NO LOAD AND BLOCKED ROTOR TEST ON A 3- ϕ INDUCTION MOTOR

AIM:

To determine the equivalent circuit of a 3- ϕ induction motor and calculate various parameters of induction motor with the help of circle diagram.

APPARATUS REQUIRED:

Sl. No.	Equipment	Type	Range	Quantity
1	Voltmeter	MI	(0-600)V	1 no
2	Ammeter	MI	(0-10)A	1 no
3	Wattmeter	Electro dynamo meter type	10A/600V UPF 10A/600V LPF	1 no 1 no
4	Tachometer	Digital	*****	1 no
5	Connecting Wires	*****	*****	Required

NAME PLATE DETAILS:

Power rating	
Voltage	
Current	
Speed(RPM)	

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Frequency	
PF	

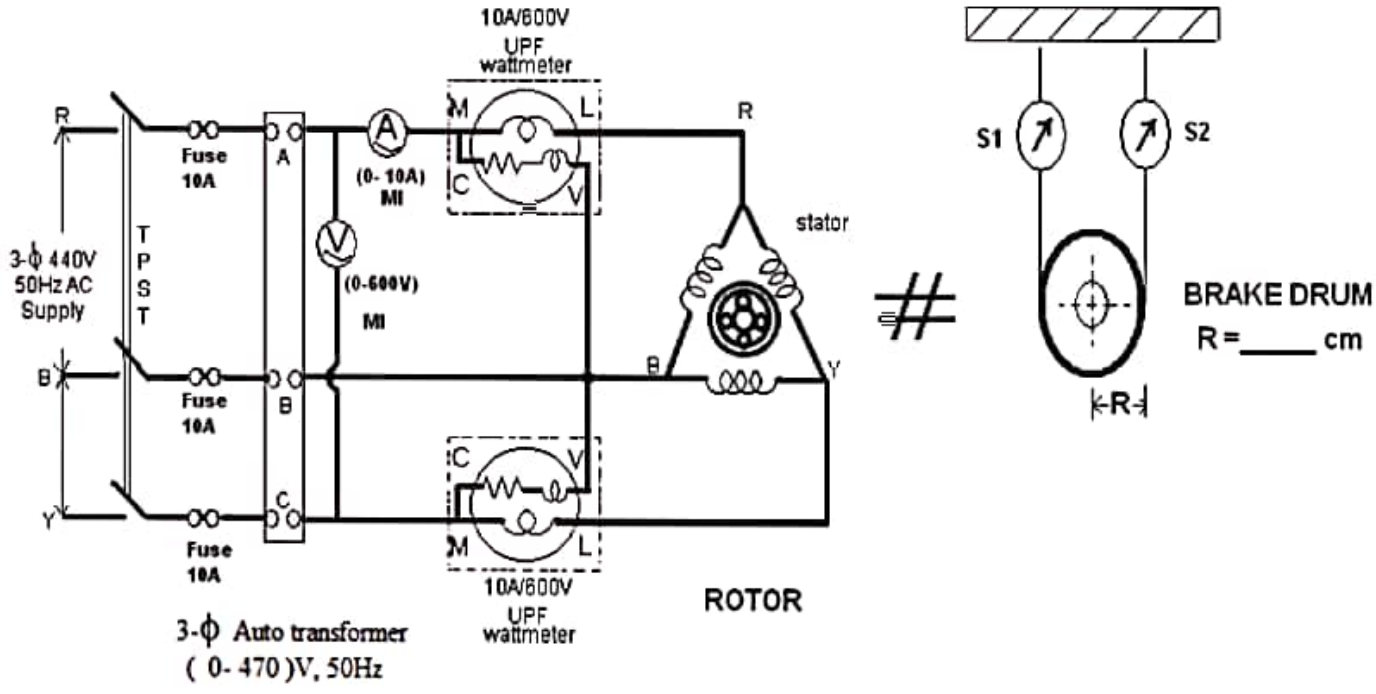
3- ϕ Auto transformer Details:

Input Voltage: _____ (Volt)

Output Voltage: _____ (Volt)

Current:_____ (Amp.)

CIRCUIT DIAGRAM:



PROCEDURE:

NO LOAD TEST:

1. Connections are made as per the circuit diagram.

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2. Ensure that the 3- ϕ variac is kept at minimum output voltage position and belt is freely suspended.

3. Switch ON the supply. Increase the variac output voltage gradually until rated voltage is observed in voltmeter. Note that the induction motor takes large current initially, so, keep an eye on the ammeter such that the starting current current should not exceed 7 Amp.

