

Model all (CAR)**Overview**

This document contains information on:

- General
- Function requirements
- Recording and evaluation of variables
- Actuation of air conditioning components

General

The climate control system is controlled according to the following criteria:

- Settings on the air conditioning control panel or the multimedia system control
- Variables (registered by various sensors)

The climate control controller regulates the following properties:

- Air temperature (heating/cooling)
- Air humidity (humidify/dry)
- Air components (filtering/exchange)
- Air speed (blower control)

Recording and evaluation of variables

The climate control controller registers the following variables and evaluates them:

- Interior temperature
The vehicle interior temperature is registered by a temperature sensor in the overhead control panel or in the instrument panel and is transmitted to the climate control controller.
- Outside temperature
The outside temperature is registered by the outside temperature sensor and is transmitted to the climate control controller.
i If the vehicle is stationary, the measured temperature can differ considerably from the actual outside temperature. The outside temperature is only incorporated into the interior temperature regulation, when the vehicle speed is more than 20 km/h. At speeds below 20 km/h and when the ignition is switched off and on, the climate control controller uses the last measured temperature value.
- Temperature at the air outlets in the vehicle
The climate control controller receives the information from the outlet air temperature sensors and uses it to regulate the outlet air temperature.
- Temperature and moisture on windshield
In the rain and light sensor with additional functions, the relative air humidity is registered directly at the windshield. If the probability of window fogging is high, the climate control controller increases the blower setting. If automatic engine start/stop is active, the climate control controller can prevent an automatic engine stop. In the case of impending window fogging during an engine stop phase, the climate control controller can cause the engine to start and activate the refrigerant compressor.
- Coolant temperature
The combustion engine control unit calculates the coolant temperature and transmits a corresponding signal to the climate control controller. In hybrid or electric vehicles, the coolant temperature is recorded in the high-voltage PTC heater and read in by the climate control controller. The coolant temperature is used to control the air mixing flaps and to actuate the coolant circulation pump.

Depending on the vehicle model, the climate control system is controlled via various control units:

- Climate control control unit
- Central controller unit (SAM)

The climate control controller is networked with the on-board electronics. This means it can incorporate relevant influences for the control. The control quality is therefore improved and energy consumption is reduced. The tasks of the climate control controller are:

- Recording and evaluation of variables
- Actuation of air conditioning components
- Switch point adjustment with transmission 725 (not in hybrid vehicles)
- Control of operating modes (e.g. fresh air/air-recirculation mode, evaporator drying, etc.)

Function requirements

- Circuit 15 on (not for residual heat utilization or heating mode request from stationary heater)

- Climate control switched on

Only for cooling mode:

- Refrigerant compressor switched on (A/C function)
- Engine running (for vehicles with mechanical refrigerant compressor).

- Evaporator temperature

The climate control controller receives the information from the evaporator temperature sensor. If the evaporator temperature drops to approx. 2°C, the refrigerant compressor shuts down. This prevents the evaporator from icing up. As of an evaporator temperature of 2.5 °C, the refrigerant compressor cuts in again.

- Refrigerant pressure

The climate control controller receives the value from the refrigerant pressure sensor and compares it with a stored temperature/pressure curve. At a refrigerant pressure below or above predetermined values, the refrigerant compressor switches off or does not switch on.

- Solar radiation (equipment specific)

The climate control controller receives the information from the rain and light sensor with additional functions and regulates the interior temperature accordingly. In the sun is shining in on one side, it sets an adequate temperature difference between the left and the right specified control temperatures.

If the sun is shining into the vehicle from the side or from the rear and also at an acute angle, the sun sensor provides imprecise values. This is why a sun sensor is virtually realized in the rear passenger compartment. In addition, the multimedia system control sends time and location information (with the aid of the GPS signal) to the climate control system. The climate control system references the values from the sun sensor at the windshield and adapts the temperature control accordingly.

- Vehicle speed

The ESP® control unit transmits the speed signal to the climate control controller. The vehicle speed is used to regulate the ram air and for the internal calculation of the outside temperature, e.g. while stationary.

- Engine speed

The combustion engine control unit determines the engine speed and transmits the information to the climate control controller. It is used among other things for controlling the refrigerant compressor.

- Door status, position of side windows and sliding roof

The corresponding control units register the information and transmit it to the climate control controller.

When a door, the windows or the sliding roof is open, the climate control controller references the values of the interior temperature sensor and adjusts the temperature control accordingly. This prevents any unnecessary readjustment in the event of high temperature differences between the inside and outside air.

- Air quality (depending on equipment)

The climate control controller receives the information from the air quality sensor. If the concentration of pollutant gas is high, air-recirculation mode activated.

