Maritime University of Szczecin

Faculty of Marine Engineering

Department of Physics and Chemistry

Physics Laboratory

Laboratory Manual

Verification of Ohm's law for DC (direct current) circuits

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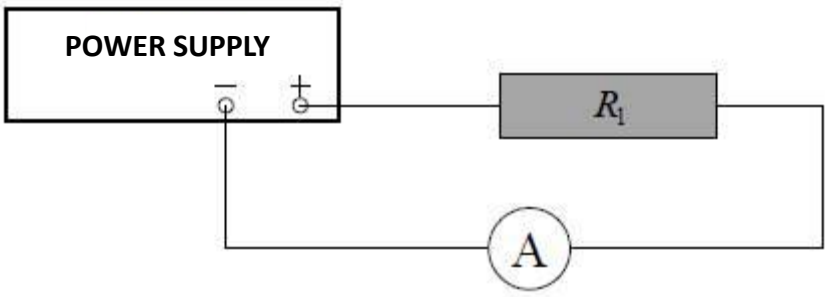
Equipment:

1. DC power supply.
2. Multimeter.
3. Two resistors.

Exercise:

1. Set the CURRENT knob on the power supply to the rightmost position and FINE and VOLTAGE to the most left position.
2. Set multimeter to 200 mA DC range.
3. Connect the circuit according to the diagram:



4. Turn on the power supply.
5. Adjusting the position of fine and voltage knobs set the supply voltage from U_{MIN} = 1 V to U_{MAX} = 10 V increasing by 1V. Record the voltage values displayed on the power supply and current values indicated by the ammeter.
6. Set the voltage U = 0 V. Turn off the power supply and the multimeter.
7. Repeat steps 2 – 6 using:
    a. resistor R_2,
    b. resistors R_1 and R_2 connected in series,
    c. resistors R_1 and R_2 connected in parallel,

    instead of resistor R_1.
8. In one graph present the dependence of *I* on *U* for all examined systems.
9. Applying the linear regression method:

$$I = \frac{1}{R} \cdot U$$

$$y = a \cdot x + b$$

find the resistance of individual resistors R_1 and R_2 as well as the resistance of resistors connected in series R_S and connected in parallel R_R.

10. Using formulas:

$$R'_s = R_1 + R_2,$$

$$R'_R = \frac{R_1 R_2}{R_1 + R_2}$$

calculate the resistance of series and parallel connections. Compare resistance values R'_S and R'_R with values R_S and R_R obtained previously. Write down the conclusions.

Measuring table:

R_1		R_2		R_1 and R_2 connected in series		R_1 and R_2 connected in parallel	
U [V]	I [mA]	U [V]	I [mA]	U [V]	I [mA]	U [V]	I [mA]

R_1 =……..Ω R_2 =……..Ω R_S =……..Ω R_R =……..Ω

R_S ’=……..Ω R_R ’=……..Ω