

Description and Operation

System Diagram

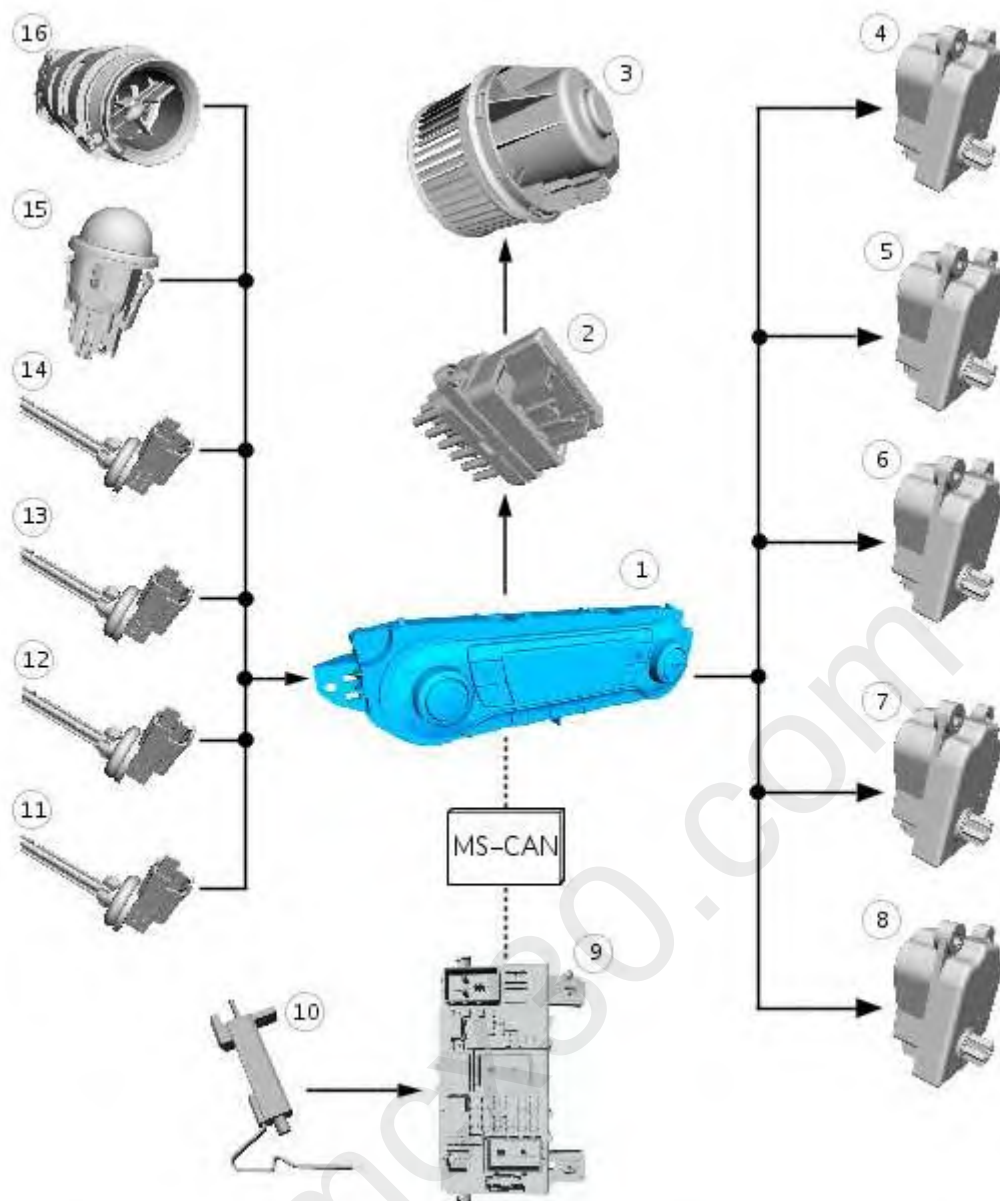
Climate control system - vehicles with manual temperature control



E97574

Item	Description
1	Climate control system control assembly Refer to Component Description: Control assembly, climate control - vehicles with manual temperature control
2	Air flap actuator
3	Blower motor resistor
4	Blower motor

