3.6 SINGLE PHASE INDUCTION MOTOR

The Single phase Induction Motor which operates on Single phase supply are manufactured in large number of variety of devices such as Homes appliances, Offices, Factories, Workshop, Business enhancement, etc. The Single phase Induction Motor can be classified into:

1. Split phase type Induction Motor
2. Capacitor type Induction Motor
3. Shaded pole type Induction Motor

A Single phase Induction Motor which is similar to 3-phase Squirrel Cage Induction Motor. The Single phase Induction Motor consists of:

(i) A stator which carries single phase winding

(ii) A squirrel cage type rotor.

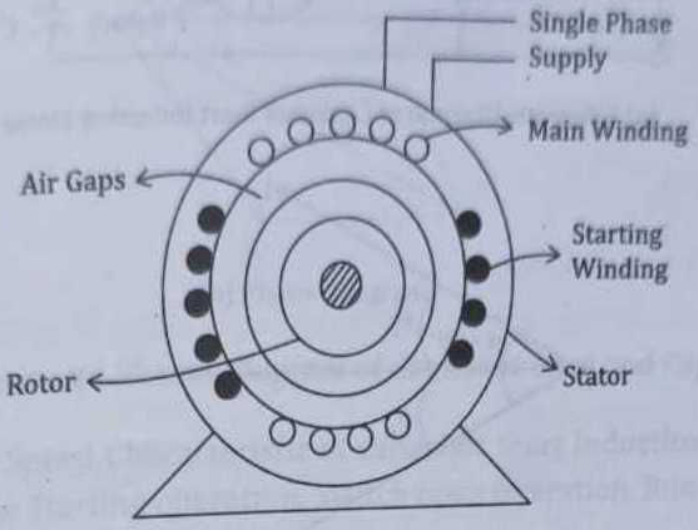


Fig 3.42 Schematic diagram of Single phase Induction Motor

The main difference between Single phase Induction Motor and 3-phase Induction Motor. The 3-phase Induction Motor is self starting and a Single phase Induction Motor is not self starting for starting purpose the Capacitance or Resistance is used.

The Schematic diagram of a Single phase Induction Motor as shown in Fig 3.42. The Single Induction Motor is physically similar to 3-phase Induction Motor except the stator is provided with single phase winding. The Rotor construction which is similar to 3-phase Induction Motor. The stator and rotor are not physically connected and the uniform air gap is provided between stator and rotor.

The Single phase supply is applied to the Stator winding which produces the alternating flux. The alternating field produces an emf of the rotor conductor by the **Principle of Mutual Inductance** when the rotor circuit is closed.

There are Different methods for Starting a Single phase Induction Motor and can be classified into:

1. **Split phase Induction Motor**
   The motor which is started by two phase motor action with the help of additional winding is known as **Starting Winding**.

2. **Capacitor start Induction Run Motor**
The above motors are started by Two phase motor action similar to Split phase Induction Motor with the help of Capacitor.

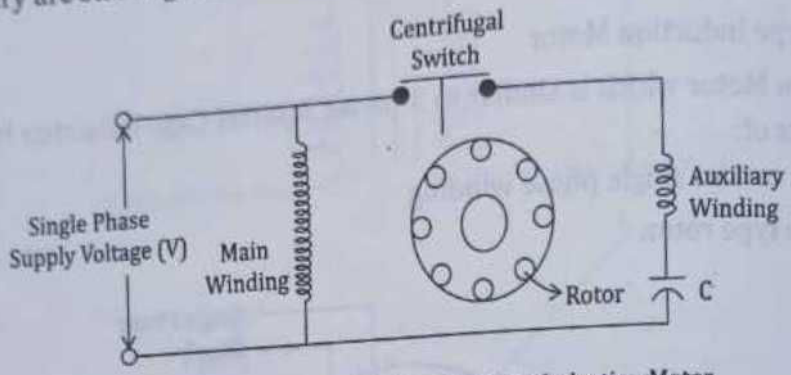
3. **Shaded pole type Induction Motor**
The motor which is having Salient pole on the stator and Squirrel cage type rotor through Shaded pole principle.

3.6.1 Spilt phase Induction Motor

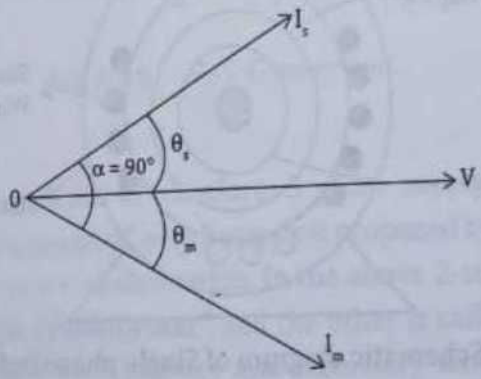
A Single Induction Motor is temporarily converted into 2-phase winding by providing extra winding in stator. The Stator of a Split phase induction Motor consists of 2-windings such as:

1. Main Winding or Running Winding
2. Auxiliary Winding or Starting Winding

The Schematic diagram For Split phase Induction Motor as shown in Fig 3.43. The Main winding(M) has Single winding and the Auxiliary are starting winding is connected with Centrifugal switch with Resistance.