Actuation of air conditioning components

The climate control system actuates the following climate control components:

- Electronic blower motor
The electronic blower motor drives a radial blower in the air conditioner housing. It is actuated according to the respective settings on the air conditioning control panel.
- Electronic booster blower (vehicle and equipment specific)
The electronic booster blower improves ventilation of the rear compartment. Actuation takes place depending on the settings made at the rear air conditioning operating unit.
- Refrigerant compressor
Via the regulation valve, the climate control controller regulates the refrigerant compressor steplessly up to 100 %.
The climate control controller also transmits the calculated torque of the refrigerant compressor to the combustion engine control unit. This keeps the idle speed constant in accordance with the additional load that occurs when the refrigerant compressor is switched on.
- Actuation of fan motor (engine fan)
The climate control controller calculates the target fan speed depending on the refrigerant pressure and transmits this information to the combustion engine control unit.
- Actuation of PTC heater booster (with certain engines and equipment features)
The climate control controller activates the PTC heater booster as required. This heats up the vehicle interior up more quickly.
- Actuation of high-voltage PTC heater (for hybrid or electric vehicles)
The climate control controller activates the high-voltage PTC heater booster as required. This heats up the vehicle interior up more quickly.
- Actuation of the coolant circulation pump (for certain engines and equipment features)
To guarantee the heat output at low engine speeds or when the engine has stopped, the coolant circulation pump is also actuated.

- Actuation of the actuator motors for the respective air flaps:
 - Air distribution flaps
 - Fresh air/recirculated air flap
 - Air mixing flaps (temperature control)

In the equipment variant with air quality package, the climate control system also actuates the following climate control components:

- Driver side air vent ionizer
- Perfume atomizer generator

Actuation by other systems

The A/C components can also be actuated via the revitalization.

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| | Further basic function | | |
| | Multimedia system, basic function | | GF82.85-P-9900A |
| | Function schematics | | |
| | Function schematic for actuating blower motor | Model 118, 177, 247 Model 167 Model 293 | PE83.10-P-2502-97A PE83.10-P-2502-97B PE83.10-P-2502-97D |
| | Function schematic for actuating refrigerant compressor | Model 118, 177, 247 Model 167 Model 293 | PE83.55-P-2501-97A PE83.55-P-2501-97B PE83.55-P-2501-97D |
| | Function schematic for actuating PTC heater booster | Model 118, 177, 247 with engine 608, 654 Model 247 with engine 260, 282 For countries with FMVSS certification Model 167 with engine 264, 274, 654, 656 except code 581 (Automatic air conditioning) Model 167.9 with engine 256 except code 581 (Automatic air conditioning) Model 167 with code 581 (Automatic air conditioning) | PE83.70-P-2502-97A PE83.70-P-2502-97B |
| | Function schematic for high voltage PTC heater actuation | Model 177 with code ME08 (Hybrid drive 75-84 kW VARIANT (INCLUDING PLUGIN)) Model 167 with code ME05 (HYBRID DRIVE 80KW VARIANT (INCLUDING PLUGIN)) Model 293 with code ME01 (Electric motor) | PE83.70-P-2503-97A PE83.70-P-2503-97B PE83.70-P-2503-97D |
| | Control units | | |
| | Central controller unit, basic function | Model 118, 177, 247 | GF54.21-P-9895A |
| | Climate control control unit, basic function | Model 167, 293 | GF83.40-P-9890A |
| | Components | | |
| | Air conditioner housing, basic function | | GF83.40-P-2015A |
| | A/C operating unit, basic function | | GF83.40-P-2016A |
| | Expansion valve, basic function | | GF83.40-P-2018A |
| | Outlet air temperature sensor, basic function | | GF83.40-P-2019A |
| | Circulation pump, basic function | | GF83.40-P-2020A |
| | Refrigerant pressure sensor, basic function | | GF83.40-P-2021A |

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| | Air quality sensor, basic function | Model all (CAR) with code 581 (Automatic air conditioning) Model all (CAR) with code 830 (Vehicles for China, additional parts) | GF83.40-P-2022A |
| | Fine particle sensor, basic function | Model all (CAR) with code 830 (Vehicles for China, additional parts) with code P53 (Air cleaning package) | GF83.40-P-2023A |
| | Electric refrigerant compressor, basic function | | GF83.55-P-2000A |
| | Mechanical refrigerant compressor, basic function | | GF83.55-P-2001A |
| | PTC heater, basic function | Model 167.1 with engine 264, 274, 654, 656 except code 581 (Automatic air conditioning) Model 167.1 with code 581 (Automatic air conditioning) Model 177, 247 with engine 608, 654 | GF83.70-P-2009A |
| | High-voltage PTC heater, basic function | Model all (CAR) with code ME01 (Electric motor) Model all (CAR) with code ME05 (HYBRID DRIVE 80KW VARIANT (INCLUDING PLUGIN)) Model all (CAR) with code ME08 (Hybrid drive 75-84 kW VARIANT (INCLUDING PLUGIN)) | GF83.70-P-2014A |