Climate control system - vehicles with automatic temperature control

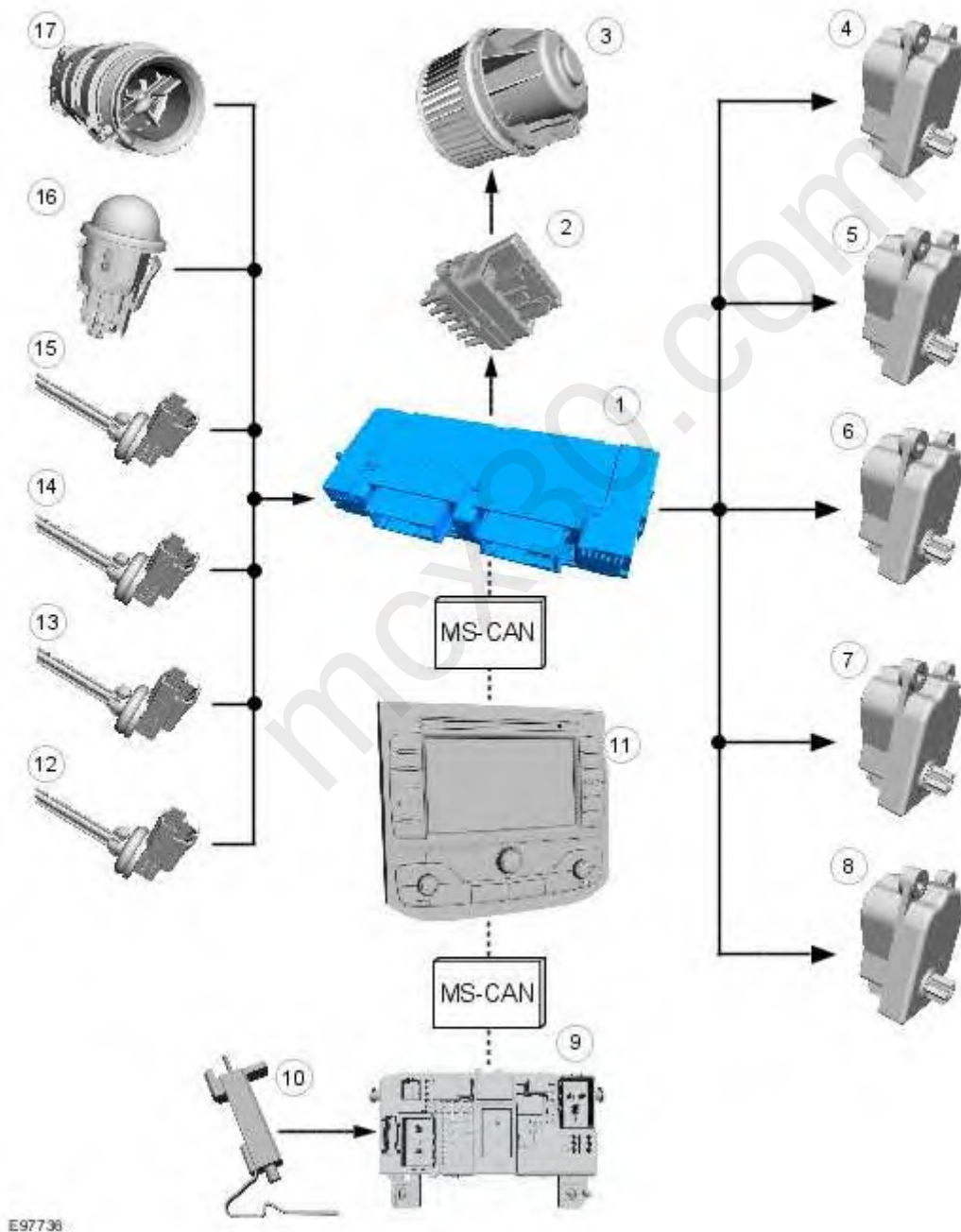


E97575

Item	Description
1	Climate control system control assembly Refer to Component Description: Control assembly, climate control - vehicles with automatic temperature control
2	Blower control module Refer to Component Description: Blower control module - vehicles equipped with automatic temperature control
3	Blower motor Refer to Component Description:
4	Air flap actuator
5	Actuator - right-hand temperature control flap
6	Actuator - left-hand temperature control flap
7	Actuator - air distribution flap - demister vents
8	Actuator - air distribution flap - center vents
9	Genetic electronic module (GEM).

- | | |
|----|--|
| 10 | Ambient air temperature sensor
Refer to Component Description: Ambient temperature sensor |
| 11 | Air outlet temperature sensor - left-hand center vents |
| 12 | Air outlet temperature sensor - right-hand center vents |
| 13 | Air outlet temperature sensor - left-hand footwell |
| 14 | Air outlet temperature sensor - right-hand footwell |
| 15 | Solar sensor
Refer to Component Description: Sun sensor - vehicles with automatic temperature control |
| 16 | In-vehicle temperature sensor
Refer to Component Description: |

