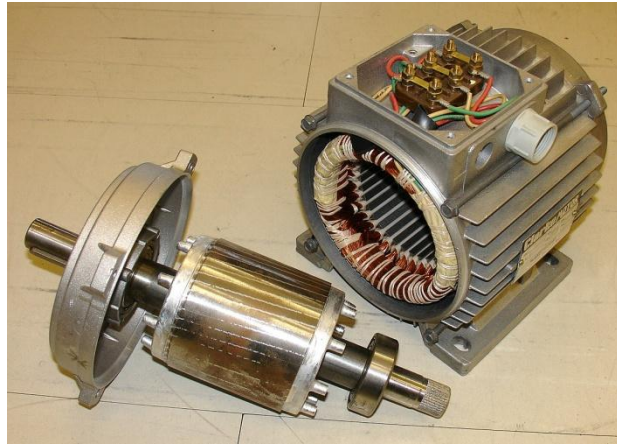
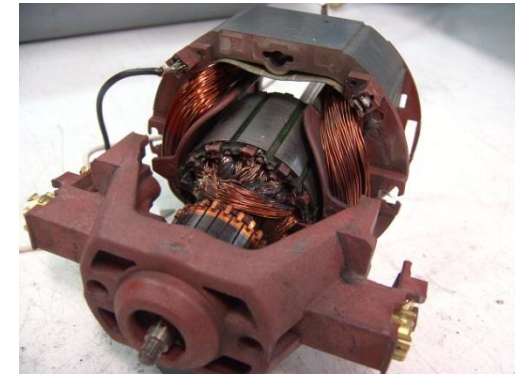




ELECTRIC MOTORS



SINGLE PHASE INDUCTION MOTOR





INTRODUCTION

- Single phase induction motors are used in a wide range of applications where only single phase supply is available.
- These are manufactured in fractional kilowatt range to meet the requirements of various applications such as ceiling fans, food mixers, refrigerators, vacuum cleaners, portable drills, hair driers, etc.





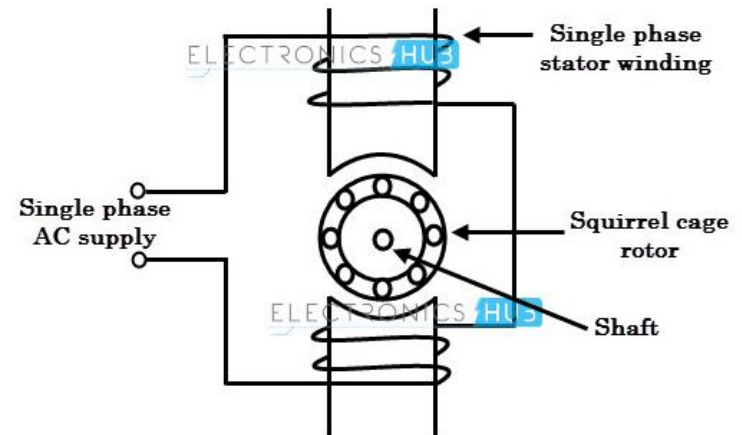
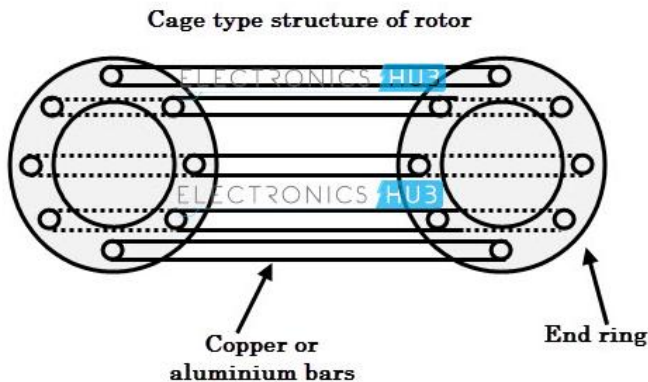
Basics

Construction of these motors is more or less similar to a three-phase squirrel-cage induction motor.

The stator is a stationary part and it has laminated construction, which is made up of stampings.

The rotor is a rotating part and its construction is of squirrel cage type. The rotor consists of uninsulated aluminum or copper bars which are placed in the slots.

