DENSO

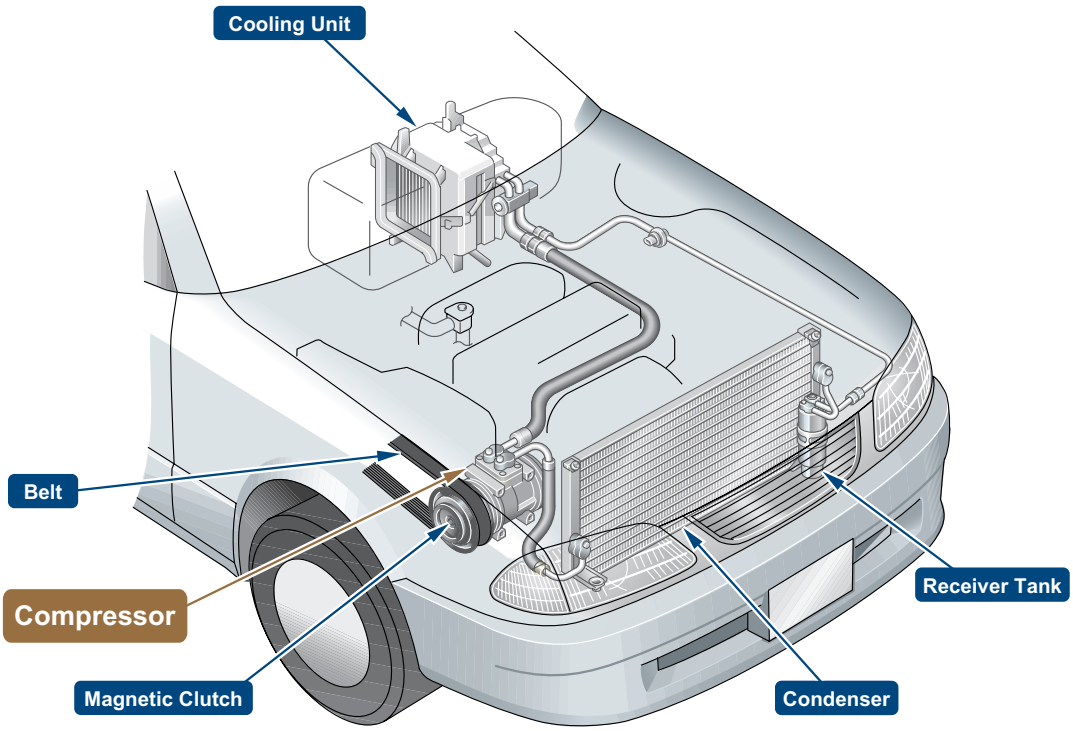
Basic Technology Series

Compressor Fundamentals

2008 Compressor #001

Fundamentals of the Compressor

The air conditioner compressor is operated by the engine via a belt and magnetic clutch. The evaporator in the cooling unit absorbs the heat in the passenger compartment, thus vaporizing the refrigerant into a low-temperature, low-pressure gas. The compressor draws and compresses this refrigerant into a high-temperature, high-pressure gas and sends it to the condenser.