Climate control system - vehicles with DVD navigation system with a touch screen



E97736

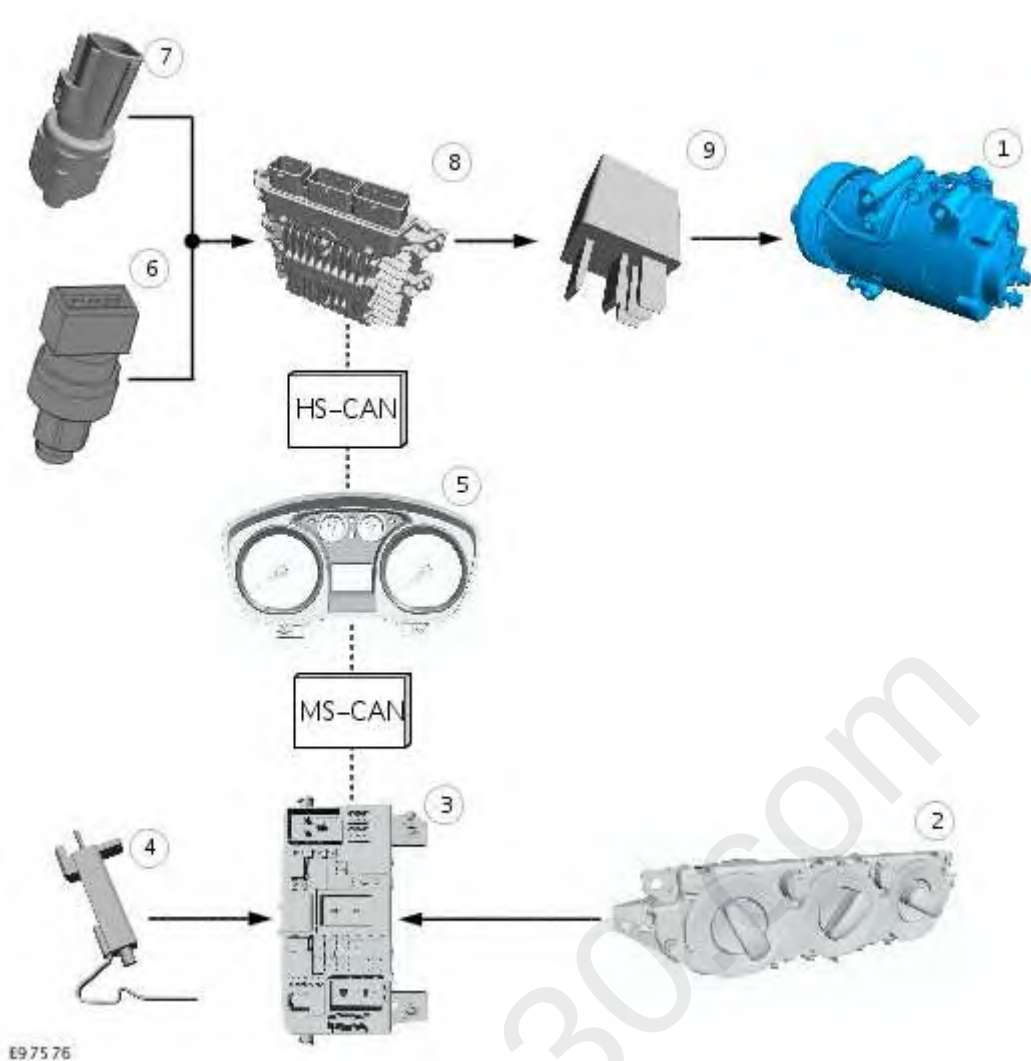
Item	Description
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- | | |
|---|------------------------|
| 1 | Climate control module |
|---|------------------------|

Refer to Component Description: Climate control module - vehicles with DVD navigation system with a touch screen

