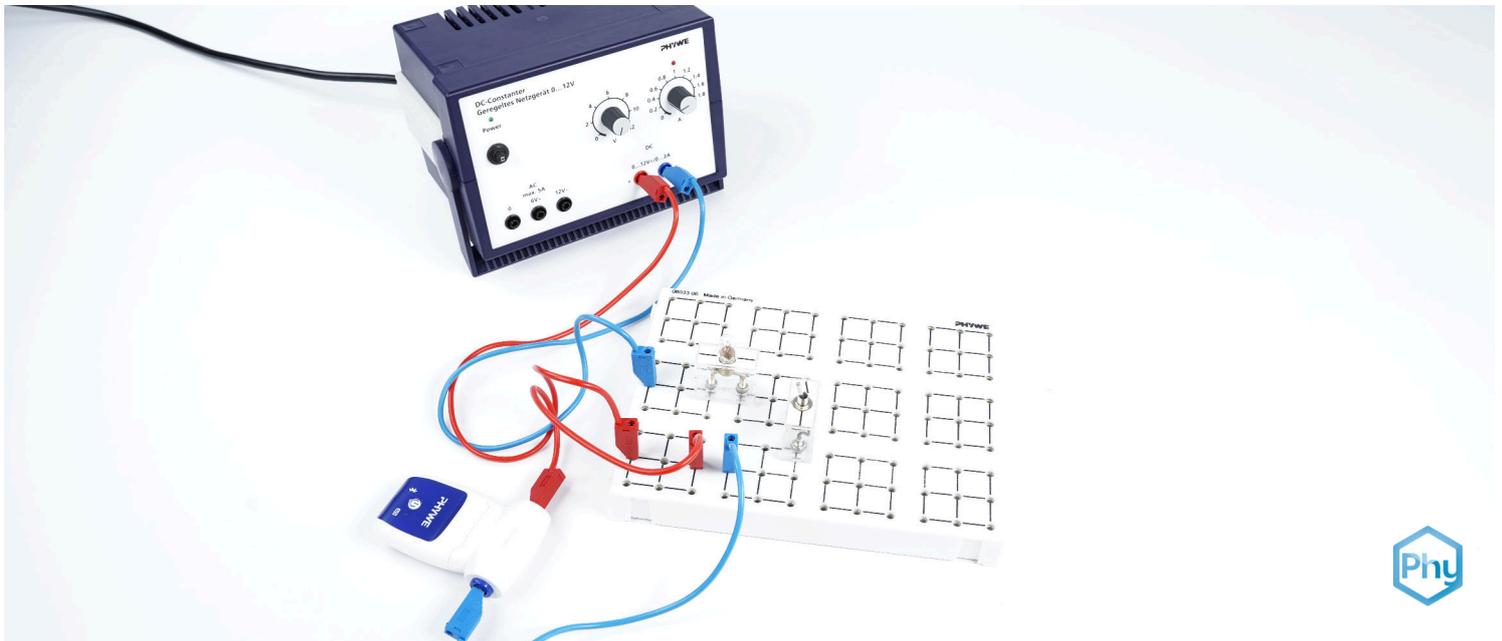


Current measurement with Cobra SMARTsense



Physics

Electricity & Magnetism

Simple circuits, resistors & capacitors



Difficulty level

easy



Group size

2



Preparation time

10 minutes



Execution time

20 minutes

This content can also be found online at:



<https://www.curriculab.de/c/686b7a52d7122b000255f73b>

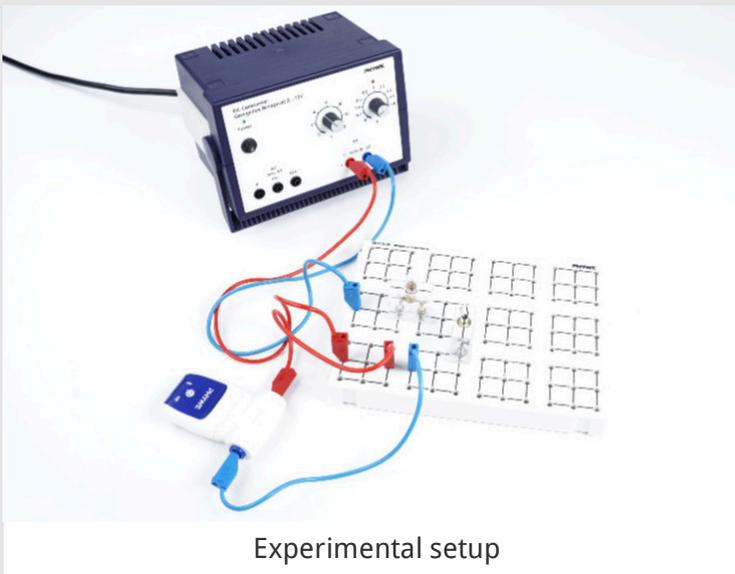
PHYWE



Teacher information

Application

PHYWE



Experimental setup

In this experiment, students learn how to measure one of the most fundamental quantities in electricity: The current. To do this, the students measure how high the amperage is for different voltages and light bulbs.

Other teacher information (1/2)

PHYWE

Prior knowledge



Pupils should be able to build a simple circuit independently and know what a series and parallel circuit is.

Principle



Different mains voltages are applied to a simple circuit, and the current through a light bulb connected in series is measured. To prevent the bulbs from breaking, they must always be replaced when the voltage is increased.

Other teacher information (2/2)

PHYWE

Learning objective



Students should be able to measure the current independently using the Cobra SMARTsense Current.

Tasks



Firstly, the students should set up the circuit according to the circuit diagram and the pictures. Then they measure the current for different voltages, repeatedly changing the light bulbs. Finally, they should observe what current is measured when the circuit is interrupted.

Safety instructions

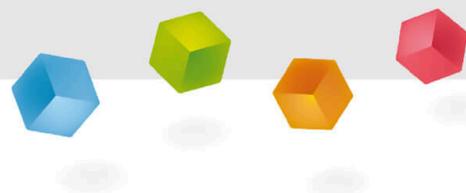
PHYWE



The general instructions for safe working in science lessons apply.

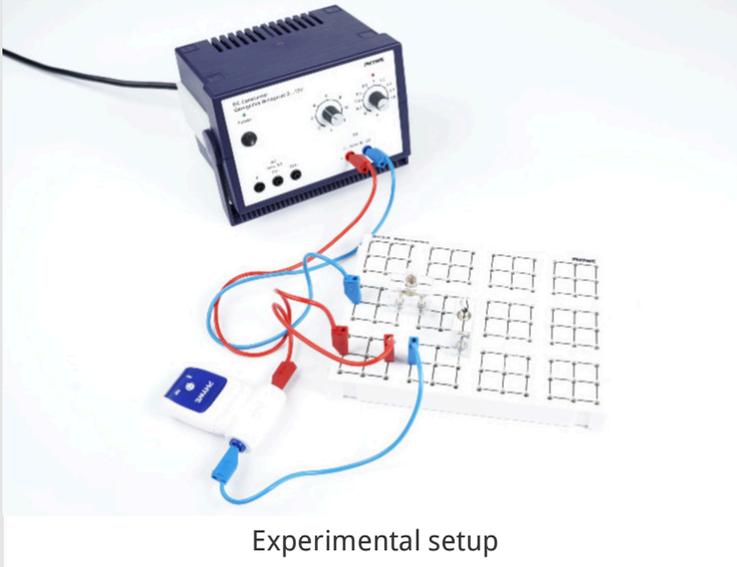
PHYWE

Student information



Motivation

PHYWE



Experimental setup

In everyday life, we encounter many devices that run on electricity — from mobile phones to coffee machines. But how much electric current is actually flowing? And how can you find out?

In this experiment, you'll learn how to measure electric current. You'll discover why it's important to set up an electrical circuit correctly — and how to connect a measuring device the right way.