These rotor bars are permanently shorted at both ends with the help of end rings

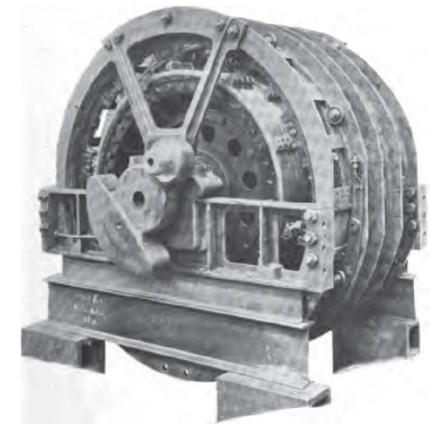
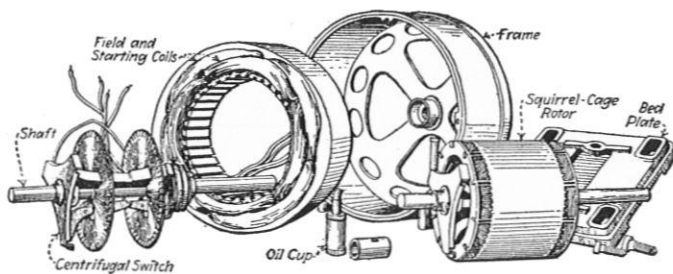




Types of Single Phase Induction Motor

Based on the starting method, single phase induction motors are basically classified into the following types.

- ❖ Split-phase motor
- ❖ Capacitor start motor
- ❖ Permanent capacitor run motor
- ❖ Capacitor start capacitor run motor
- ❖ Shaded pole motor



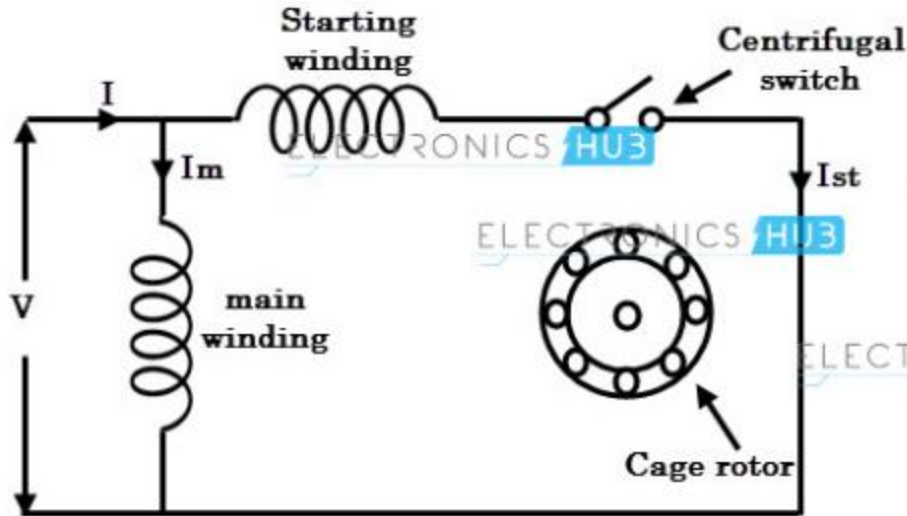


Split-phase motor

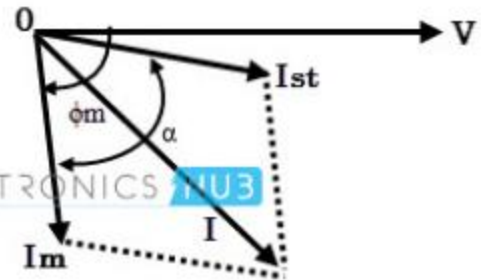
This is one of the most widely used types of single phase induction motors.

The essential parts of the split phase motor include main winding, auxiliary winding and a centrifugal switch.

This is the simplest arrangement to set up a rotating magnetic field by providing two winding on the same stator core.