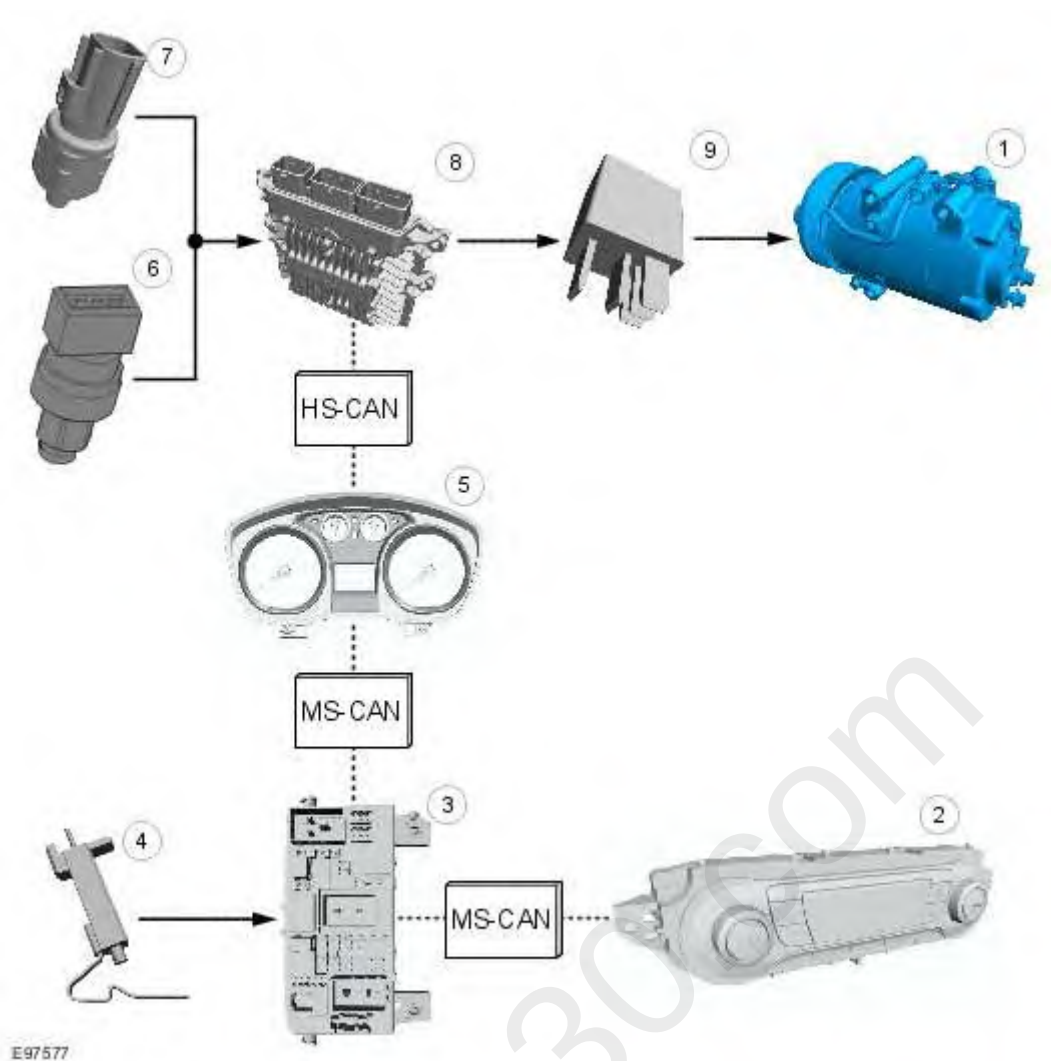
2	Blower control module Refer to Component Description: Blower control module - vehicles equipped with automatic temperature control
3	Blower motor Refer to Component Description:
4	Air flap actuator
5	Actuator - right-hand temperature control flap
6	Actuator - left-hand temperature control flap
7	Actuator - air distribution flap - demister vents
8	Actuator - air distribution flap - center vents
9	Genetic electronic module (GEM).
10	Ambient air temperature sensor Refer to Component Description: Ambient temperature sensor
11	DVD navigation system with touchscreen
12	Left-hand air outlet temperature sensor - left-hand center vents
13	Air outlet temperature sensor - right-hand center vents
14	Air outlet temperature sensor - left-hand footwell
15	Air outlet temperature sensor - right-hand footwell
16	Solar sensor Refer to Component Description: Sun sensor - vehicles with automatic temperature control
17	In-vehicle temperature sensor Refer to Component Description:

Air conditioning system - vehicles with manual temperature control



Item	Description
1	Air conditioning compressor
2	Climate control system control assembly Refer to Component Description: Control assembly, climate control - vehicles with manual temperature control
3	Genetic electronic module (GEM).
4	Ambient air temperature sensor Refer to Component Description: Ambient temperature sensor
5	instrument cluster
6	High pressure limiting switch
7	Dual pressure switch
8	Powertrain control module (PCM)
9	Air conditioning clutch relay