Examples of the Main Car Air Conditioner Components Mounted Onboard

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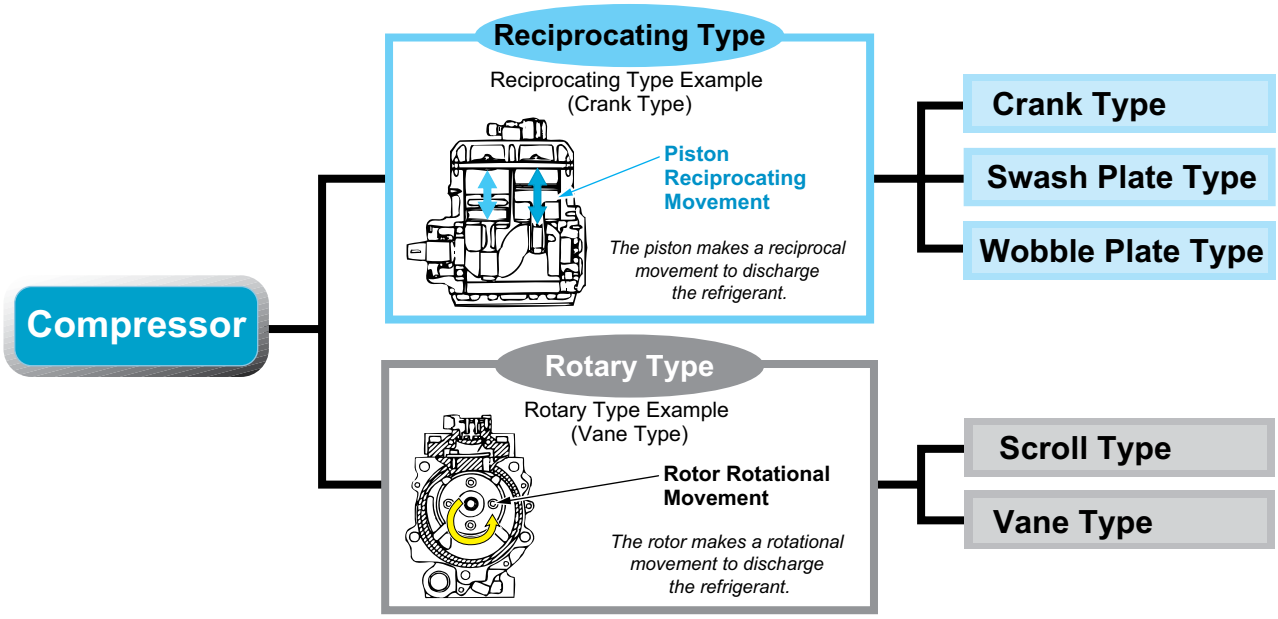
Classification and History

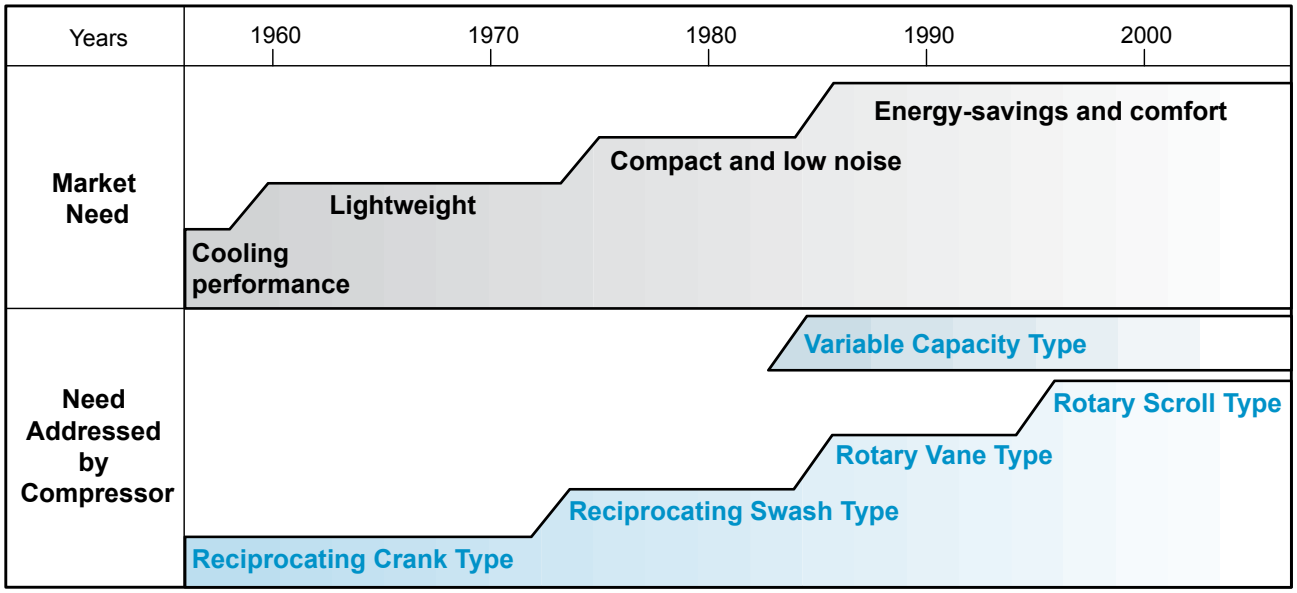
The compressors that are used for car air conditioners are classified into the reciprocating and rotary types. The reciprocating type is further divided into the crank, swash, and wobble types. The rotary type is further divided into the scroll and vane types.

