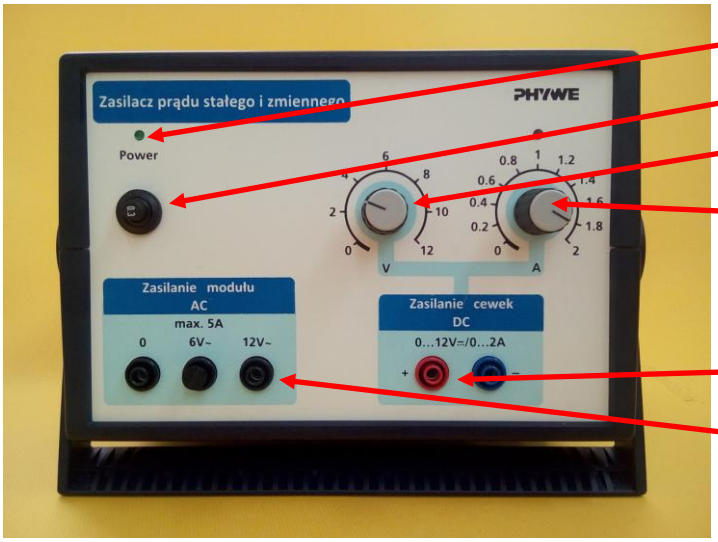
30 – HALL EFFECT IN SEMICONDUCTORS

THE POWER SUPPLY OF THE MEASUREMENT MODULE AND THE COILS (the mains switch is located on the back panel of the device)

The power supply of the measurement module consists of two separate supplying circuits. The first of them is marked "Zasilanie modułu AC" ("AC Power Supply of the Module"). It is used to supply the AC current to the measurement module. The second one is marked as "Zasilanie cewek DC" ("DC Power Supply of the Coils" – it is used to supply the DC current to the coils of the electromagnet that creates magnetic field. The current value (and the related magnetic induction field) can be changed by rotation of the output voltage control knob (within the control range from 0 to 12 V). The maximum output current is 2 A, but it can be limited with the current limit know A. If the diode above this knob is on, it means that the current limit is active – further increase of voltage will not lead to any change of the current.



(1) – "Power ON" diode

(2) – Protective fuse – do not touch!

(3) – DC Voltage control knob (for powering the coils)

(4) – Current limit on the DC voltage output control knob - if the diode above the control knob is lit, the current limit is activated and further increase of voltage will not lead to any change of the current.

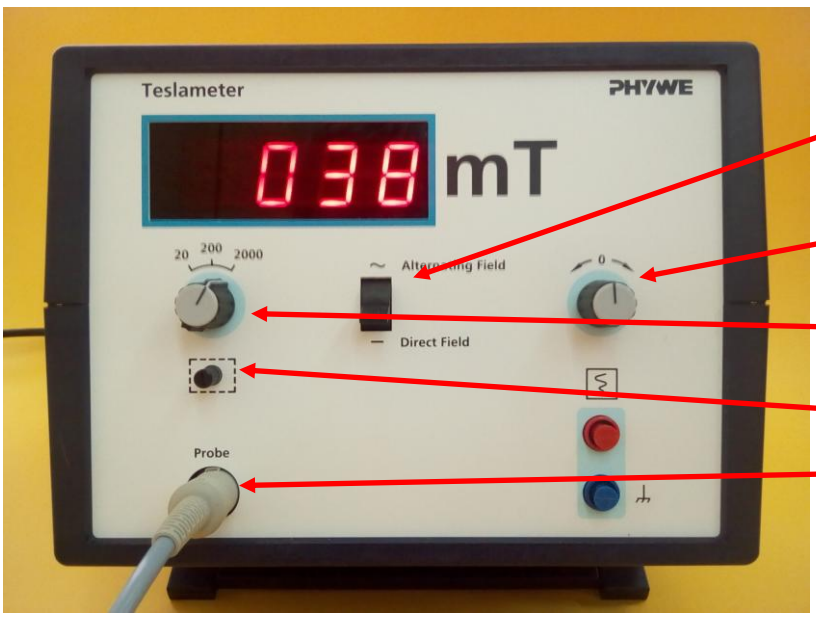
(5) – Electromagnet coils connection terminals

(6) – Measurement module connection terminals – please use the terminals marked as 0 and 12V~

The uncertainty of the current measurement with the measurement module is 0.5 mA

TESLAMETER (the mains switch is located on the back panel of the device)

This is an instrument that measures magnetic field. It uses the Hall effect (which is analyzed in this experiment). The tip of the probe that is connected to the instruments contains a very small sample of the monocrystalline gallium arsenide (GaAs). The necessity of setting the zero value of the value shown by the instrument when the coil current is off is the result of presence of the Earth's magnetic field.



The instrument is used for the measurement of magnetic field

(1) – Type of field measurement selector – it has to be set in the DIRECT FIELD position

(2) – Zero field setting knob – it should be set at 0 position.

(3) – Measurement range selector: 20 / 200 / 2000 mT (set at 2000 mT position)

(4) – Coarse zero magnetic field setting – **do not rotate!**

(5) – Cord with a probe for field measurements (do not disconnect!)

The uncertainty of the field measurement is 2% of the readout

NOTE: THE RD700 MULTIMETER ACCURACY: c_1 = 0,5%; c_2 = 0,1% (for all the measurements of DC voltages)