4. By the time speed gains rated value, note down the readings of voltmeter, ammeter, and wattmeter.

5. Bring back the variac to zero output voltage position and switch OFF the supply.

BLOCKED ROTOR TEST:

1. Connections are as per the circuit diagram.

2. The rotor is blocked by tightening the belt.

3. A small voltage is applied using 3- ϕ variac to the stator so that a rated current flows in the induction motor.

4. Note down the readings of Voltmeter, Ammeter and Wattmeter in a tabular column.

5. Bring back the Variac to zero output voltage position and switch OFF the supply.

OBSERVATIONS:

No Load Test:

Sl no.	Voltmeter reading V_{nl}	Ammeter reading I_{nl}	Wattmeter reading		W_{nl} (P_{nl}) W_1+W_2
			W_1	W_2	

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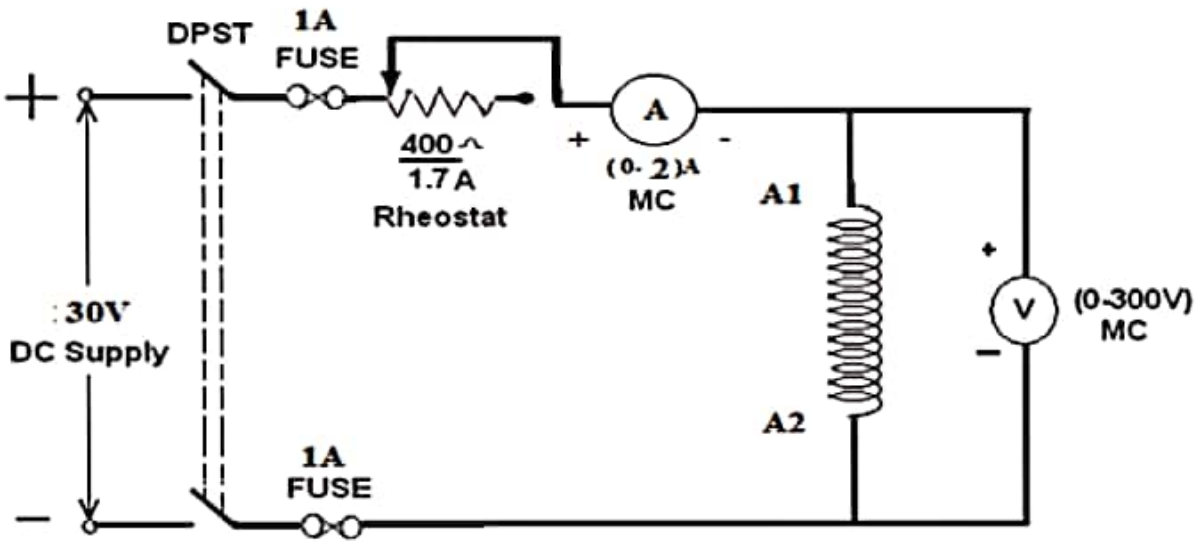
Blocked Rotor Test

Sl no.	Voltmeter reading V_{br}	Ammeter reading I_{br}	Wattmeter reading		W_{br} (P_{br}) W_1+W_2
			W_1	W_2	

Measurement of stator winding resistance (r_1):

CIRCUIT DIAGRAM:



TABULAR COLUMN:

S no.	Voltage (v)	Ammeter (I)	Resistance (R)

Procedure to find r_1:

1. Connections are made as per the circuit diagram
2. Switch ON the supply. By varying the rheostat, take different readings of ammeter and voltmeter in a tabular column.

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3. From the above readings, average resistance r_1 of a stator is found

Measurement of Stator resistance

1. Connect the circuit as per the circuit diagram shown in fig (2).
2. Keeping rheostat in maximum resistance position switch on the 220 V Dc supply.
3. Using volt-ammeter method measure the resistance of the stator winding.
4. After finding the stator resistance, R_{dc} must be multiplied with 1.6 so as to account for skin effect i.e. $R_{ac} = 1.6\ R_{dc}$.

MODEL CALCULATIONS:

$$G_0 = \frac{W_0}{3V^2} \quad , Y_0 = \frac{I_0}{V} \quad , \quad B_0 = \sqrt{Y_0^2 - G_0^2}$$

$$Z_{01} = \frac{V_{SC}}{I_{SC}} \quad , R_{01} = \frac{W_{SC}}{3x{I_{SC}}^2} \quad , \quad X_{01} = \sqrt{Z_{01}^2 - R_{01}^2}$$

For circle diagram

$$\cos\phi_0 = \frac{W_0}{\sqrt{3}\ V_0\ I_0} \ , \qquad \phi_0 = \cos^{-1}\left(\frac{W_0}{\sqrt{3}\ V_0\ I_0}\right)$$

$$\cos\phi_0 = \frac{W_{SC}}{\sqrt{3}\ V_{SC}\ I_{SC}} \ , \qquad I_{SN} = I_{SC}\left(\frac{V_0}{V_{SC}}\right)$$

PRECAUTIONS:

1. Connections must be made tight
2. Before making or breaking the circuit, supply must be switched off

RESULT:

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