

Electric Motor

An electric motor converts electrical energy into kinetic/mechanical energy. When electric current is passed through a wire loop that is placed inside a magnetic field, a mechanical force is produced, and the resulting rotating motion is transmitted to a shaft which can provide useful mechanical work. The first electric motor was invented in 1821 by Michael Faraday. Electric motors can be driven both by alternative current (AC) and direct current (DC).

AC motors can be further divided into single phase and three phase motors. They consist of two parts. The first part is an outside stationary stator winding and the second part is the inside rotor. Synchronous motor and Induction motor are the most common types of AC motors. Synchronous motor rotates exactly at the supply frequency or a sub-multiple of the supply frequency. For induction motor, the phase differences, i.e. the slip, between the three phases of the electrical supply create a rotating electromagnetic field in the motor and hence the motor rotates. DC motors include brush motors, brushless motors and step motors. The classic DC motor has a rotating armature in the form of an electromagnet. Slip ring commutator is used to reverse the direction of the electric current twice in a rotating cycle. During polarity switching, the motor keeps going in the same direction by its own inertia.

The power output of electric motor is often measured by horsepower (馬力), a traditional measurement possibly based on the power of one horse. Motors come with different turning speed, usually specified as revolution per minute (RPM) at no load condition. The application of electric motor is ubiquitous in our daily life such as air-conditioners, washing machines, vacuum cleaners, lifts and escalators, cars, chillers, and generator-motor sets. They can also take a miniature form to reside in our PC hard disks, cameras, toy cars, and robots too.

The Electrical Blog is contributed by Electrical Division. If you would like to know more about this topic please contact the Division Hon. Secretary Ir Gary Ko, cwko@kumshing.com.hk

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