Air conditioning system - vehicles with automatic temperature control

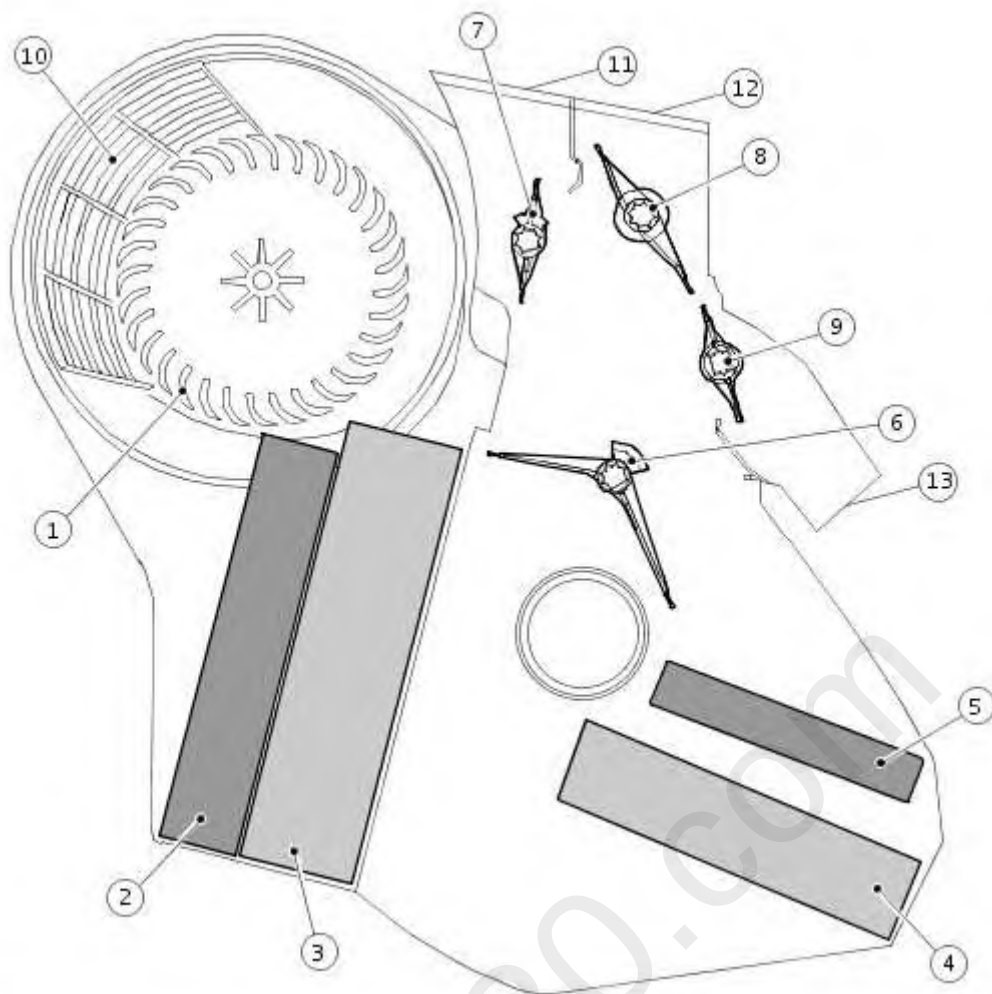


Item	Description
1	Air conditioning compressor
2	Climate control system control assembly Refer to Component Description: Control assembly, climate control - vehicles with automatic temperature control
3	Genetic electronic module (GEM).
4	Ambient air temperature sensor Refer to Component Description: Ambient temperature sensor
5	instrument cluster
6	High pressure limiting switch
7	Dual pressure switch
8	Powertrain control module (PCM)
9	Air conditioning clutch relay