Tasks

PHYWE



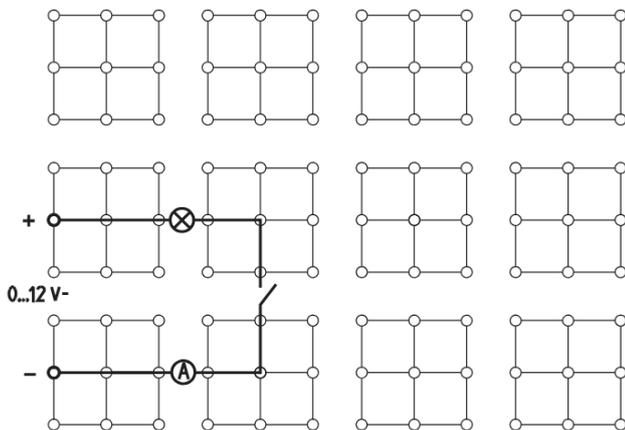
1. Build the circuit according to the circuit diagrams and pictures
2. Connect the Cobra SMARTsense Current to the measureApp
3. Measure the current for different mains voltages. Change the light bulbs for the appropriate voltages.
4. Observe the current strength of an interrupted circuit

Equipment

Position	Material	Item No.	Quantity
1	Cobra SMARTsense Current - Sensor for measuring electrical current \pm 1 A (Bluetooth + USB)	12902-02	1
2	Plug-in board, for 4 mm plugs	06033-00	1
3	on-off switch, G1	39139-00	1
4	Lampholder E10, case G1	17049-00	1
5	Connecting cord, 19 A, 25cm, red	07313-01	2
6	Connecting cord, 19 A, 25cm, blue	07313-04	2
7	Filament lamps 4V/0.08A, E10, 10	06154-03	1
8	Filament lamp 6 V/3 W, E10, 10 pcs.	35673-03	1
9	Filament lamps 12V/0.1A, E10, 10 pieces	07505-03	1
10	PHYWE Power supply, 230 V, DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1

Setup (1/4)

PHYWE



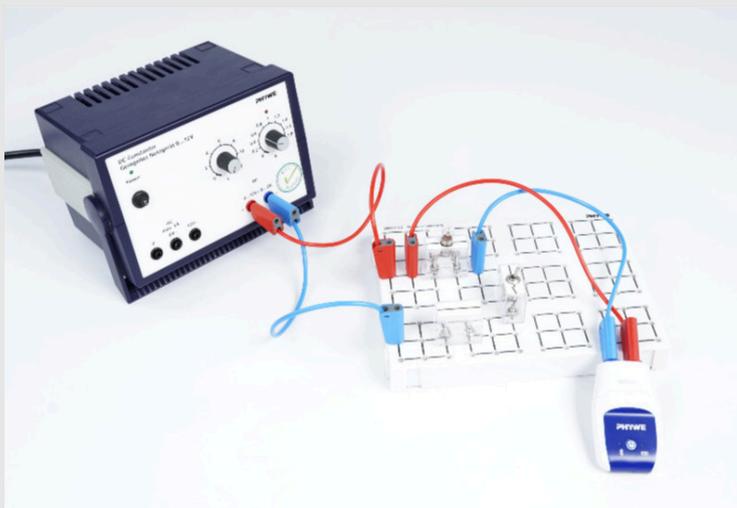
Circuit diagram of the experiment



- Build the circuit as shown in the sketch on the left. The Cobra SMARTsense Current is marked here by a circled A.
- When connecting the Cobra SMARTsense Current, make sure that the red connection is connected to the side of the lamp that is closer to the positive pole. The blue connection should be connected closer to the negative pole. It is best to use uniform cable colours (red for plus, blue for minus) to avoid confusion. You can see what the whole thing looks like when it is assembled by pressing the blue button.

Setup (2/4)

PHYWE



Experimental setup

- Make sure that the light bulb for 4 V is installed. You can recognise this by the fact that this value is engraved on the bulb.
- Now switch on the Cobra SMARTsense by pressing the on/off button for three seconds.

