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Single Input Multiple Output by Capacitor Start Single Phase Induction Motor During Running Condition

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Abstract - *The aim of our project is to produces the power with the help of capacitor winding of induction motor by separating the capacitor winding during starting of motor by controlling IC 555. Single phase induction motor (SPIM) plays major role in domestic and industrial application. Capacitor start single phase induction motor consist of two windings first one is running winding (Main winding) and second is starting winding (Capacitor winding). Capacitor winding have more number of turns of thin copper wire than running winding.*

***Key Words*: SPIM, Capacitor winding**

1. INTRODUCTION

Capacitor start single phase induction motor is similar to that of split phase type induction motor, the difference is the capacitor winding of capacitor start single phase induction motor have more number of turns of thin copper wire than the main winding. The auxiliary winding connected in series with the capacitor draws a leading current while the main winding continues to draw the lagging current.

The capacitor starts induction motor have low initial cost, better speed performance and low losses hence have better efficiency. Because of this capacitor start single phase induction motor are most commonly used in agriculture and industrial purpose etc. In capacitor start single phase induction motor consists of two winding one is main winding called running winding and other one is auxiliary winding called capacitor winding both are connected in parallel and separated by centrifugal switch during the running of motor.

The capacitor start induction motor have high starting torque to start the motor hence capacitor winding is used only to start the motor. The Capacitor start induction motor needed greater phase difference between the current in the main winding than auxiliary winding hence the capacitor start motor are a single phase induction motor that utilises a capacitor in the auxiliary winding circuit. The capacitor is used for starting purpose because the starting torque is very high hence the motor suggest the name capacitor start single phase induction motor.

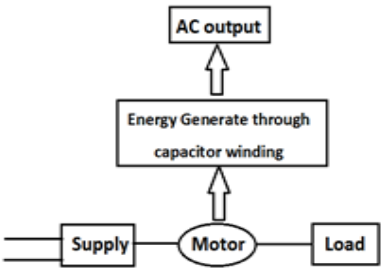

Fig: Block diagram of power generation by capacitor start single phase induction motor

Capacitor start induction motor more over the auxiliary winding have more turn of heavier wire used in resistance split phase motor is less savvier to heat rise, the result is that more starting torque is available for heavy load. The role of capacitors is to improve the starting and running performance of single phase induction motor. A capacitor start induction motor is like a split phase motor. The capacitor start motor is identical to a split phase motor except that the starting winding has as many turns as the main winding.

A motor capacitor such as start capacitor or run capacitor (include a dual Run capacitor) is an electrical capacitor that transfer the current from one or more winding of single phase AC induction motor to create a rotating magnetic field(RMF).

1.1 Methodology

In our project we are produces the power from the capacitor winding of induction motor by disconnecting the capacitor winding after starting of motor as shown in below circuit diagram of power generation.

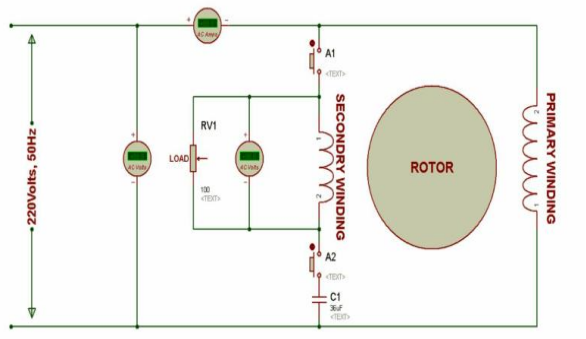

Fig : circuit diagram of capacitor start single phase induction motor

The single phase stator or main winding of induction motor is connected to the single phase supply as shown in above diagram. Due to ac voltage applied, the current start flowing in the stator conductor of single phase induction motor. This alternating current produces an alternating flux called main flux. The rotor winding is still stationary. So the main flux also links with the rotor conductors and hence cut the rotor conductors.

As per the 'faraday's law' of electromagnetic induction EMF get induce in the rotor conductor as the rotor circuit is closed one show , the current start flowing the rotor. This current is called the rotor current. The rotor current generates its own flux called rotor flux since the flux is generated due to induction principle so got its name as induction motor. Now there are two fluxes one is main flux and another is called rotor flux this two fluxes produced desired torque which is necessary for the motor to torque.

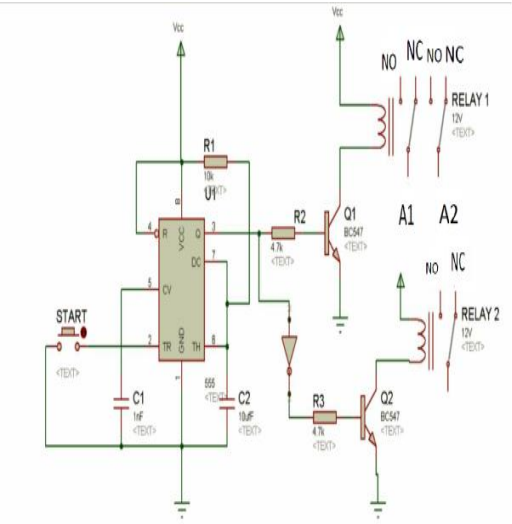

Fig: Control diagram of electricity produces by using capacitor start single phase induction motor during running condition.