Circuit diagram of split phase motor



Phasor diagram

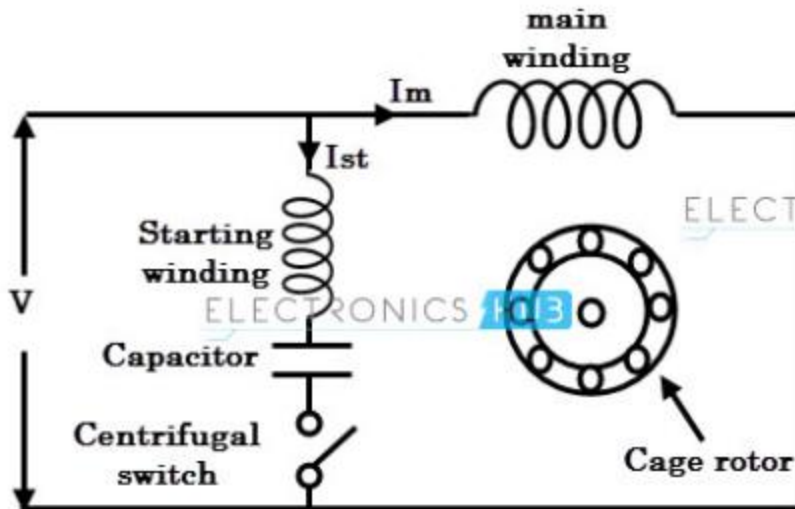


Capacitor Start Induction Motor

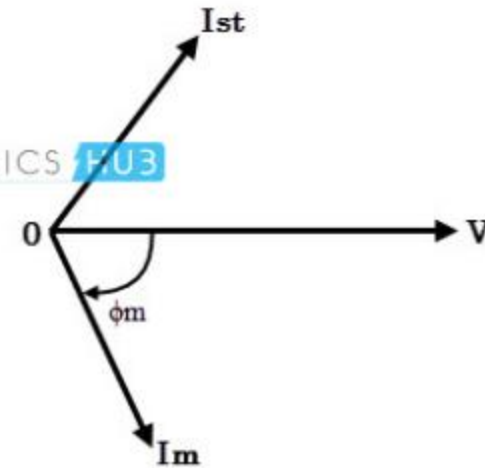
This motor is similar to the split phase motor, but in addition a capacitor is connected in series to auxiliary winding.

This is a modified version of split phase motor. Since the capacitor draws a leading current, the use of a capacitor increases the phase angle between the two currents (main and auxiliary) and hence the starting torque.

This is the main reason for using a capacitor in single phase induction motors.



Circuit diagram of capacitor start motor



Phasor diagram



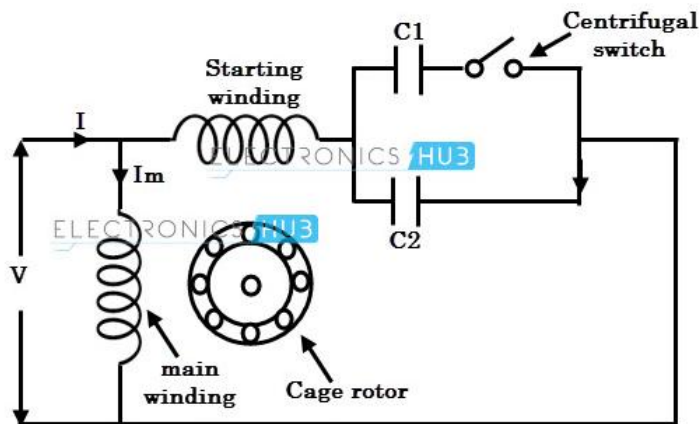
Capacitor Start and Capacitor Run Induction Motor

These motors are also called as two-value capacitor motors.

It combines the advantages of capacitor start type and permanent capacitor type induction motors.

This motor consists of two capacitors of different value of capacitance for starting and running.

A high value capacitor is used for starting conditions while a low value is used for running conditions.



Circuit diagram of capacitor start capacitor run motor



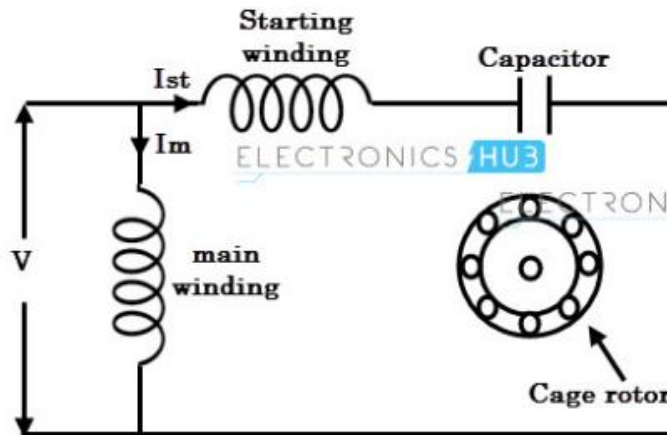


Permanent Capacitor Induction Motor

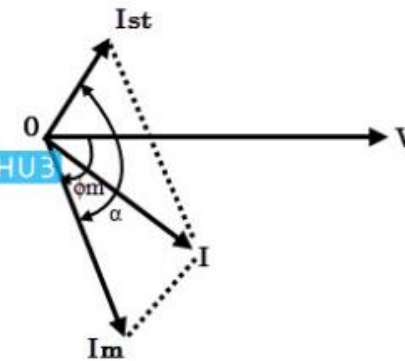
This motor is also called as a capacitor run motor in which a low capacitor is connected in series with the starting winding and is not removed from the circuit even in running condition.

Centrifugal switch is not required. Here the capacitor is capable of running continuously.

The low value capacitor produces more leading phase shift but less total starting current as shown in phasor diagram.



