

# 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 resistor to be measured to the corresponding sockets on the measuring device (the sockets labelled 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  $R_{\text{1}}$  (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 hand to your left hand.

	$R_{\text{1}}$	$R_{\text{2}}$	$R_{\text{3}}$	$R_{\text{L}}$	$R_{\text{K}}$
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 combinations of resistors  $R_{\text{1}}$ ,  $R_{\text{2}}$  and  $R_{\text{3}}$ .

State the formulae used:

$$R_{\text{series}} = R_{\text{a}} + R_{\text{b}}$$

$$R_{\text{parallel}} = R_{\text{a}} \parallel R_{\text{b}} = \frac{R_{\text{a}} \cdot R_{\text{b}}}{R_{\text{a}} + R_{\text{b}}}$$

	R1+R2	R1+R3	R2+R3	R1    R2	R1    R3	R2    R3
calculated						
measured						

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Tab. 2: Series and parallel combinations

### Indirect resistance measurement

Resistance can also be determined by measuring current and 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 measurement circuit shown in [figure 1](#) for each of the three resistors and set the voltage on the power supply to  $12 \text{ V}$ .

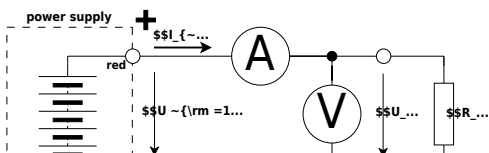
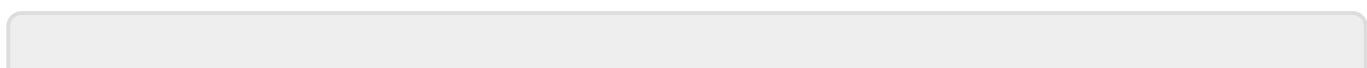


Fig. 1: Indirect resistance measurement

Measure  $U_{\text{n}}$  and  $I_{\text{n}}$ . Calculate  $R_{\text{n}}$  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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