

When the control valve of compressor "goes on strike"...

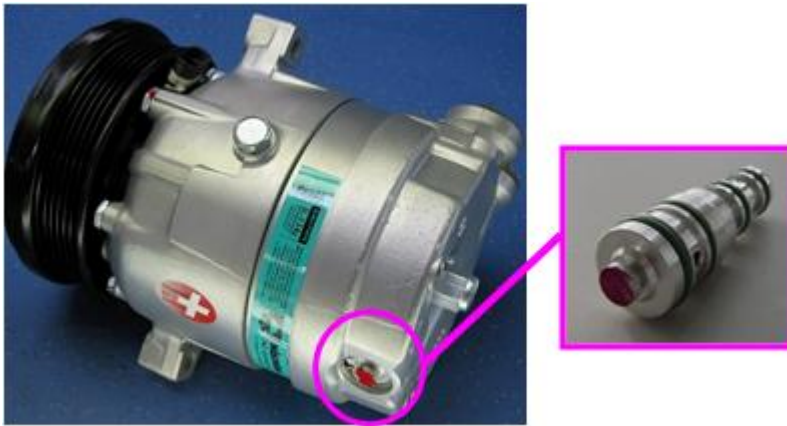
The auto compressor is the core driving component of the automotive air-conditioning. For vehicles with fixed displacement compressor, the cooling capacity of the air-conditioning alters with the change of the engine speed, and the temperature fluctuations in the vehicle cannot be stably controlled. The air-conditioning with variable displacement compressor can realize the "intelligent" adjustment of the cooling capacity under different heat loads, and always control the temperature inside the car under a stable state. Therefore, most modern car air-conditionings use variable displacement compressors today to meet the requirements of vehicles in terms of power, energy saving and comfort.

Usually, a small component called "control valve" is embedded in the variable displacement compressor, which is the control center of the compressor displacement adjustment and the key component of the stepless variable adjustment of the air-conditioning cooling capacity.



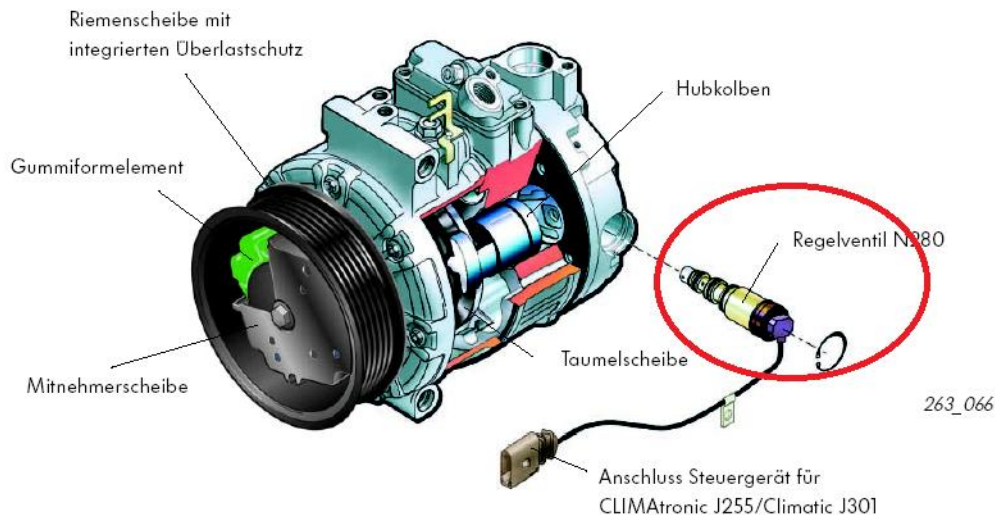
Internally controlled valve

The birth of variable displacement automotive air conditioning compressor can be traced back to the 1970s. Earlier variable displacement compressors used an internal control method (with a mechanical control valve embedded) to keep the compressor suction pressure stable under different heat loads and different vehicle speeds (thereby maintaining the evaporating temperature of the evaporator at about 0°C), and then, by mixing hot air so as to increase the temperature of air supply in the HVAC, to achieve the desired temperature in the car.

**Externally controlled valve**

With the continuous development of technology, externally controlled variable displacement compressors (also known as "electronically controlled variable displacement compressors") began to be applied to automobiles in the late 1990s. As part of the vehicle's overall control system, the air-conditioning control unit outputs the controlling signals to adjust the movement of the control valve according to various temperature parameters and heat loads, thereby changing the displacement and cooling capacity of the compressor. Compared with the internally controlled variable displacement compressors, externally controlled variable

displacement compressors are more intelligent and precise in adjusting the cooling capacity of air -conditioning and are more energy efficient.



Failure modes

Whether it is an internally or externally controlled valve, when they "go on strikes" due to faults and abnormalities (mechanical or electrical failures), under such circumstance, the variable displacement compressor will lose the ability to alter the displacement (then it becomes equivalent to a fixed displacement compressor), the cooling capacity of the air-conditioning only changes with the change of the engine speed, resulting in temperature fluctuations in the car, which cannot be controlled stably. For example, in a vehicle equipped with a variable displacement compressor, if the air-conditioning is not cold at the idle, but when the engine speed increases, the air temperature will drop apparently; after the vehicle resumes idle, the air temperature climbs again. For such a case, the cause behind it is likely because of a malfunction with the variable displacement control valve of the compressor.