

AC Motor

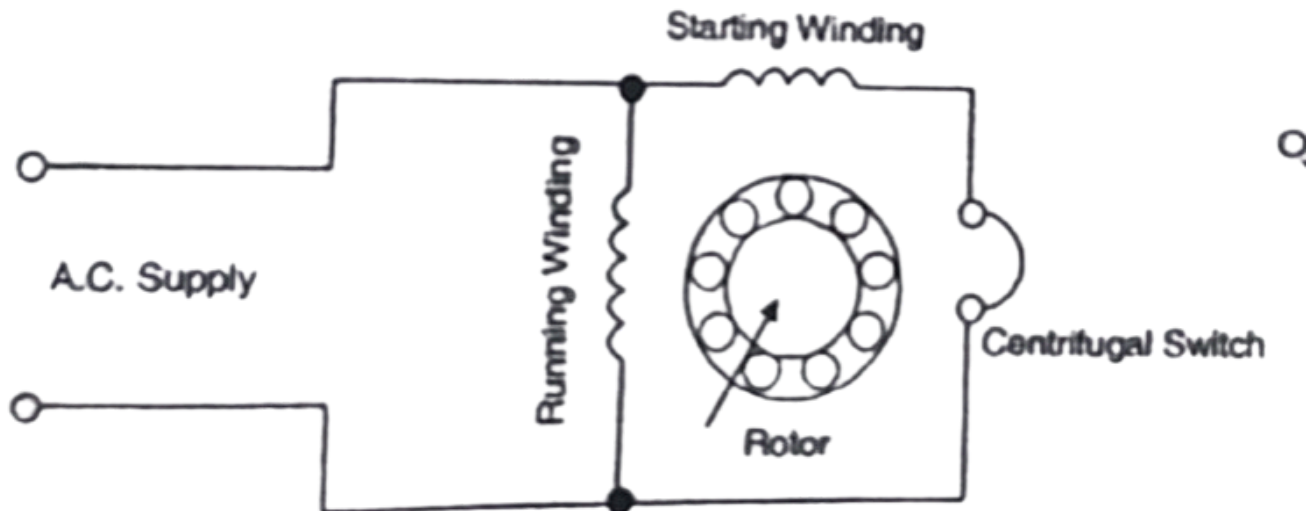
Split phase induction motor:

Construction: The rotor of this motor is of squirrel cage type. It is made of laminated iron cores, having closed slots around the periphery of the rotor in which copper or aluminium bars are driven and their ends are welded to rings on either side.

Methods for making self start: As the single-phase motor is not self-started, it can be started by any one way of the following methods:

1. Phase splitting method: Splitting one phase into two phases.
2. By commutator method.

It has two stator windings i.e., Starting Winding (S.W.) and Running Winding (R.W.). The starting winding consists of a thin enamelled copper wire so as to have a high resistance and low inductance, while the running winding consists of thick enamelled copper wire so as to have a low resistance with high inductance. These two are spaced at 90° (electrical degrees) from each other and the impedance of the two circuits is so made that the phase difference between their currents is nearly 90° (elect.). This is called splitting the phase. The starting winding is connected in series with the centrifugal switch, it is fitted on the rotor shaft, and it automatically cuts out the starting winding when the motor is nearly up to its full speed. Connections are shown in the Fig. 1.



Working Principle: When the motor is connected across the supply, the current flows in both the windings, but this current is out of phase due to the unequal resistance and inductance. A rotating magnetic field is produced, a torque is exerted on the rotor and rotor tends to rotate. When the motor attains its 75% or 80% of the speed, the centrifugal switch disconnects the starting winding, and now, the motor is running on running winding only. The starting torque is low, but the starting current is high.

Use: It is used to drive blowers, fans, centrifugal pumps, etc

The motors which run on single phase supply are called single phase motors and convert electrical energy into mechanical energy.

Single phase motor not self starting motor: This motor is similar in construction to the three phase motor, with the exception that the stator has a single phase winding. When the stator of the motor is connected to a single phase supply, it produces only alternating field which keeps on varying. It does not produce any torque. In this way, the rotor remains stationary. If the rotor is slightly rotated by hand in any direction, the rotor will rotate in the direction in which it is rotated by hand. It means the alternating flux cannot produce rotating torque. That is why a single phase motor does not self start.

To make a motor self start, a rotating magnetic field is necessary to produce, just like in a three phase induction motor. To start a single phase motor, some form of starting device is necessary. Usually, an auxiliary winding is done in the stator to form a second phase winding. It is also known as split phase winding. It produces a field with its poles between the main poles. The flux due to the current in the two windings combines and produces a rotating magnetic field, and the rotor tends to rotate itself.

Principle of working of a single phase induction motor: The motor works on the same principle as of a three phase motor, *i.e.*, whenever a current carrying or short-circuited conductor is placed in a magnetic field, a torque is developed on the conductor, and the conductor tends to rotate in the direction of the rotating magnetic field.