Circuit diagram of capacitor run motor



Phasor diagram

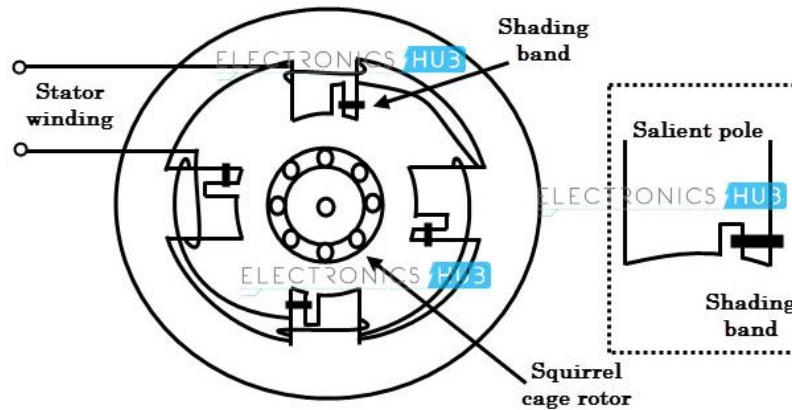


Shaded pole Induction Motor

This motor uses entirely different technique to start the motor as compared with other motors so far we have discussed now.

This motor doesn't use any auxiliary winding or even it doesn't have a rotating field, but a field that sweeps across the pole faces is enough to drive the motor.

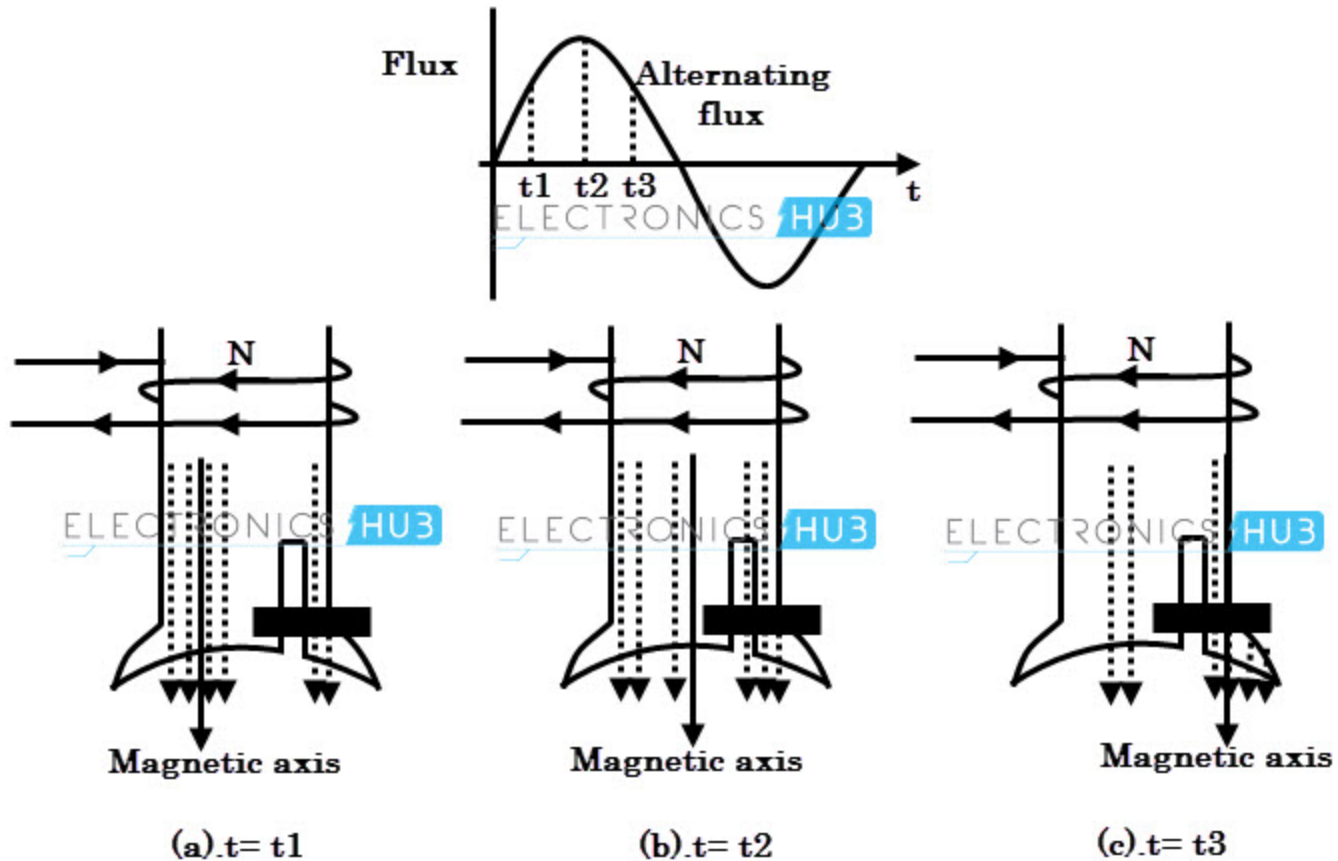
So the field moves from one side of the pole to another side of the pole.



4-Pole Shaded pole motor construction



Shaded Pole IM- Operation



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