

Introduction to Compressors

A compressor is a mechanical device like a pump that is used in various different applications. Find out here what a compressor does and what its different types are.

What Is a Compressor and How Does it Work?

An HVACR compressor is a refrigerant gas pump in which the evaporator supplies gaseous refrigerant at a low pressure and increases it to a greater pressure. Upon being compressed, the temperature and pressure of the vapor are increased. The gaseous refrigerant is delivered to the condenser at a pressure at which condensation occurs at an appropriate temperature.

A compressor consists of two components: the power source and the compressing mechanism (piston, vane, etc.). In the case of an air compressor, the compressing mechanism is in fact compressing the atmospheric air. The air compressor works in the following way:

Air enters the piston or vane, and it is compressed by increasing its pressure and at the same time decreasing its volume. As soon as the pressure reaches a maximum set by the operator or the manufacturer, a switch mechanism prevents any further air intake in the compressor. The compressed air is used and pressure levels decrease. As soon as the pressure reaches a minimum, also set by the operator or the manufacturer, the switch allows air to enter the compressor. This procedure is repeated as long as the compressor is being used.

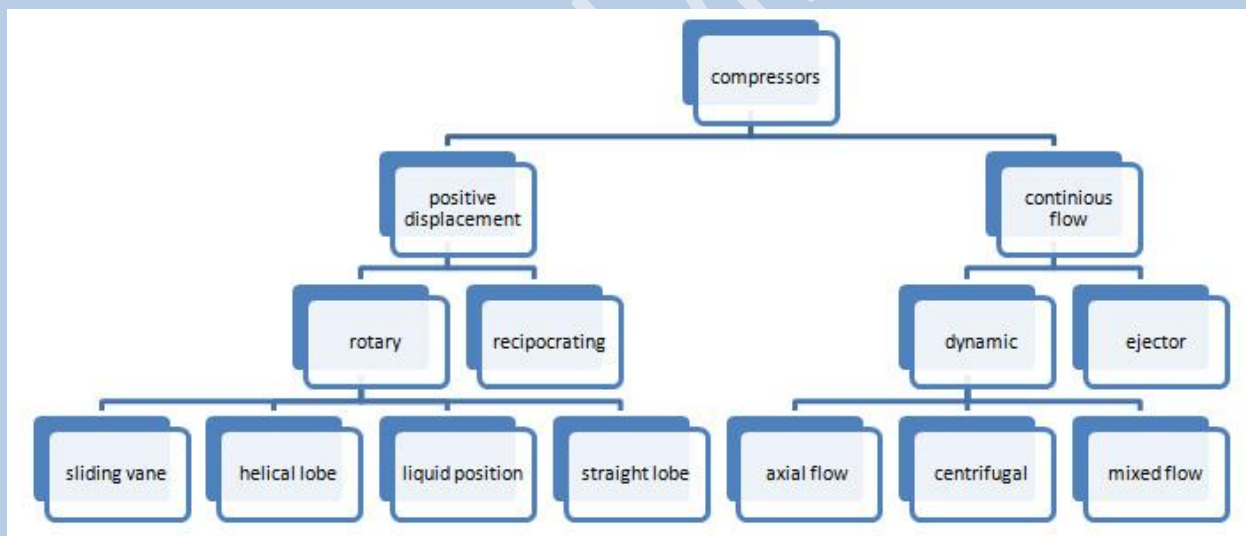
Performance Factors for Compressors

Factors which affect the performance of compressors are:

- speed of rotation
- pressure at suction
- pressure at discharge and
- type of refrigerant being used

Similar compressors can operate at different capacities by varying their refrigerants and compressor horsepower input. When purchasing any type of compressor, the buyer should check certain characteristics that include the machine configuration, the operation type, the price, and the operating cost. In any case, he should check the performance of the compressor and consult with the manufacturer about the most suitable and safest compressor for his budget and requirements.

