WARSAW UNIVERSITY OF TECHNOLOGY
INSTITUTE OF ELECTRICAL MACHINES
ELECTRICAL MACHINES LABORATORY

3-PHASE INDUCTION MOTOR TESTS
(SI 1)

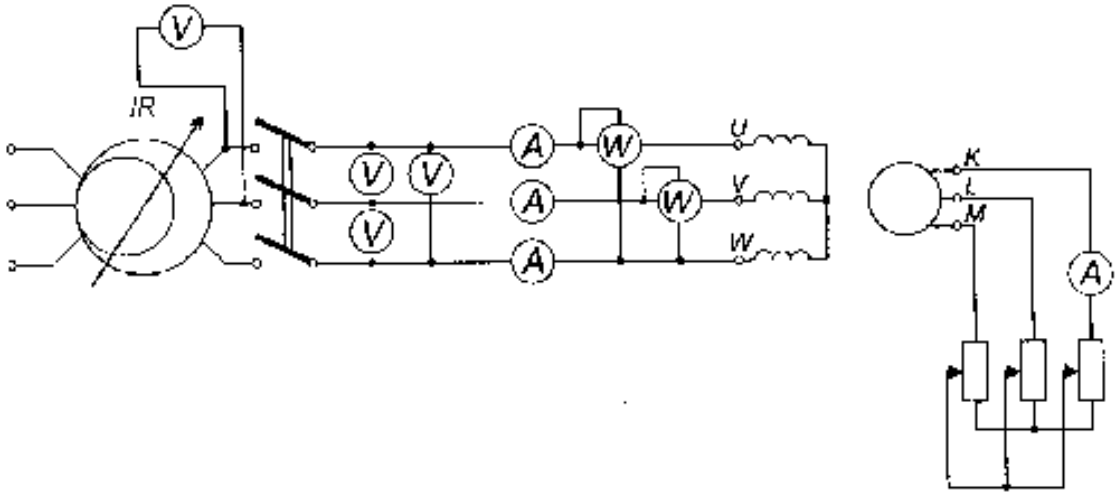
RATING OF THE MOTOR TO BE TESTED

P_N=...	$\cos\varphi_N$=...	*Windings resistances:*
U_N=...	U_{2N}=.....	*Stator winding* R_1=...
I_{1N}=...	n_N=....	*Rotor winding* R_2=...
I_{2N}=...		

Calculations: Rated torque T_N=...
Synchronous speed n_1=...
Number of poles $2p$=...

Scheme of windings and terminals' symbols (diagram):

1.1. No-load characteristics



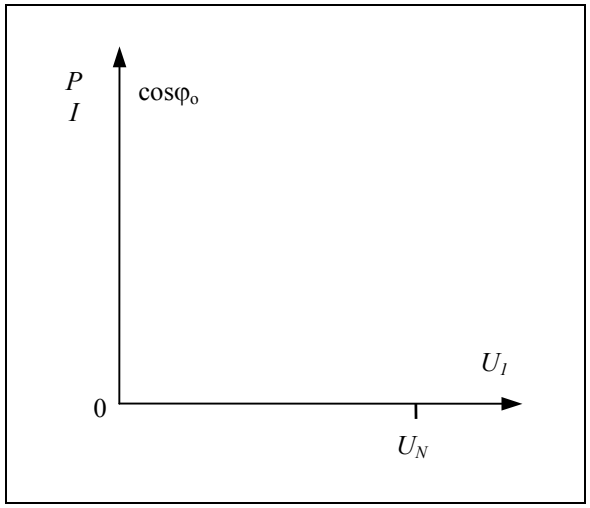
Start up the motor gradually increasing the supplying voltage up to its nominal value U_N. Beginning from $U_1 \approx U_N$ make readings of all required quantities for about 10 values of the supplying voltage within the range (U_N;0.2U_N).