Above figure shows A1 and A2 are the switches used automatically disconnect the capacitor winding after starting the motor. For the purpose of turn on and turn off the load on capacitor winding automatically, switch S1 is used.

This is the control diagram for our project using a single 555 timer IC.

Above diagram indicates IC 555 is used as a controller for disconnecting the capacitor winding from the running winding. Here the IC is connected in monostable multivibrator configuration. It works as timer for separating the capacitor winding. As we push on button motor starts rotating and at the same time timer starts running. Motor needs 2-3 seconds to achieve its full speed, so we set the timer for 2 seconds so that it can disconnect the capacitor winding automatically after 2 seconds and switch on the load connected with capacitor winding.

Above figure shows A1 and A2 are the switches used automatically disconnect the capacitor winding after starting the motor. For the purpose of turn on and turn off the load on capacitor winding automatically, switch S1 is used.

2. Components and their ratings

Table -1: Components and their ratings

Sr.no	Components	Rating
1.	Capacitor start single phase induction motor	1/4Hp single phase, 50Hz
2.	sugar cube relays	12 volt
3.	Voltmeter	300 volt
4.	Ammeter	0-6 A
5.	Timer IC	ne 555
6.	Resister	10k, 4.7k, 1k, 470 ohms
7.	Capacitors	40/60 micro F
8.	Transformer	230/12 volt center tab transformer
9	Transistor	BC547,BC557

2.1 Calculation

Rating of capacitor start single phase induction motor

1/4 HP, 2A, 1440 rpm.

1/4 HP = ¼ * 746 = 186.5 W

1 HP = 746 W

P = V*I*COS(Ø)

COS(Ø) = P/VI = 186.5/230*2 = 0.405

Output power =110*0.5*0.405

= 22.275 W

3. CONCLUSIONS

We are connect and tight all the connections and starts the motor. On 210 volts AC input supply, motor takes starting current of 2.4 Amps after separating the capacitor winding load gates automatically switched on and output voltage is 107 volts and the total input current is still stable on 2.4Amps. In this way we have produces power (Electricity) successfully and utilize power generated in capacitor winding of single phase induction motor for multiple purpose hence the name single input multiple output.

REFERENCES

[1] V. K. Mehta "A Text Book of Principle of Electrical Machine" 2006, Edition, S. Chand publication,pp. 544 – 565.

[2] Single-phase Induction Motors: Construction, Theory and Calculation Book by J. Stepina Design of a Single-Phase Induction Motor - Scholar's Choice Edition Book by Charles F. Holmes NEW Design of a Single-Phase Induction Motor - Scholar's Choice Edition By Charlsingle phase self-excited induction generator 1) Akshay B. Nalge, 2) Akshay R. Patil, 3) Amol S. Kachare, 4)Minakshi P. Lavate, 5) Priyanka P.

[3] Popescu, M., Miller, T.J.E., McGilp, M.I., Strappazzon, G., Trivillin, N.,Santarossa, R.: "Line Start Permanent Magnet Motor: Single-Phase Starting Performance Analysis" – Conf. Rec. of IEEE-IAS Annual Meeting 2002, 13-18 October, Pittsburgh, USA, Vol. 4, pp. 2499 – 2506

[4] Operation of Single Phase Induction Motor with two Identical Stator WindingsE.Idoko1, E.S.Obe2, J.U.Agber31, 3(Electrical and Electronics Engineering department, University of Agriculture, Makurdi, Nigeria) 2(Electrical Engineering department, Universityof Nsukka, Nigeria)

[5] Miller, T.J.E., Popescu, M., McGilp, M.I.:"Asynchronous Performance Analysis of a Single-Phase Capacitor Run Permanent Magnet Motor" – Conf.Rec. of ICEM 2002, 26-28 August 2002, Brugge, Belgium – on CD-ROM

[6] Miller, T.J.E. "Synchronisation of line-start permanent magnet motors" IEEE Transactions on Power Apparatus and Systems, Vol. PAS-103, no. 7, July 1984, pp. 1822-1828

[7] Miller, T.J.E. "Single-phase permanent magnet motor analysis", IEEETrans. Ind. Appl., Vol. IA-21, pp. 651-658, May-June 1985

[8] N. Mohan, Electric Machines and Drives: A First Course, Wiley, 2012.

[9] AshfaqHusain,"Electrical Machines" Dhanpatrai and co. 110006, second edition, pp549-555.

[10] B.L. Thereja "A text book of electrical technology", vol.2, 2008 Edition, S.chand publication, pp 567-595.

[11] J. S. Hsu. J. D. Kueck, M. Olszewski, D. A. Casada, P. J. Otaduy, and L. M. Tolbert, (June 1998) (199) "Comparison of Induction Motor Field".

[12]G. R. Slemon, Electric Machines and Drives, Edition – Wesley, 1992