System Operation

Climate control housing

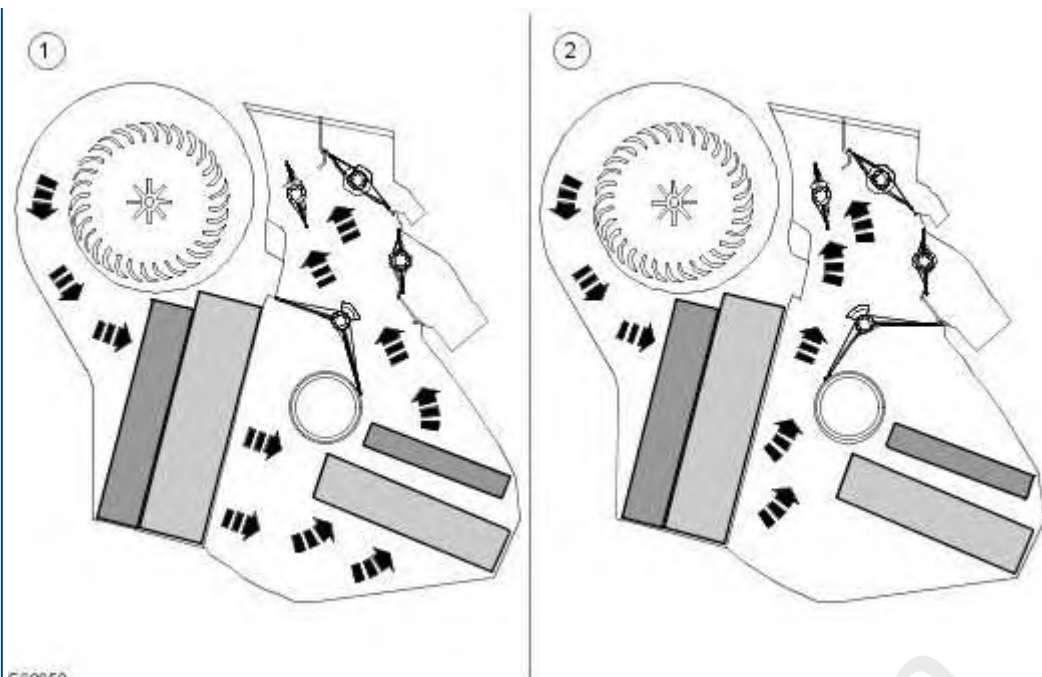
General overview



E97261

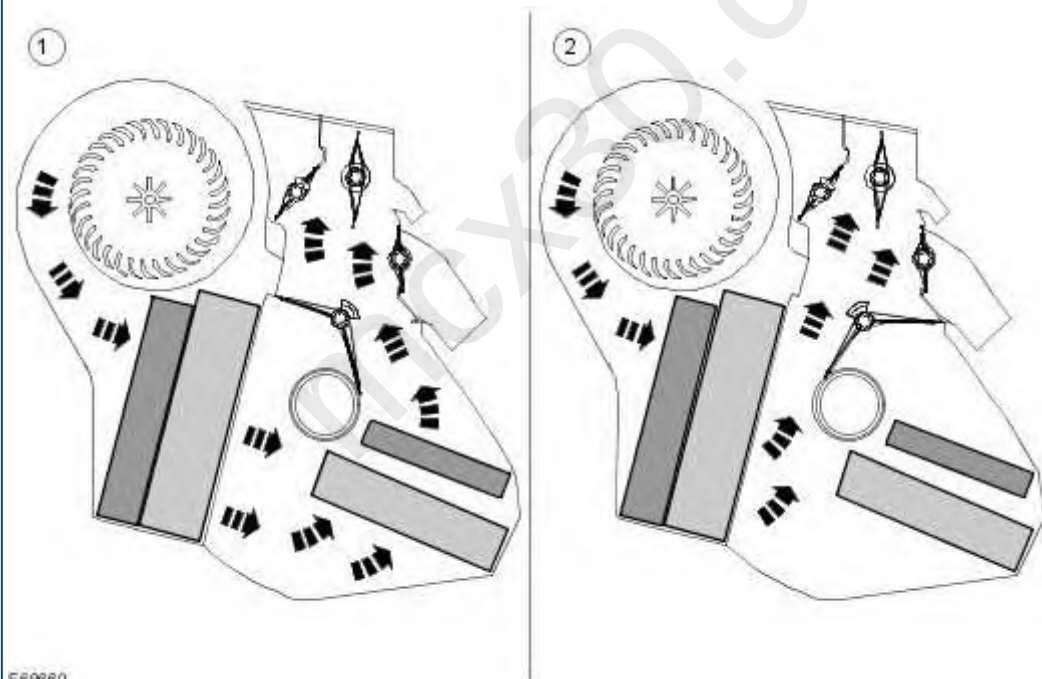
Item	Description
1	Blower motor Refer to Component Description:
2	Pollen filter Refer to Component Description:
3	Evaporator assembly
4	Heat exchanger
5	Electric booster heater (if equipped)
6	Temperature blend door motor
7	Air distribution flap, demister vents
8	Air distribution door - center vents
9	Air distribution door - footwell
10	Air intake door
11	Air duct, demister vents
12	Air passages - center vents
13	Air ducts, rear footwell