No of read.	READINGS						CALCULATIONS						
	U_1	I_U	I_V	I_W	P_a	P_b	I_o	P_{1o}	$\cos\varphi_o$	I_{ow}	I_f	ΔP_{Cu1o}	ΔP_o
	V	A	A	A	W	W	A	W	-	A	A	W	W
1													
2													
3													
...													

$$I_o = \frac{I_U + I_V + I_W}{3}; \quad I_{ow} = I_o \cos\varphi_o;$$

$$I_f = I_o \sin\varphi_o; \; P_{1o} = P_a + P_b; \; \Delta P_{Cu1o} = 3I_o^2 R_1$$

$$\Delta P_o = P_{1o} - \Delta P_{Cu1o}; \; \cos\varphi_o = \frac{P_{1o}}{\sqrt{3}U_1 I_o}$$



In common co-ordinates, at a single piece of the drawing paper of 1/2 of A4 size, draw the characteristics:

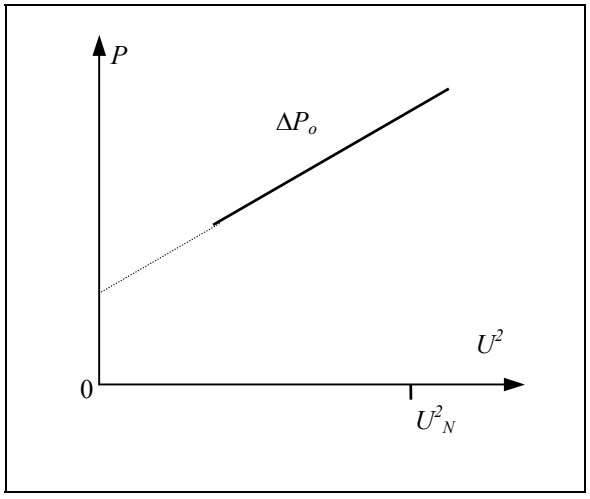
P_{1o}; P_o; I_o; I_f; I_{ow}; $\cos\varphi_o$=f(U_1)

(apply three different scales for P, I, $\cos\varphi$).

From the diagram, for U_1=U_N,, determine the rated values of:

I_{oN}; $\cos\varphi_{oN}$; I_{owN}; I_{fN}; ΔP_{oN}

and calculate their percent values.



Draw the characteristic ΔP_o=f(U^2) and determine the values of:

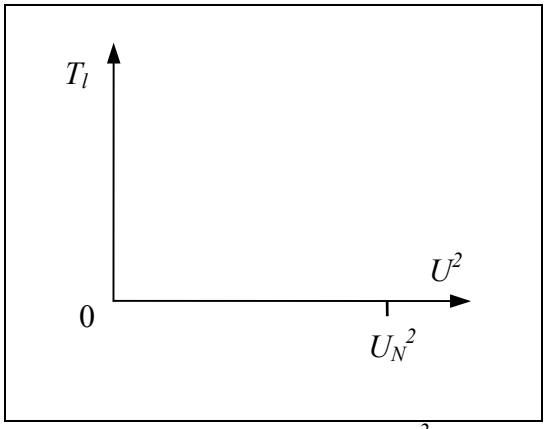
- mechanical loss ΔP_m
- iron core loss ΔP_{FeN} .

1.2. Measurements of starting torque (locked-rotor torque) T_l

Tested motor is supplied from the induction regulator. Its rotor winding circuit is closed by three-phase variable resistor R_r. The rotor shaft is locked by means of the lever attached to the shaft end and attracting the weighting scales with a force F. The supplying voltage and current drawn from the supply should be measured (be sure that $I \leq I_N$). For three different values of R_r make measurements of $T_l = f(U)$.

Length of the lever =....m.

R_r position	U	I	F	T_l
	V	A	N	N.m
$R_r = R_{rmax}$				
$R_r \approx 1/2 R_{rmax}$				
$R_r = 0$				



Draw the characteristics $T_l = f(U^2)$.
Determine the values of T_{lN} (for $U = U_N$).

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