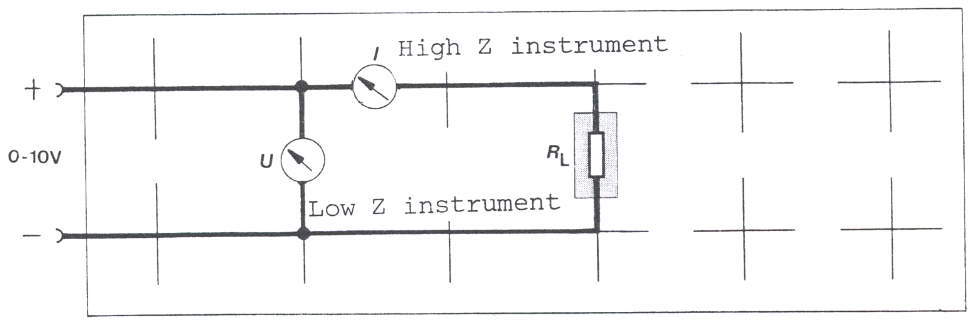
Ohm’s Law

Aim of the experiment

Measuring the currents through different load resistors R_L as a function of the applied voltage

Circuit



Equipment and components

1 Rastered socket panel

1 Resistor R_{L1}, 10 kΩ

1 Resistor R_{L2}, 100 kΩ

1 Resistor R_{L3}, 470 kΩ

1 Low Z instrument

1 high Z instrument

1 D.C. power supply unit

Bridging plugs

Connecting leads

Conducting the experiment

1. Assemble the measuring circuit.
2. Measure the current for three different resistors R_L as a function of the applied voltage (voltage steps of 1 V), and arrange the measured values in a table. Then draw a graph based on the measured values. Use a high Z instrument when measuring the current.
3. From the graph find the value of the resistor R_L.

U/V	I/mA		
	10 kΩ	100 kΩ	470 kΩ

Slope =

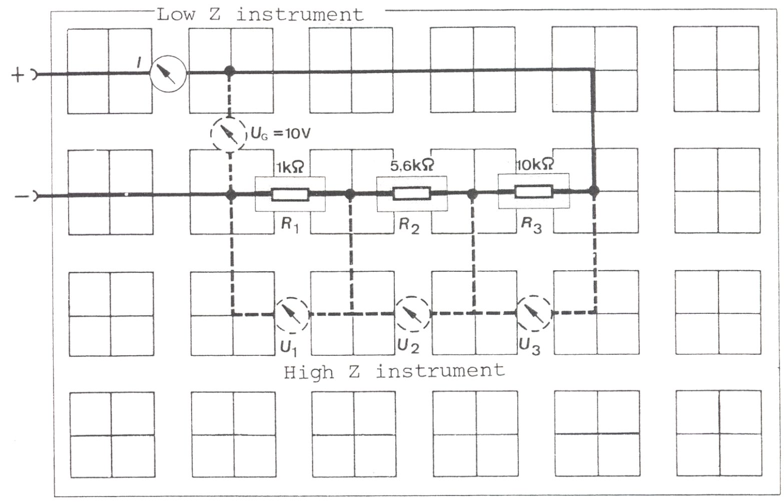
R_L =

Series Connection of Resistors

Aim of the experiment

Measurement of the total voltage U and the voltage drops U_1, U_2, and U_3 across the resistors and the current I flowing through the circuit.

Circuit



Equipment and components

1 Rastered socket panel

1 Resistor R_1, 1 kΩ

1 Resistor R_2, 5.6 kΩ

1 Resistor R_3, 10 kΩ

1 Low Z instrument

1 high Z instrument

1 D.C. power supply unit

Bridging plugs

Connecting leads

Conducting the experiment

1. Assemble the circuit and connect a multi-meter in series for measurement of the current.
2. Adjust U_G = 10 V. Measure all voltages with the high Z instrument. Then measure, one after the other, the voltage drops U_1, U_2 and U_3 across the corresponding resistors R_1, R_2 and R_3.

Total current I_G =

Voltage U_G =

Resistor	Voltage
R_1 = 1 kΩ	
R_2 = 5.6 kΩ	
R_3 = 10 kΩ	

Exercise

- Calculate the total resistance R_G from the law of series connection of resistors; $R_G = R_1 + R_2 + R_3$.

R_G =

- Calculate the total voltage across the resistors $U_{total} = U_1 + U_2 + U_3$ and compare it with U_G .

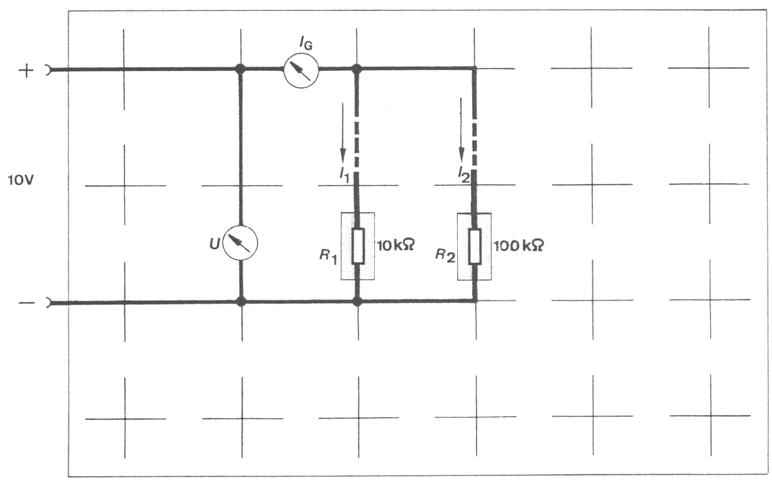
U_{total} =

Parallel Connection of Resistors

Aim of the experiment

Measurement of the current I and the voltage U in a circuit and a number of circuit variations.

Circuit



Equipment and components

1 Rastered socket panel

1 Resistor R_1, 10 kΩ

1 Resistor R_2, 100 kΩ

1 Low Z instrument

1 high Z instrument

1 D.C. power supply unit

Bridging plugs

Connecting leads

Conducting the experiment

3. Assemble the circuit step by step (the single stages are indicated by dotted lines).
4. Measure the current I and the voltage U as given in the table below.

Circuit with	U/V	I/mA	R/kΩ
R_1			
R_2			
$R_G = \frac{R_1 \times R_2}{R_1 + R_2}$			

Exercise

- Enter the resistance values into the table for each of the circuits.
- Calculate the total resistance R_G of the circuit from the law of parallel connection of resistors; $\frac{1}{R_G} = \frac{1}{R_1} + \frac{1}{R_2}$,

$$R_G = \frac{R_1 \times R_2}{R_1 + R_2}$$

R_G =

- Calculate the total current using 1st law of Kirchhoff: $I_G = I_1 + I_2$.

I_G =