

DC MOTORS TESTS (MPS3)

5. MEASUREMENTS OF FLUX DENSITY IN THE AIR GAP OF DC MACHINE

RATING OF THE MOTOR TO BE TESTED

$$P_N = \dots$$

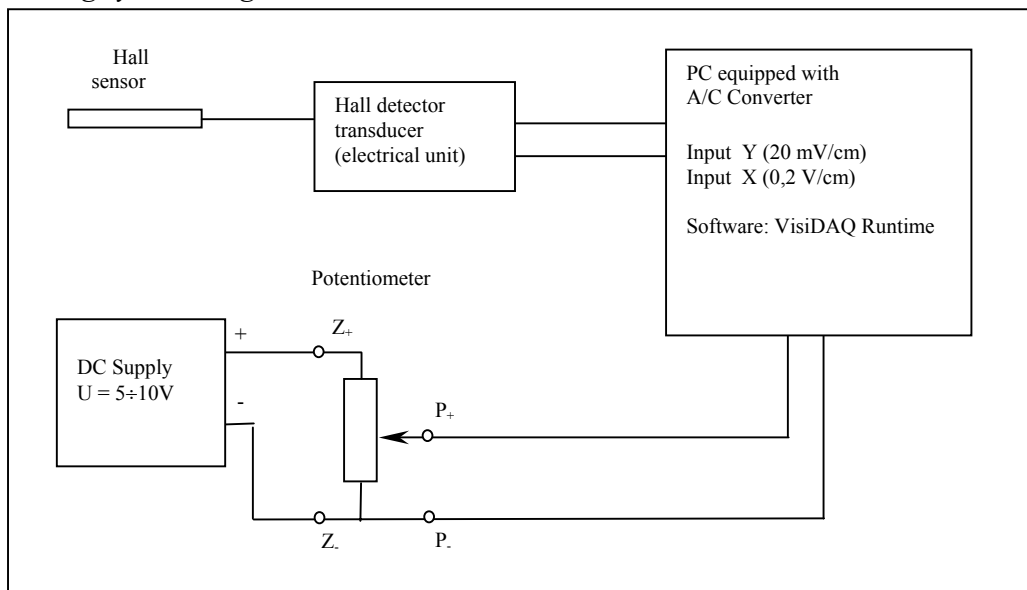
$$U_N = \dots$$

$$I_N = \dots$$

$$n_N = \dots$$

$$I_{fN} = \dots$$

Measuring system diagram:



Hall sensor is characterised by parameters as below:

$$\text{excitation current} \quad I_{exc} = 10 \text{ mA},$$

$$\text{Hall factor} \quad \chi = 26.1 \text{ V}/(\text{A} \cdot \text{T}),$$

and is placed in the air gap of DC motor.

Value of the flux density can be calculated from equation:

$$B_n = \frac{U_y}{\chi \cdot I_{exc}},$$

where: U_y – voltage measured at the output of the Hall detector transducer.

Hall detector is mounted on the rotational arm. The range of arm rotation ($>180^\circ$) makes it possible to measure the radial component of flux density B_n at the entire half of the air-gap circumference. Signal U_x proportional to the position of the Hall sensor is generated by

potentiometer. Both signals (from the Hall detector U_y and from the potentiometer U_x) should be transmitted to PC based data acquisition system to have the function $B_n = f(\alpha)$ printed.

For information about the PC acquisition system & VisiDAQ Runtime software refer to the Measurement of Flux Density in the Air Gap of DC Machine manual.

5.1. Static measurements

Register the distributions of the radial component of flux density in the air gap when the rotor is locked and the successive windings are supplied by rated currents (field, armature, interpole winding + selected combinations of these windings).

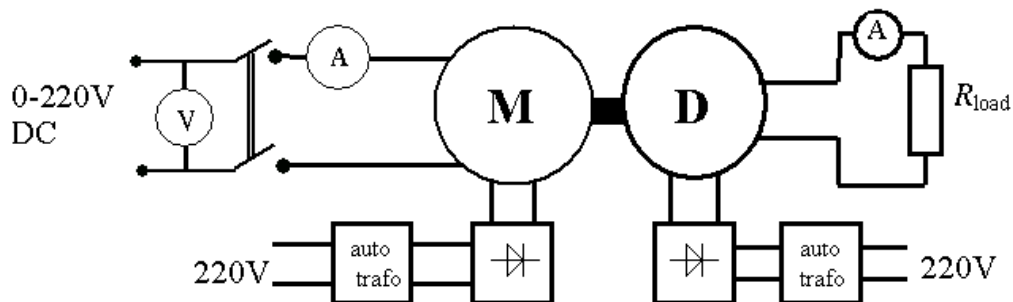
5.2. Dynamic measurements

Register the flux density distributions for machine operations as below:

- a) No-load operation ($I_f = I_{fN}$, $I_a \rightarrow 0$, $n = n_N$);
- b) Rated load operation ($I_f = I_{fN}$, $I_{\text{interpole}} = I_a = I_{aN}$).

NOTE!: It is forbidden to load machine without interpole winding or with inverted connection of this winding with respect to armature winding for the reason of possible damage of commutator and brushes.

Power supply scheme:



Using the PC OPERA's application „VF/JALLOWY”, “VF/ODTWOR” and “VF/PRACA” calculate flux density in the air gap on the base of DC Motor field model. Compare test results 4 with calculations.

BIBLIOGRAPHY

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