■ Classification

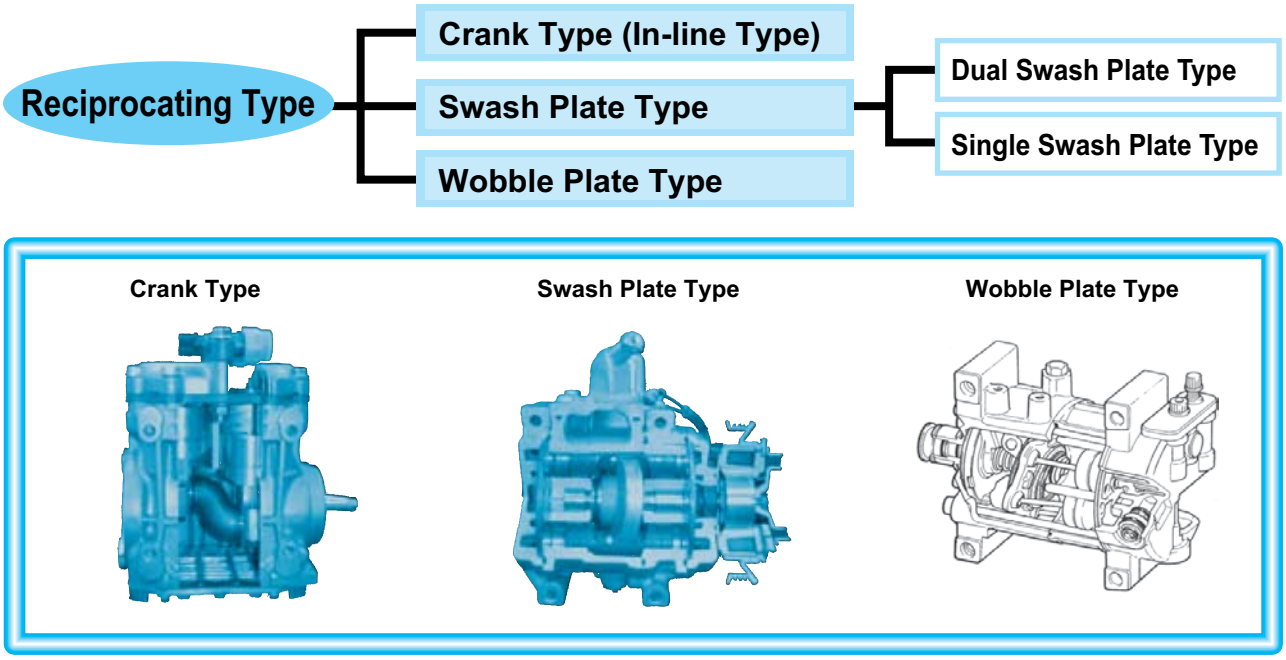


■ History

There was a time when users required the air conditioner to deliver only cooling performance. As the market evolved, other attributes were required such as lightweight, compact, low-noise, energy-saving, and comfortable air conditioners. Thus, air compressors that meet these market needs are in use today. Although reciprocating compressors were used in the beginning, rotary compressors came into use in order to meet the need for a compact and low-noise system. Then, to meet the need for energy-savings and comfort, variable-displacement compressors, which change the discharge capacity in accordance with the cooling or engine load, made an appearance.



