

Electric Drive Block Diagram, Types and Applications

The first electric drive was invented in 1838 by B.S.Iakobi in Russia. He tested a DC motor which is supplied from a battery to push a boat. Although, the application of electric drive in industrial can happen after so many years like in 1870. At present, this can be observed almost everywhere. We know that the speed of an electrical machine(motor or generator) can be controlled by the source current's frequency as well as the applied voltage. Although, the revolution speed of a machine can also be controlled accurately by applying the electric drive concept. The main benefit of this concept is too controlling the motion can be optimized simply using the drive.

What is an Electric Drive?

An Electric Drive can be defined as, a system which is used to control the movement of an electrical machine. This drive employs a prime mover such as a petrol engine, otherwise diesel, steam turbines otherwise gas, electrical & hydraulic motors like a main source of energy. These prime movers will supply the mechanical energy toward the drive for controlling motion

An electric drive can be built with an electric drive motor as well as a complicated control system to control the motor's rotation shaft. At present, the controlling of this can be done simply using the software. Thus, the controlling turns into more accurate & this drive concept also offers the ease of utilizing.

The types of electrical drives are two such as a standard inverter as well as a servo drive. A standard inverter drive is used to control the torque & speed. A servo drive is used to control the torque as well as speed, and also components of the positioning machine utilized within applications that need difficult motion.



Block Diagram of Electric Drive

The block diagram of an electric drive is shown below, and the load in the diagram signifies different kinds of equipment which can be built with an electric motor such as washing machine, pumps, fans, etc. The electric drive can be built with source, power modulator, motor, load, sensing unit, control unit, an input command.

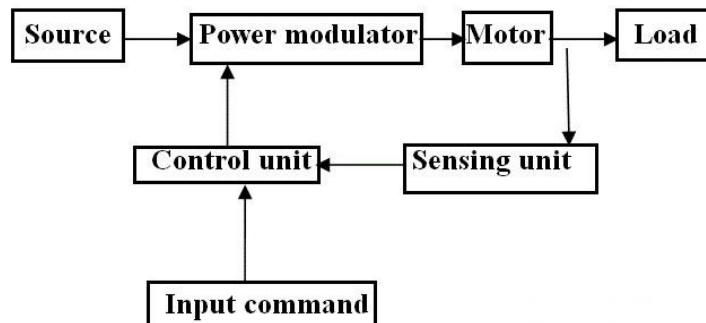


Fig. Block Diagram of Electric Drive

Power Source

The power source in the above block diagram offers the necessary energy for the system. And both the converter and the motor interfaces by the power source to provide changeable voltage, frequency and current to the motor.

Power Modulator

This modulator can be used to control the o/p power of the supply. The power controlling of the motor can be done in such a way that the electrical motor sends out the speed-torque feature which is necessary with the load. During the temporary operations, the extreme current will be drawn from the power source.

The drawn current from the power source may excess it otherwise can cause a voltage drop. Therefore the power modulator limits the motor current as well as the source.

The power modulator can change the energy based on the motor requirement. For instance, if the basis is direct current & an induction motor can be used after that power modulator changes the direct current into alternating current. And it also chooses the motor's mode of operation like braking otherwise motoring.

Load: The mechanical load can be decided by the environment of the industrial process & the power source can be decided by an available source at the place. However, we can choose the other electric components namely electric motor, controller, & converter.

Control Unit: The control unit is mainly used to control the power modulator, and this modulator can operate at power levels as well as small voltage. And it also works the power modulator as preferred. This unit produces the rules for the safety of the motor as well as power modulator. The i/p control signal regulates the drive's working point from i/p toward the control unit.

Sensing Unit: The sensing unit in the block diagram is used to sense the particular drive factor such as speed, motor current. This unit is mainly used for the operation of closed loop otherwise protection.

Motor: The electric motor intended for the specific application can be chosen by believing various features such as price, reaching the level of power & performance necessary by the load throughout the stable state as well as active operations.

Classification of Electrical Drives

Usually, these are classified into three types such as group drive, individual drive, and multi-motor drive. Additionally, these drives are further categorized based on the different parameters which are discussed below.

- Electrical Drives are classified into two types based on supply namely AC drives & DC drives.
- Electrical Drives are classified into two types based on running speed namely Constant speed drives & changeable speed drives.
- Electrical Drives are classified into two types based on a number of motors namely Single motor drives & multi-motor drives.
- Electrical Drives are classified into two types based on control parameter namely stable torque drives & stable power drives.

Advantages of Electrical Drives

The advantages of electrical drives include the following.

1. These drives are obtainable with an extensive range of speed, power & torque.
2. Not like other main movers, the requirement of refuel otherwise heat up the motor is not necessary.
3. They do not contaminate the atmosphere.
4. Previously, the motors like synchronous as well as induction were used within stable speed drives. Changeable speed drives utilize a dc motor.
5. They have flexible manage characteristics due to the utilization of electric braking.
6. At present, the AC motor is used within variable speed drives because of semiconductor converters development.

Disadvantages of Electrical Drive

The disadvantages of electrical drives include the following.

1. This drive cannot be used where the power supply is not accessible.
2. The power breakdown totally stops the entire system.
3. The primary price of the system is expensive.
4. The dynamic response of this drive is poor.
5. The drive output power which is obtained is low.
6. By using this drive noise pollution can occur.

Applications of Electrical Drives

The applications of electrical drives include the following.

The main application of this drive is **electric traction** which means transportation of materials from one location to another location. The different types of electric tractions mainly include **electric trains, buses, trolleys, trams, and solar-powered vehicles** inbuilt with battery.

Electrical drives are extensively used in the huge number of **domestic as well as industrial applications** which includes motors, *transportation systems, factories, textile mills, pumps, fans, robots, etc.* These are used as main movers for petrol or diesel engines, turbines like gas otherwise steam, motors like hydraulic & electric.

Thus, this is all about the fundamentals of electrical drives. From the above information, finally, we can conclude that a drive is one kind of electrical device used to control the energy which is sent to the electrical motor. The drive supplies energy to the motor in unstable amounts & at unstable frequencies, thus ultimately controls the speed and torque of the motor. Here is a question for you, what are the main parts of the electric drive.