

DC MOTORS TESTS (MPS2)

3. MEASUREMENT OF THE WINDING RESISTANCES AND THE CONTACT (BRUSH) RESISTANCE OF THE ROTOR

By means of the voltmeter-ammeter method make measurements of all winding resistances in the cold state of the machine:

armature winding R_A

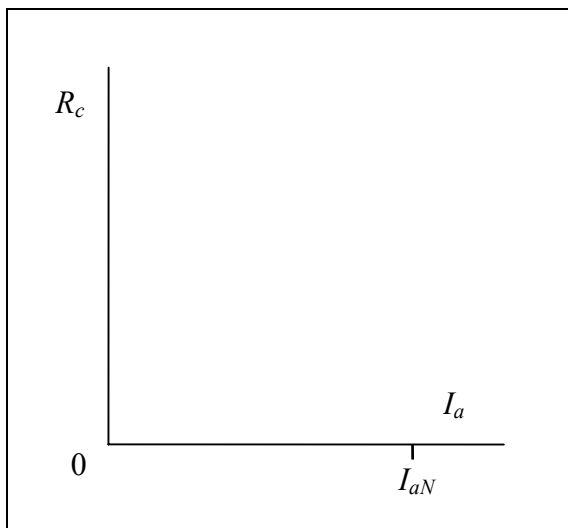
commutating winding R_B

field winding (shunt) R_E

any other winding?

ambient temperature $\vartheta_a = \dots$

Notice: Measurements should be made with the limited value of the current. As the final results of winding resistances give the average numbers from several measurements.

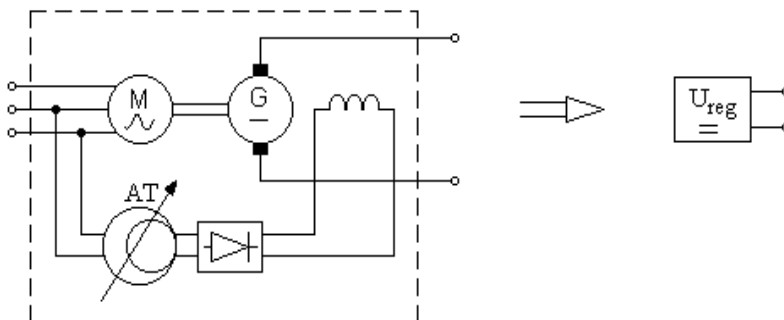


By means of the same method of measurements determine the characteristic of the contact resistance

$$R_c = f(I_a)$$

for the armature current range $I_a \in (0; I_{aN})$.

As the source of measuring current the separately-excited DC generator of the arrangement shown below can be applied:



4.IDENTIFICATION OF THE DC MOTOR WINDINGS TERMINALS

At the beginning with the help of high voltage source (inductor) identify the pairs of terminals. Resistance measurements should be performed with true DC voltage source.

4.1 Armature circuit terminals

Armature circuit terminals (A1, A2) are easy to determine taking into account that they are connected in series with the brushes. Circuit can be disconnected (and thus identify) by separation of its contact with the commutator surface. Can you propose any other simpler method of identification?

4.2 Commutating winding terminals

Comparatively small DC machines are typically equipped with two symmetrical commutating winding sections (terminals: 1B1, 1B2 and 2B1, 2B2). Identical resistance of two windings may suggest symmetrical commutating windings.

4.3 Series and shunt field winding terminals

Identification of series and shunt field windings can be performed by their resistance comparison:

$$R_{\text{shunt}} \gg R_{\text{commutating}} > R_{\text{series}}$$

Another problem is identification of terminals polarity. Beginning and the end of armature and field terminals can be identified taking into account a direction of shaft rotation. Beginning and the end of series field winding terminals can be named with the help of load test (see: speed-torque characteristic - $n = f(M)$). While determining the beginning and the end of commutating winding one should remember the aim of commutating winding application. Correct commutating winding connection should assure suppression of flux density in the neutral zone.

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