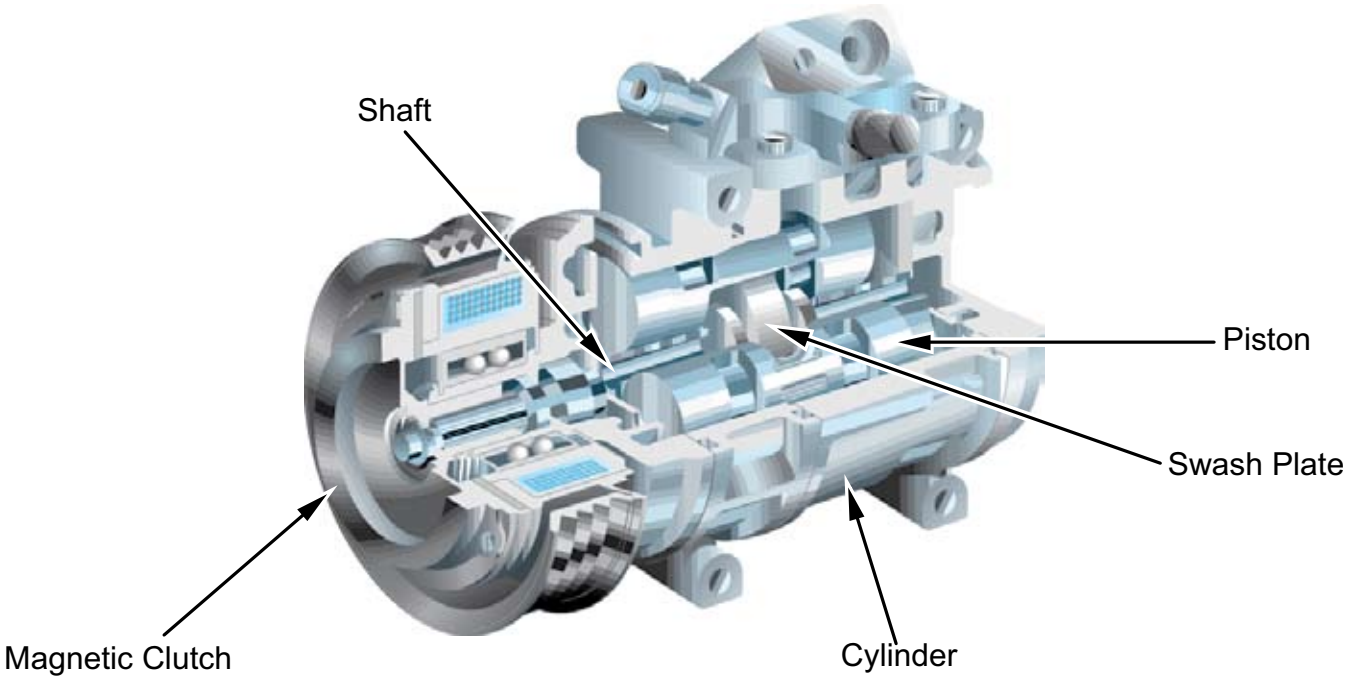
Reciprocating Type Compressor



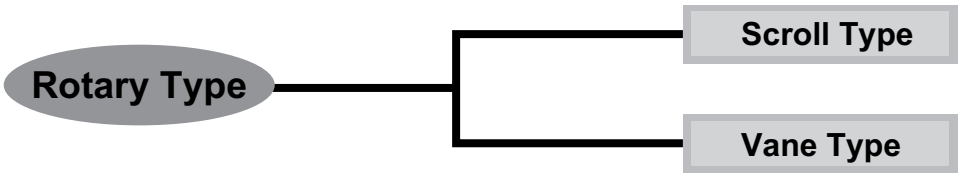
The following is an outline of the swash plate type compressor, which is a representative type of reciprocating compressor.

