

# AUTOMATIC AIR-CONDITIONING

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In recent years, air-conditioning has shifted from being a luxury option, reserved for up-market saloons, to basic equipment requested as standard.

What's more, **as well as the comfort provided, air-conditioning contributes to safety.** On the one hand, studies have shown that when the temperature in the cabin exceeds 28 °C, driver behaviour tends to deteriorate, owing to discomfort and tiredness caused by the excessive heat. On the other hand, air-conditioning enables the air in the passenger compartment to be dried, preventing the formation of mist on the windscreen and windows.



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## BASIC FACTS

**Air-conditioning** is used to cool the air temperature. Automatic air-conditioning ensures optimal heat comfort whatever the external conditions, by both heating and cooling the air distributed in the passenger compartment ventilation circuit. Renault equips

many of its models with automatic airconditioning control by zone. The system acts on the temperature of the air blown from various air outlets according to the specific needs of each zone in the passenger compartment. Finally, on some vehicles with

hands-free cards (see sheet), the airconditioning parameters are automatically memorised. The personal settings of the driver are restored when the car detects his card.

▸ Safety

▸ Environment

▸ Life on board

▸ Mobility

▸ Competitiveness

## IN SHORT

AS WELL AS PROVIDING COMFORT BY MAINTAINING A CONSTANT TEMPERATURE IN THE CABIN, AIR-CONDITIONING ALSO PLAYS A ROLE IN SAFETY, BY PREVENTING CONDITIONS WHICH MAY LEAD TO A DROP IN DRIVER VIGILANCE. IN THE WINTER, IT ALSO PREVENTS THE FORMATION OF MIST ON THE WINDSCREEN AND WINDOWS BY DRYING THE AIR IN THE PASSENGER COMPARTMENT.

# HOW DOES IT WORK?

**To carry out the task satisfactorily**, a computer manages the automatic adjustment of the air-conditioning. It uses sunshine, temperature and air quality sensors. The first two enable it to regulate the temperature of the air that is distributed through the air-conditioning circuit, the third commands the switch-over to "recycling" mode as soon as it detects external air pollution. Note that recycling mode is also activated automatically after the car has remained stationary in the sun for a long time, to ensure rapid lowering of the cabin temperature. To simultaneously deliver both the heating and cooling of the air distributed throughout the cabin, the air-conditioning has a double circuit. These circuits are known as the "cold loop" and the "heat loop".

**The cold loop** functions by way of a system identical to that found in refrigerators and freezers. A compressor with variable cubic capacity (in order to be able

to precision-manage the action of the air-conditioning) is driven by the car engine. It contains coolant at a pressure of approximately 20 bar. Under the effect of this compression, the temperature of the coolant, now in a gaseous state, rises to reach 100 °C. The coolant then moves across a condenser in the form of a radiator placed in the car air intake grille and therefore subjected to the temperature of the ambient air. The fall in temperature which takes place in the condenser causes the coolant to liquefy. In liquid form, it reaches an expansion valve – a special valve that lowers the pressure of the coolant to within the neighbourhood of 3 bar as well as the temperature to approximately 2 °C – then it moves through an evaporator which acts as a second radiator where once again, the coolant changes from a liquid state to a gaseous state, thanks to the heat exchange which takes place between the coolant and the air. The air yields its heat to the fluid, which allows it to change from a liquid state to a gaseous state.

A fan then blows the air coming from outside, or else recycled air, through the evaporator and thus supplies cold air to the cabin.

**The hot air loop** uses the coolant circuit of the engine. A fan propels air through an auxiliary radiator, where it heats up. This process is comparable to that used by the traditional heating system of cars with no air-conditioning. However, because of the increase in the efficiency of current engines, and therefore a lessening of their release of heat, an auxiliary heating device using an electric resistance is often present to speed up the rise in cabin temperature. Lastly, to reduce misting of the windscreen and windows, the cold air-conditioning circuit can be used even in winter. Its function is then to dry out the cabin air by creating a "cold point" in its circuit where the moisture can condense. Renault has equipped some of its models with a cabin air moisture sensor to automate this demisting function.

