, N, L; BST
1	539 005	Connector block, 90° angle with socket, BST
1	300 40	Stand rod, 100 mm
1	590 02	Small clip plug
1	from 501 868	Croc-clips, bare
1	531 832	Digital multimeter P
1	521 49	Power supply, 12 V, AC
2	500 602	Safety connection lead, 10 cm, blue
2	500 604	Safety connection lead, 10 cm, black
1	500 600	Safety connection lead, 10 cm, yellow/green
2	500 59 101	Safety bridging plugs, 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	502 04	Distribution box with earthing socket

### Carrying out the experiment

- Switch on the power supply (12 V, AC).
- Connect one of the model person's hands (539 089) to the outlet's phase conductor (L) using the digital multimeter P. Connect feet to earth (e.g. an earthing socket on the teacher's desk or a distribution box).
- Observe the light emitting diode on the model person and the fuse.
- Read the current from on digital multimeter P.
- Connect one of the model person's hands (539 089) to the outlet's neutral conductor (N) using the digital multimeter P. Connect feet with earth again (e.g. an earthing socket on the distribution box).
- Observe the light emitting diode on the model person and the fuse.
- Read the current on the digital multimeter P.
- Connect the stand rod to earth.
- Connect one of the model person's hands (539 089) to the outlet's phase conductor (L) using the digital multimeter P. Connect the other hand to the earthed stand rod (representing a water pipe).
- Observe the light emitting diode on the model person and the fuse.

### Observation

The light emitting diode lights up when the model person is simultaneously connected to the wall outlet's phase conductor and earth (e.g. a water pipe). The fuse does not trip. A current of approx. 10 mA flows through the model person.

### Evaluation

Single-pole contact occurs when a person is simultaneously connected to the phase conductor and earth (e.g. the floor, a water pipe or a heating pipe).

When simultaneously touching a phase conductor and earth, the person closes the circuit.

In this experimental example, a current of about 10 mA flows through the human body.

In this case, we are referring to an "electric shock" (as in the double-pole contact).

Since the fuse only interrupts the circuit in the event of high currents, it provides no protection to the person in this case.

The same is true for single-pole contact in the household (230 V).

Note:

However, the single-pole voltage tester, for example, is based on the principle of single-pole contact. If the probe is in contact with a live conductor, the current first flows through a resistor and a neon lamp, then the human body, then down to earth. Pole tester resistance is set high enough that the current is very small and poses no real danger to humans.