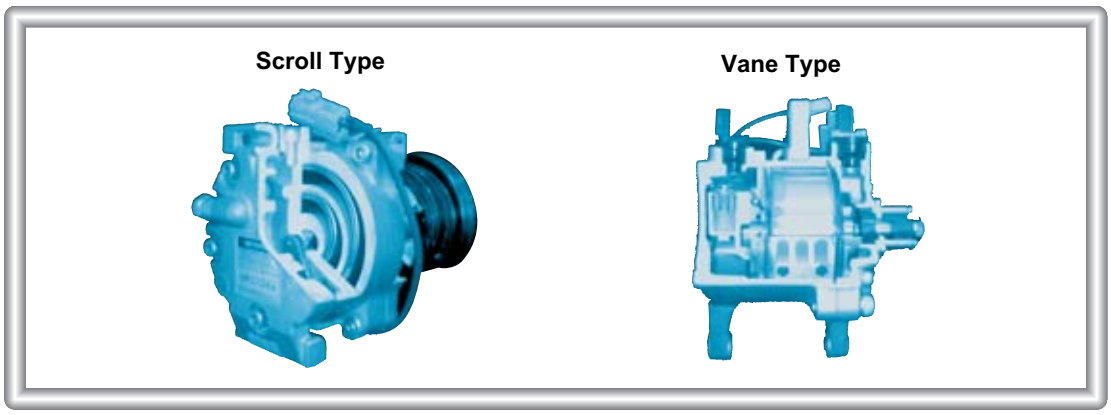
■ Swash Plate Type Compressor

This type of compressor contains 3 pairs of pistons (in 6 cylinders) or 5 pairs of pistons (in 10 cylinders), with a swash plate mounted diagonally on a shaft. As the shaft rotates, the swash plate that is integrated with the shaft converts this rotational movement into reciprocating movement of the pistons, which draw and compress the refrigerant gas.



Rotary Type Compressor

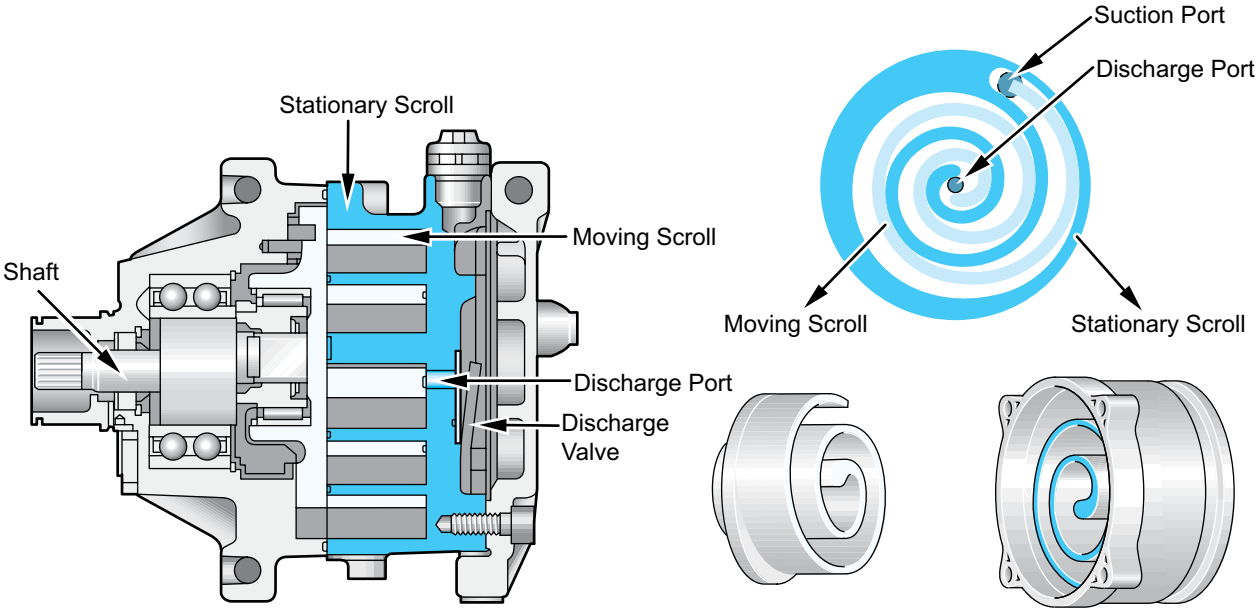




The following is an outline of the scroll type compressor, which is a representative type of rotary compressor.

■ Scroll Type Compressor

This type of compressor consists of a pair of spiral scrolls: one is stationary and the other is movable. The movable scroll is eccentrically connected (off-set) to the compressor shaft. When the compressor shaft rotates, the moving scroll does not revolve, but makes a circular movement while maintaining the same posture. Therefore, the capacity of the space that is partitioned by the two scrolls changes, in order to draw and compress the refrigerant gas.



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