Setup (3/4)

PHYWE

To measure with the **Cobra SMARTsense sensors**, the **PHYWE measureAPP** is required. The app can be downloaded free of charge from the respective app store (QR codes below). Please check that **Bluetooth is enabled** on your device (smartphone, tablet, desktop PC) before starting the app.



iOS



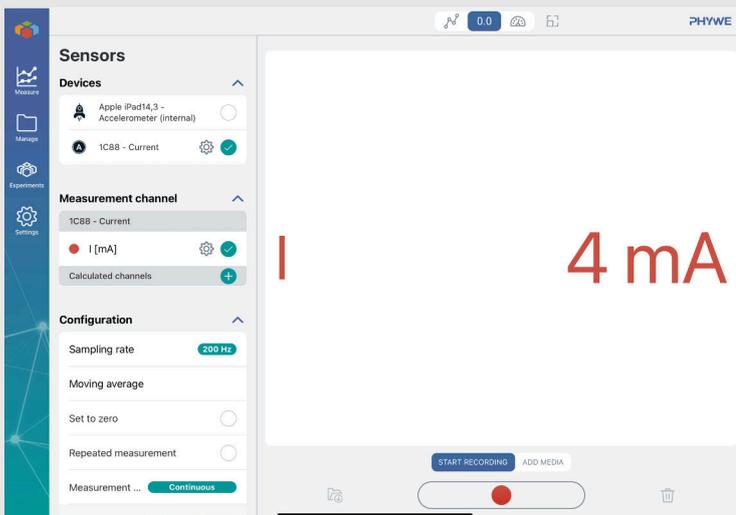
Android



Windows

Setup (4/4)

PHYWE

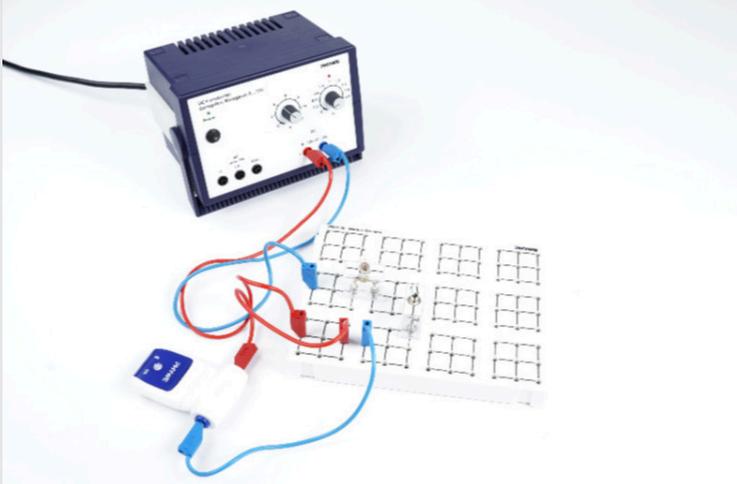


Example screenshot

- Now open the measureAPP and connect to the Cobra SMARTsense Current by clicking on the name.
- Press "0.0" at the top of the app to display the measured values as digitals.
- Even if the power supply unit has been switched off until now, you may still see fluctuating measurement results. This is due to the measurement errors of the measuring device. These always occur and must be taken into account for particularly accurate measurements. Today, however, you can ignore them.

Procedure (1/4)

PHYWE

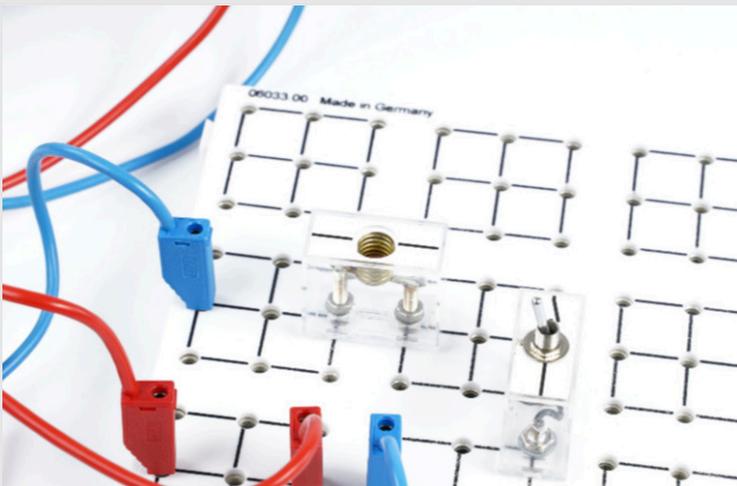


Experimental setup

- Switch on the power supply unit while the rotary head for the voltage is set to 0 V.
- Now slowly turn the rotary knob to 4 V and then note the measured current in Table 1 in the report section.

