

# Resistance measurement

## Student Group

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Resistance measurement

Procedure for resistance measurement:

1. Set the measuring device to resistance measurement
2. Connect the resistance to be measured to the corresponding sockets on the measuring device (the measuring device sockets labeled COM and  $\Omega$ )
3. Read the measured value

There are different types of resistance measurement:

- **direct** resistance measurement
- **indirect** resistance measurement

Direct resistance measurement

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

|                | $R_{\rm 1}$ | $R_{\rm 2}$ | $R_{\rm 3}$ | $R_{\rm L}$ | $R_{\rm K}$ |
|----------------|-------------|-------------|-------------|-------------|-------------|
| nominal value  |             |             |             |             |             |
| measured value |             |             |             |             |             |

Tab. 1: Direct resistance measurement

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

What consequences can  $R_K$  have?

Now determine the series and parallel connections of resistors  $R_1$ ,  $R_2$  and  $R_3$ .  
Specify the formulas used:

$R_{\text{serial}} =$

$R_{\text{parallel}} (= R_a || R_b) =$

|            | $R_1+R_2$ | $R_1+R_3$                        | $R_2+R_3$ | $R_1    R_2$ | $R_1    R_3$ | $R_2    R_3$ |
|------------|-----------|----------------------------------|-----------|--------------|--------------|--------------|
| calculated |           |                                  |           |              |              |              |
| measured   |           | Text is not SVG - cannot display |           |              |              |              |

Tab. 2: Series and parallel connections

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.**

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

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

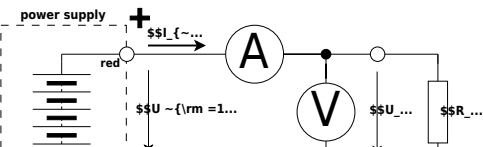


Fig. 1: Indirect resistance measurement

Measure  $U_{\text{n}}$  [V] and  $I_{\text{n}}$  [mA]. Calculate  $R_{\text{n}}$  [k $\Omega$ ] from these values.

| $I_{\text{n}}$ | $U_{\text{n}}$ | $R_{\text{n}}$ | $I_{\text{n}}$ | $U_{\text{n}}$ | $R_{\text{n}}$ | $I_{\text{n}}$ | $U_{\text{n}}$ | $R_{\text{n}}$ |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                |                |                |                |                |                |                |                |                |

Tab. 3: Indirect resistance measurement

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