

Electricity with the Modular System

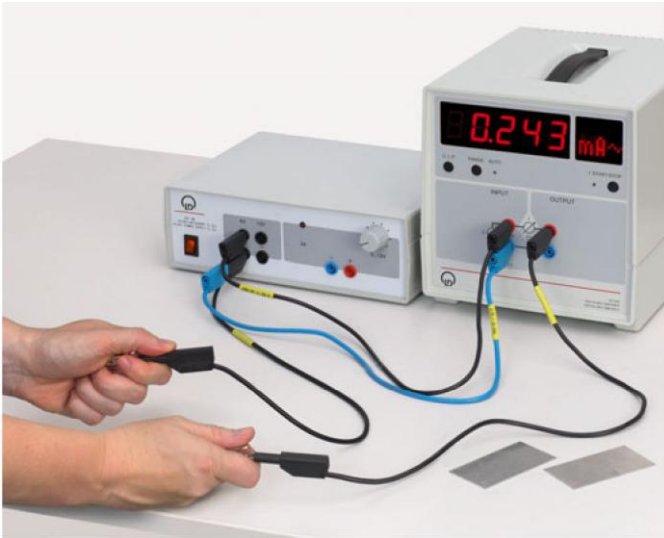
Electrical Safety in the Household
The human being in an electrical circuit

Current flow through the human body

Objective of the experiment

To investigate the relationship between current and voltage, skin moisture, and contact area when touching both poles of a voltage source.

Setup



Apparatus

2	from	591 57	Plate electrodes, Al
2	from	501 861	Croc-clips
1		521 49	Power supply, 12 V, AC
1		531 832	Digital multimeter P
1		500 622	Safety connection lead, 50 cm, blue
3		500 624	Safety connection lead, 50 cm, black

Carrying out the experiment

- Switch on the power supply (12 V, AC) and read the voltage on the digital multimeter.
- Using the U , I , P button, adjust the 0,0 μ A measuring range on the digital multimeter.
- Hold the crocodile clips firmly with your hands.
- Read the current on the digital multimeter P and enter it into the table.
- Reduce the voltage by replugging the connection leads at the power supply to 6 V, AC and repeat the measurement.
- Moisten your hands and repeat the measurement.
- Dry your hands.
- Connect the alligator clips to the plate electrodes and hold them firmly with your hands.
- Read the current on the digital multimeter P and enter it into the table.

Measurement results

Hands	Voltage U / V	Current I / mA
dry	12	0.5
	6	0.2
moist	6	0.4
dry with plate electrodes	6	0.6

Evaluation

The current flow through the human body depends on the voltage, skin moisture, and contact area.

- The higher the contact voltage,
 - the moister the skin
- and
- the larger the contact area:
- the higher the current flow through the human body.

Note:

Current	Effect
$I < 0,5 \text{ mA}$	Mostly not perceived
$0,5 \text{ mA} < I < 20 \text{ mA}$	Up to 3 mA tingling sensation on the skin, then painful contractions
$20 \text{ mA} < I < 50 \text{ mA}$	Severe muscle spasms; voltage source cannot be released; cardiac arrhythmia; disturbance of consciousness
$I > 50 \text{ mA}$	Often fatal by ventricular fibrillation (results in unconsciousness and respiratory arrest due to inadequate oxygen supply to the brain)