Products Whose Use Leads to Prevention of Global Warming
Delivering Products that Reflect Concern for Conserving Energy and Other Resources

Our environmental initiatives in the development of compressor products include improving car fuel efficiency, preventing global warming that may result from the use of car air conditioners, and other measures to lower the environmental impact, such as:

●Energy conservation: Making compressors more efficient, introducing compressor systems with external control variable displacement, etc.

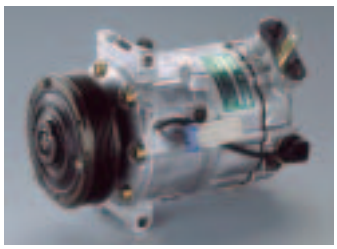
●Resource conservation: Making units lighter, introduction of common parts, standardization, reuse of materials, lengthening equipment lives, improving recyclability, etc.

●Lowering environment impact: Compliance with laws regarding harmful and restricted substances, reduction of emissions, reduction of coolant leakage, etc.

In addition to these initiatives, we are proceeding with R&D on electric-powered compressors for use in hybrid and other automobiles and compressors that use non-CFC coolants.

Examples of Initiatives

Compressors with External Control Variable Displacement



These compressors are able to control compressor function at the optimal level by responding to signals from external sensors that detect the temperature inside the automobile, amount of sunlight, and other factors. As a result, since temperatures can be controlled more precisely, the following beneficial effects are obtained:

●These compressors contribute to better fuel economy through improvement in energy usage resulting from avoidance of overcooling.

●They also contribute to drivability because of their ability to vary compressor displacement continuously with the use of a clutch.

Demand for these compressors is especially strong in Europe, where they are one of our principal products, because of the prevalence of smaller automobiles.

Compressors for Hybrid Automobiles

As a consequence of the growing seriousness of global warming issues and rising crude oil prices, automobile manufacturers are introducing more and more hybrid cars that feature superior fuel economy. This trend is expected to continue.

Sanden's hybrid compressors offer two drive modes: the belt drive mode powered by engine torque and the internal electric motor powered by the battery. As a result,

●The air-conditioning system can be used, even when the gasoline engine is turned off.

●When the car is running, the internal systems can switch between engine torque power and electric power, using either one of these power sources or a combination of the two to achieve the greatest fuel economy.

Electric-Powered Compressors—Natural Coolant Compressors

Most open compressors are driven by the vehicle's engine. As a result, they require shaft seals and sealing materials, from which tiny amounts of HFC134a escape into the atmosphere, directly contributing to global warming. We are developing technologies and materials that can minimize the amount of HFC134a that escapes from the compressor. We are also working on technologies to make compressors more energy efficient.

At Sanden, we are actively engaged in initiatives to use non-CFC coolants to contribute to the prevention of global warming and are working on the development of compressors that use CO_2 as a natural refrigerant. When vehicle air-conditioning systems are adapted to use CO_2, the pressure will rise about 10 times in comparison with R134a. Another property of these CO_2-based systems will be that gas will not condense on the high-pressure inner side. Accordingly, when introduced, these new products will incorporate high-pressure seal technology and control technology.

Compact, High-Efficiency HVAC Units

Compact, high-efficiency HVAC unit (under development)

From the perspective of global warming, energy conservation has become a major issue, and an emergency response is required. To respond, we are moving ahead with R&D in this area under the concept of "Light & Compact." These activities have led to the development of our compact and highly efficient HVAC units, which incorporate our technological capabilities. For example, as a result of improvements in the airflow configuration, we have succeeded in reducing heat loss and lowering airflow resistance through improvements in the location of the heat-exchange unit as well as reduced the size of the unit through the adoption of a high-performance evaporator. Compared with previous units, HVAC units take up 15% less space, but they offer 15% higher cooling capacity and 20% higher heating capacity.