Types of Compressors



The image above shows the available types of compressors. The most common ones used in refrigeration are described below:

Rotary: Compressors of the rotary type are generally low capacity equipment, used normally in home refrigerators and freezers, and not used for air conditioning.

These compressors can consist of one vane, which is placed in the body, and sealed against the rotor, or multivane rotary, with vanes located in the rotor.

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Centrifugal Compressors: These compressors revolve at high speed, and refrigerant is compressed by the application of centrifugal force. These compressors are normally used with refrigerants possessing higher specific volumes, which need lower compression ratios. Multi-stage units can be used to attain greater discharge pressures, and the number of stages is determined by the discharge temperature of the gas as it exits from the rotor. These compressors are utilized for water chilling in air conditioning and for low temperature freezing purposes.

Reciprocating Compressor: These compressors have pistons, and move in cylinders. Types of reciprocating compressors are:

- **Open Compressors:** One extremity of the crankshaft is drawn out of the crankcase, due to which multiple drives can be used with the compressor. A mechanical seal is used to check external seepage of refrigerant and oil, and escape of air towards the inside. These compressors are driven by electric motors or internal combustion engines. With belt drive, changes in speed are achieved by altering the dimensions of the pulleys, while with direct drive units the compressor is planned to operate at the speed of motor.
- **Hermetic Compressors:** These compressors are serviceable hermetic, in which motor and compressor are enclosed in the same housing, while the welded hermetic type has the compressor and motor sealed in a welded steel shell.

Applications of compressors:

The applications of the compressors are as follows:

- The difficulties of vapor contaminants process generate the requirement to apply and analyze the distinct type of compressors.
- In the fields of production, the distinct types of equipment like nut runners are powered by availing compressed air.
- The air compressors and gas compressors avails air pressure for measuring instrument.
- The air compressors and gas compressors are used in many industries like electronics, automobiles, steel, chemicals, food processing industry, machinery, pharmaceuticals, construction, civil engineering, glass, pulp and paper, and theme parks.

Accessories

- Lubrication

- Cooling
- Filtering

Lubrication

- MAIN FUNCTION IS TO REDUCE FRICTION BETWEEN THE MOVING PARTS
- LUBRICATION HELPS COOLING THE COMPRESSOR MOVING PARTS AND HELP PREVENT THE LEAKING GAS OUT OF COMPRESSOR.

Cooling

WHEN A GAS IS COMPRESSED HEAT IS PRODUCED THIS HEAT CAN CAUSE TWO PROBLEM .

1. EXCESS HEAT CAN BREAK DOWN OIL CAUSING IT TO BE LOOSE ITS LUBRICATING CHARACTERISTIC
2. GASES EXPAND WHEN THEY ARE HEATED SINCE COMPRESSOR IS DESIGNED TO COMPRESS GASES THE EFFECT CREATE ADDITIONAL FORCE WHICH COMPRESSOR MUST OVERCOME.

Heat Removal

AIR COOLING AND WATER COOLING ARE TWO TECHNIQUES

1. AN AIR COOLED COMPRESSOR EASILY IDENTIFIED BY METAL FINS ON ITS CASING
2. THE FINS PROVIDE INCREASED SURFACE AREA.

Advantages of centrifugal compressor over reciprocating device:

The benefits of a centrifugal compressor over reciprocating device are explained below:

- It has low maintenance cost.
- It has low installation cost.
- It has high continuity of service and also dependability.
- It is adaptable to high speed and less maintenance cost drivers.

Advantages of reciprocating compressor over a centrifugal device are as follows:

The advantages of a reciprocating compressor over a centrifugal device are explained below:

- It contains high flexibility in the range of pressure and capacity.
- It has a greater efficiency of the compressor.
- It is less sensitivity to the changes to the composition of gas and density.

Disadvantages of reciprocating compressor:

The disadvantages of a reciprocating compressor are as below:

- Separate heavy foundation
- Pulsating flow
- Vulnerable to dirt and liquid
- Low reliability
- Maintenance
- Plot area