

# Resistance measurement

## Student Group

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# Resistance measurement

## Background Information

Procedure for resistance measurement: \* Set the measuring device to resistance measurement \* Connect the resistance to be measured to the corresponding sockets on the measuring device (the measuring device sockets labeled COM and  $\Omega$ ) \* Read the measured value There are different types of resistance measurement: \* **direct** resistance measurement \* **indirect** resistance measurement The resistances can also be determined by measuring the current/voltage. **Ohm's law:** **In an electrical circuit, the current increases with increasing voltage and decreases with increasing resistance.**

$$I = \frac{U}{R}$$

## Experimental Tasks

### Direct resistance measurement

Determine the nominal and measured values of the resistance for  $R_{\text{1}}$  (brown, green, orange),  $R_{\text{2}}$  (yellow, violet, red),  $R_{\text{3}}$  (red, violet, red) and the incandescent lamp  $R_{\text{L}}$ . Also measure the approximate resistance  $R_{\text{K}}$  of your body from your right to

your left hand.

|                | $R_1$ | $R_2$ | $R_3$ | $R_L$ | $R_K$ |
|----------------|-------|-------|-------|-------|-------|
| nominal value  |       |       |       |       |       |
| measured value |       |       |       |       |       |

Tab. 1: Direct resistance measurement

How do you explain the deviation between  $R_{\text{L,nominal}}$  and  $R_{\text{L,meas}}$ ?

What consequences can  $R_{\text{K}}$  have?

Now determine the series and parallel connections of resistors  $R_{\text{1}}$ ,  $R_{\text{2}}$  and  $R_{\text{3}}$ .

Specify the formulas used:

$$R_{\text{serial}} =$$

$$R_{\text{parallel}} (= R_{\text{a}} \parallel R_{\text{b}}) =$$

|            | $R_1+R_2$ | $R_1+R_3$ | $R_2+R_3$ | $R_1 \parallel R_2$ | $R_1 \parallel R_3$ | $R_2 \parallel R_3$ |
|------------|-----------|-----------|-----------|---------------------|---------------------|---------------------|
| calculated |           |           |           |                     |                     |                     |
| measured   |           |           |           |                     |                     |                     |

Tab. 2: Series and parallel connections

Indirect resistance measurement

Build the measuring circuit shown in [figure 1](#) for each of the three resistors and set the voltage on the power supply to  $\sim 12\text{ V}$ .

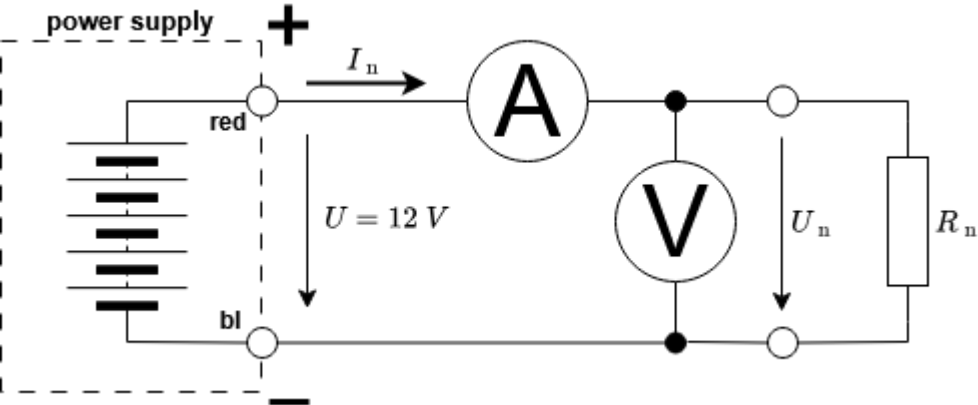


Fig. 1: Indirect resistance measurement Measure  $U_{\text{n}}$  [V] and  $I_{\text{n}}$  [mA]. Calculate  $R_{\text{n}}$  [k $\Omega$ ]

| $I_1$ | $U_1$ | $R_1$ | $I_2$ | $U_2$ | $R_2$ | $I_3$ | $U_3$ | $R_3$ |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|       |       |       |       |       |       |       |       |       |

from these values.

Tab. 3: Indirect resistance measurement

Test Questions - Resistors

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