Air flow - defroster vents



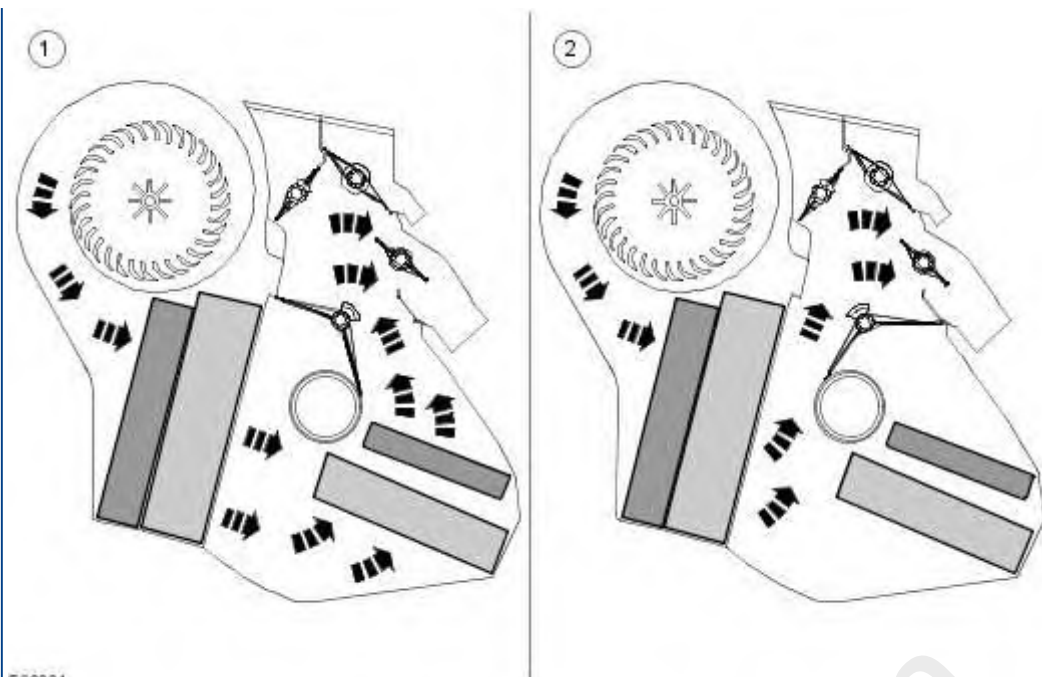
Item	Description
1	Warm air
2	Cold air

Air flow - center vents



Item	Description
1	Warm air
2	Cold air

Air flow - footwell



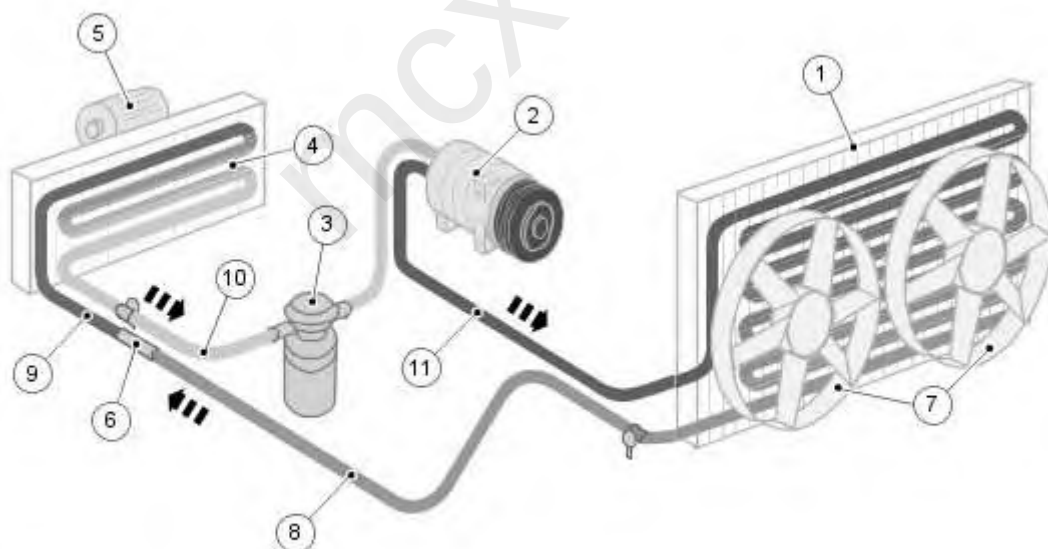
E69661

Item	Description
1	Warm air
2	Cold air

Climate control

Two options are available:

- manual climate control
- Air conditioning system with automatic temperature control (DEATC)



E100819

Item	Description
1	Condenser
2	Air conditioning compressor
3	Suction accumulator

4	Evaporator assembly
5	Blower motor
6	Evaporator Core Orifice Tube
7	Cooling fans.
8	High - pressure (liquid and warm)
9	Low - pressure (liquid and cool)
10	Low pressure (gaseous and cold)
11	High pressure (gaseous and hot)

The engine driven refrigerant compressor (2) sucks in gaseous refrigerant from the suction accumulator and compresses it. The temperature of the refrigerant rises to a value between 70 °C and 110 °C. It passes to the condenser (1) under high pressure.

At this point heat is drawn from the refrigerant by the air being forced past the cooling fins. Because of this heat loss, the refrigerant liquefies and leaves the condenser.

A fixed orifice tube (6), which separates the refrigerant at high pressure from that at low pressure, is located between the condenser and the evaporator (5). This fixed orifice tube slows down the flow of the refrigerant from the compressor, so that pressure builds up in the condenser.

After passing through the fixed orifice tube the liquid refrigerant expands in the circuit to the evaporator, where it becomes gaseous. This causes heat to be extracted from the air coming into the vehicle. The air cools down, and excess moisture contained in it is condensed and is drained off. The refrigerant coming from the evaporator flows into the refrigerant accumulator and is again sucked in by the refrigerant compressor.

The system is protected by a high-pressure limiting switch, in order to prevent damage by excessive pressure (e.g. because of overfilling with refrigerant). If the pressure exceeds the maximum permitted, the high-pressure switch turns off the refrigerant compressor.

The compressor on-off cycle is controlled by the dual pressure switch depending on the pressure in the refrigerant accumulator. The dual pressure switch turns the refrigerant compressor off permanently if the pressure falls below a permitted value (e.g. if there is a leak).

