

# Single phase motors



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Report by ashok kaul Single Phase Motors When the availability of three-phase power is unreliable and the cost is a major factor, single-phase motor is the best alternative to use as a prime power source. Single-phase motors find us in vast applications ranging from home to small farms and industries. However, the successful running and little maintenance of a single phase motor will depend on the type and design of the motor selected for a particular application. Since most of the motor failure and other problems arise from the mismatch of the motor type with required application, a few types of single phase induction motors are given below, with their brief details; the difference mainly being in the way the motor is started.

#### Split Phase Motor

It is also called an induction start and induction run motor. This is the simplest form of a single-phase motor meant for small industries. There are two windings. While the starter winding has fewer gauge wiring and turns, the main winding has higher gauge wire with more turns. This puts the start winding field at a different angle to the main winding field, resulting in the motor to rotate. Then the main winding, which is of heavier wire, takes over and keeps the motor running. When the speed reaches up to around 75% of its peak, the switching mechanism, mainly a centrifugal switch on the motor shaft, disconnects the start winding from the main one. Although the application of such motor is advisable only for those jobs where the starting torque requirement is not high, this type of motor is least expensive for industrial uses.

#### Capacitor start and Induction run

This type is the most widely used motor for industrial applications. While this is similar to the split phase motor, the starter winding has a capacitor in the

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circuit, which gives a boost to the starting function. Here again the start winding and the capacitor are disconnected when the motor reaches up to 75% of its rated speed. Due to the wider applications, including those where the starting torque requirement is high, this type of motor is more expensive than the split phase type. These motors can be used for most of the belt drive applications like, small conveyors, Blowers and pumps. These can also be used for both, direct drive as well as geared applications

#### Permanent split capacitor

This type of motor neither has the capacitor connected to the start winding nor a switch for disconnection. However, a capacitor is connected to the start winding permanently, in series with it. Once the motor reaches its running speed, this run type capacitor turns the start winding into an auxiliary winding. The starting boost is missing here, as the capacitor connected is of a permanent type designed for continuous use.

The advantages of this type of single-phase motor are many that include no need to have a starting mechanism; speed controllers can be used with a slight alteration in the design etc. Due to these and other benefits, this type of motor is used where the reliability is needed. They can have a design to meet the requirement of high power factor at the rated load, thereby obtaining the optimum efficiency.

#### Capacitor start and run type

This type of single phase motor has the features of both the above types. While it has a start type capacitor in series with the auxiliary winding, it also has the run type capacitor like PSC motor described above, that takes over when the start type capacitor is switched off the circuit. This way the overload or high breakdown torque can be high. The main advantage of this

type of motor is that it works on a lower temperature as compared to other types of same horsepower single-phase motors. However, it is the most expensive of all the three types described here.

Sources

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