(a) Schematic Diagram of Capacitor Start Induction Motor



(b) Phasor Diagram

Fig 3.43 Constructional and Phasor diagram of Capacitor start Induction Motor

Working

The Single phase supply is given to the Stator due to which a rotating magnetic field is produced. The rotating magnetic field which cuts the conductor and the magnetic field is produced in the rotor. According to the interaction between the stator and rotor magnetic field, the Torque is developed and the motor starts to rotate.

By the above method, 75% rated speed is obtained. **The above motors are used in:** (i) Large fans (ii) Centrifugal pumps (iii) Blowers (iv) Compressors (v) High inertia load applications.

3.6.2 Capacitor start and Capacitor run Motor

The Capacitor start and Capacitor run type Single phase Induction Motor as shown in Fig.3.44. The motor which is having two capacitors C_1 and C_2 are connected parallel with the auxiliary windings. At the time of starting two capacitors are kept in the circuit.

3.6.3 Shaded pole type Induction Motor

The **Shaded pole type** is the another type of Single phase Inductor Motor in which the Salient pole construction is similar to stator of DC Machine and the Rotor is made of Squirrel cage type Rotor. In necessary of phase splitting is obtained by Induction principle.

The Salient pole of Stator excited by Single phase supply and a Squirrel cage rotor as shown in Fig 3.47. The Small part of pole is placed by a short Circuited copper (Cu) coil is known as **Shading coils.**

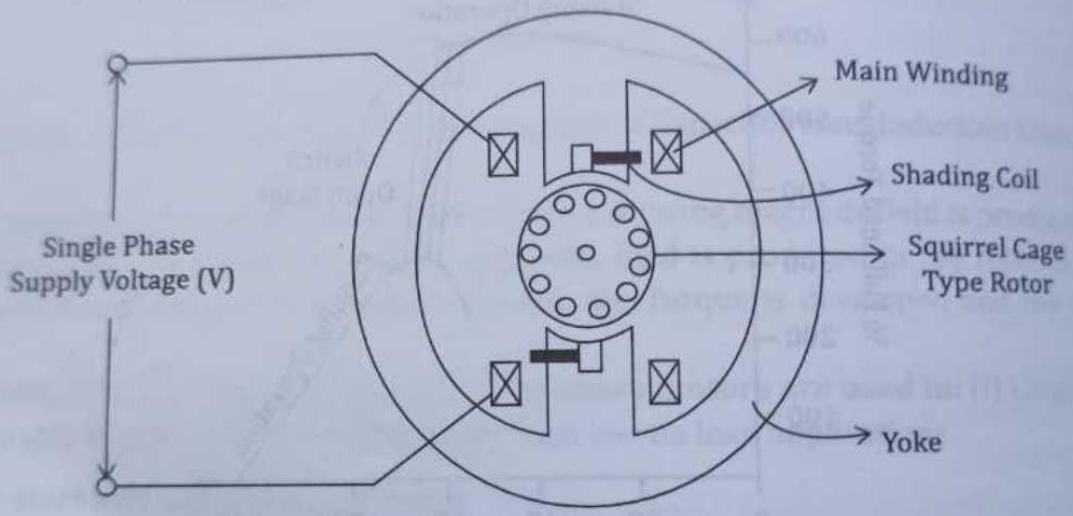


Fig 3.47 Shaded pole type Single phase Induction Motor

mainly consists of :
n windings, Shading coils)
is madeup of Squirrel cage type

e phase supply

nating current is passed through the field winding surrounded pole the magnetic axis path
ded part to the shaded part. According to the magnetic axis effect which is equal to the ac"
ment of pole. The rotor starts to rotate from unshaded part to shaded part.
ant at a, b, c flux wave on the Shaded coil is shown in Fig.3.48. The alternating flux produc by
rrent through stator pole winding.
n the flux increasing from zero to maximum
n flux is almost be maximum
n the flux is decreasing from maximum to zero

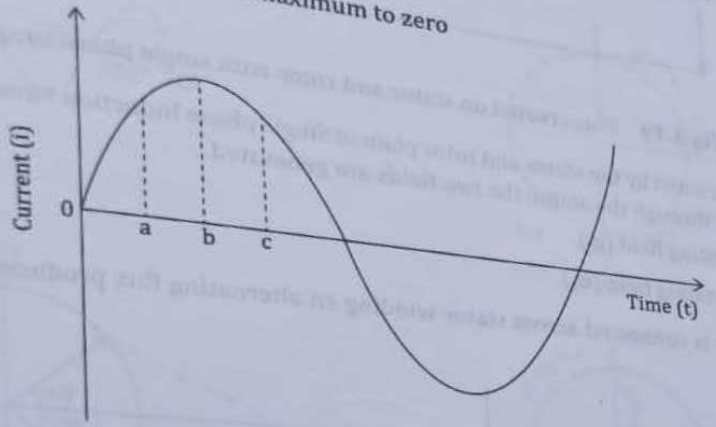


Fig.3.48 Alternating flux produced by alternating current

f Shaded pole type Singe Phase Induction Motor

aded pole motor are very small in size and simple in construction.

y are less in expensive and similarly Not requires Centrifugal switches, Capacitor, Special starting
ding, commutator.

Inherently self starting. The shaded pole motors are usually build to satisfy the load changes
o 1/2 Horse power.

es of Shade pole type Single Phase Induction Motor

roduces Low starting torque.

y little load changes and Efficiency changes from 5 to 35%.

s of Shaded pole type Single Phase Induction Motor

s

r dryers

k and Exhaust fans

n projectors