Component Description

Air conditioning compressor



The special feature of a compressor with variable swash plate is that the stroke of the pistons can be varied by means of the variable swash plate. The swash plate is mounted on a slide rail in the axial direction.

The piston stroke and thus the delivery rate are determined by means of the variable obliqueness of the swash plate.

The obliqueness of the swash plate is dependent upon the chamber pressure and thus on the pressure conditions at the top and bottom of the piston. This is supported by springs in front of and behind the swash plate.

The chamber pressure is determined by the high and low pressure applied to the control valve and by a calibrated orifice bore. If the low pressure is relatively high, the control valve is opened and the chamber pressure is reduced.

If the low pressure is relatively low, the control valve is closed and the chamber pressure is increased. The force due to the chamber pressure exerted on the piston bottom, is higher than the sum of the force due to the low pressure on the piston top and the spring force.

Pollen filter



E97720

The fresh air flowing into the vehicle through the air inlet housing passes through a pollen filter which is located on the left-hand side of the climate control housing (LHD and RHD) and removes pollen and dust particles measuring 0.003 mm or more.

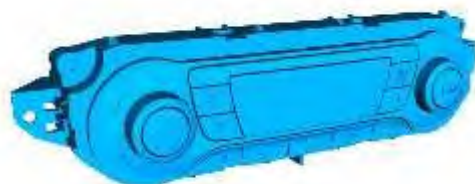
Control assembly, climate control - vehicles with manual temperature control



E97721

In vehicles with manual temperature control, the heating and air conditioning are operated using three rotary switches. The air distribution flaps are actuated via the air distribution flap/temperature control flap actuating unit, which is connected via a rod to the control assembly for the climate control. The temperature control flap is also actuated via the air distribution flap/temperature control flap actuating unit, which is connected via a cable to the control assembly. In addition, the operating switch for recirculated air mode and the on/off switch for the air conditioning are located on the control assembly.

Control assembly, climate control - vehicles with automatic temperature control



E97722

Vehicles with automatic temperature control have a control assembly with the following button operated functions:

- Switching the air conditioning system on and off

- Temperature adjustment for the driver's side/front passenger's side
- Switching the windshield defrost function on and off
- Switching the electronic automatic climate control and the dual mode on and off
- Air distribution
- Blower Control
- Switching off the dual automatic climate control
- Recirculated air control

Control assembly, climate control - vehicles with DVD navigation system with a touch screen



E97723

On vehicles with a DVD navigation system with a touch screen, the control buttons for the automatic temperature control (climate control) are integrated in this unit. In addition, all heating and air conditioning functions can be controlled via the touchscreen. The information exchange takes place on the mid-speed CAN bus (MS-CAN).

Climate control module - vehicles with DVD navigation system with a touch screen



E97724

On vehicles with a DVD navigation system with a touch screen, the climate control module is provided as a separate component underneath the DVD navigation unit. It is actuated via control buttons or via the navigation touch screen.

Sun sensor - vehicles with automatic temperature control



E97725

For vehicles with automatic temperature control the sun sensor determines the intensity of the sunload. The sunload serves as an additional parameter for determining the blower air temperature, the air distribution and the blower speed.

In-vehicle temperature sensor



E97731

The interior temperature sensor measures the temperature in the passenger compartment and thereby also helps to control the pre-selected interior temperature. This is an NTC resistor.

In order to achieve optimum measurement values, an integrated blower draws air from the interior into the in-vehicle temperature sensor.

Ambient temperature sensor



E98860

The outside-temperature sensor measures the ambient temperature outside the vehicle. The resistance, and so the voltage drop at the sensor, alter depending on the outside-air temperature. This is an NTC resistor.

Blower motor



E98855

On vehicles with electronic automatic temperature control (EATC), a blower motor with brushes is used.

Blower control module - vehicles equipped with automatic temperature control



E97726

On vehicles with electronic automatic temperature control (EATC) a blower control module is fitted instead of the conventional blower motor resistor. This is located in the usual position next to the blower motor, so that the cooling fins of the module are cooled by the air flow.

The climate control module regulates the blower control module via a PWM signal, which in turn regulates the voltage at the blower motor to between 3 V and 12.8 V, in an infinitely variable manner.

The blower control module is fitted with a temperature monitor which continuously monitors the internal temperature of the module. If the temperature rises above 105°C, the blower motor is switched off until the temperature in the module falls to below 100°C.

If the current rises above the value of $26\text{ A} \pm 3\text{ A}$ defined in the blower control module (e.g. high dynamic pressure in blower housing during fast motorway driving), the current flow through the blower motor is limited by the blower control module, until a safe value is reached. If this value cannot be achieved (e.g. blower motor blocked or partially seized or dynamic pressure in the blower housing permanently too high), the value is limited to $6\text{ A} \pm 2\text{ A}$.

Under normal conditions, the blower motor control returns to the normal state.

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