Resistance measurement

Student Group

First Name	Surname	Matrikel Nr.

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Resistance measurement

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 Ω
- 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.

Tab. 1: Direct resistance measurement

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

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

Now determine the series and parallel connections of resistors $R_{\rm 1}$, $R_{\rm 2}$ and $R_{\rm 3}$.
Specify the formulas used:

$R_{\rm serial}$ =

$R_{\rm parallel}$ (= $R_{\rm a}$ || $R_{\rm b}$) =

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 $~{\rm 12} ~{ V}$.

Fig. 1: Indirect resistance measurement

Measure $U_{\rm n}$ [V] and $I_{\rm n}$ [mA]. Calculate $R_{\rm n}$ [kΩ] from these values.

Tab. 3: Indirect resistance measurement