

# 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  $R_{\text{1}}$  (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.

	$R_{\text{1}}$	$R_{\text{2}}$	$R_{\text{3}}$	$R_{\text{L}}$	$R_{\text{K}}$
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  $R_K$  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						

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

$I_{\text{r}1}$	$U_{\text{r}1}$	$R_{\text{r}1}$	$I_{\text{r}2}$	$U_{\text{r}2}$	$R_{\text{r}2}$	$I_{\text{r}3}$	$U_{\text{r}3}$	$R_{\text{r}3}$

Tab. 3: Indirect resistance measurement

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