Procedure (2/4)

PHYWE

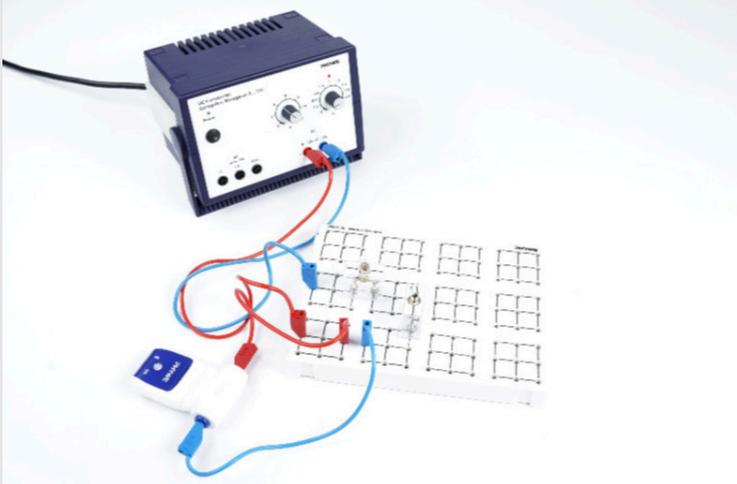


Socket without lamp

- Turn the voltage back to 0 V and switch off the power supply unit.
- Unscrew the light bulb from the socket and replace it with a 6 V-light bulb.
- Switch the power supply on again, screw the voltage up to 6 V and note the measured current in Table 1 in the report section.

Procedure (3/4)

PHYWE

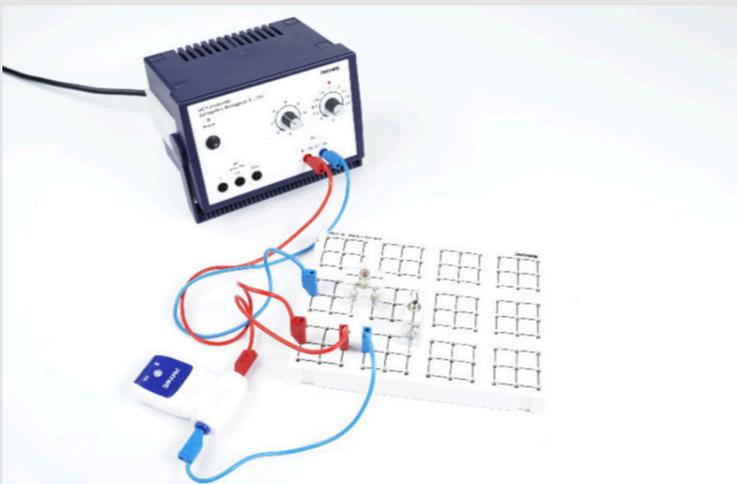


Experimental setup

- Repeat the steps from the last slide, but this time with a 12 V light bulb.
- Turn up the voltage accordingly at the end 12 V.
- Note down the measured current again.

Procedure (4/4)

PHYWE



Experimental setup

- Now interrupt the circuit by closing the switch.
- What current do you measure?

PHYWE



Report

Table 1

PHYWE

Under the respective mains voltages, note the current in milliamperes (mA) that you measured at the lamp.

4 V

6 V

12 V

--	--	--

How must the measuring device be installed in the circuit? 

The ammeter must be installed in parallel with the circuit

It doesn't matter

The ammeter must be installed in the circuit (in series with the electrical device).

Task 1

PHYWE

Tick the correct answers

- The measuring device must have the current flowing through it that it is to measure
- The polarity does not matter when the measuring device is connected.
- The circuit may also be interrupted in order to measure the current.
- Pay attention to the polarity when connecting the measuring device.

[Check](#)

Slide	Score/Total
Slide 19: Installation of the ammeter	0/1
Slide 20: Tick the correct answers	0/2

Total amount  0/3[Solutions](#)[Repeat](#)[Export text](#)