

Air conditioning

The air conditioning system is switched on by pressing the air conditioning button. The function light signals that the air conditioning system is in standby mode.

The compressor only cuts in if the switch-on conditions are fulfilled. The evaporator then produces cold air which is raised to the required temperature in reheat mode with the aid of the heat exchanger.

To protect the evaporator from icing up, the outlet temperature is monitored by means of a sensor (evaporator sensor) and the compressor is controlled by means of an electromagnetic clutch.

If a mechanically controlled compressor is installed, the evaporator cutout temperature is dependent on the outside temperature. If the outside temperature increases above 20 degrees Celsius the cutout temperature drops to 1 degrees Celsius.

The control unit output DME_KO is used to transfer the switch-on signal of the controlled compressor to the DME. The individual switching stages are transferred by way of pulse width modulation with a frequency of 5 Hz.

Pulse duty factor in %	Functions
0	Short to U-batt. or line break
15	Air conditioning off
30	Air conditioning standby (DME_AC) ON
45	A/C compressor ON, stage 1 = 5-10 Nm
60	A/C compressor ON, stage 2 = 10-15 Nm
75	A/C compressor ON, stage 3 = 15-20 Nm
90	A/C compressor ON, stage 4 = 20-24 Nm
100	Short to ground

Diagnosis of the line is carried out by the DME.

Switching conditions for the electromagnetic clutch

ON (all conditions must be fulfilled)	OFF (one of the conditions must be fulfilled)	Timed mode (switching on and off in 20 s clock cycle)
Terminal 15 ON	Terminal 15 OFF	Coolant temperature greater than 117 ° C and less than 120 ° C
Air flow control wheel _{driver} out of zero position	Air flow control wheel _{driver} in zero position	
Air conditioning standby ON (function light ON)	Air conditioning standby OFF (function light OFF)	

Evaporator temperature > 3 ° C	Evaporator temperature < 2 ° C	
Coolant temperature < 117 ° C	Coolant temperature > 120 ° C - 3 ° C hysteresis	
Air conditioning system signal sent from DME (compressor ON)	Full throttle signal from DME initiates shut-down with respect to time	
Delay time 5 s (on reaching engine speed > 600 rpm) elapsed	Speed dropped below minimum value (400 rpm)	

Pressure switch

The triple pressure switch opens the power circuit to the electromagnetic clutch when the refrigerant pressure drops below the value set for low pressure or exceeds the value set for high pressure.

Low pressure	Medium pressure	High pressure
ON < 2.8 +/- 0.2 bar	ON > 20.0 +/- 1 bar	ON > 33.0 +/- 1 bar
OFF >1.9 +/- 0.2 bar	OFF < 17.5 +/- 1 bar	OFF < 23.5 +/- 1 bar

Evaporator control

The evaporator temperature controller is made up of a two-point controller on the basis of a variable positive switching threshold with 1 ° K hysteresis. The refrigeration circuit is activated at an evaporator temperature > 3 ° C and deactivated at an evaporator temperature < 2 ° C. This function prevents the evaporator from icing up.

Coolant temperature

The instrument cluster electronics (IKE) features a coolant sensor on the radiator circuit. This analog sensor signal is processed in the IKE and read in by the IHKR via the K-bus.

To avoid the engine overheating, the cooling water is monitored by the air conditioning system. At a coolant temperature above 117 ° C, the electromagnetic clutch is switched on and off at 20 s intervals. If the coolant temperature exceeds 120 ° C, the electromagnetic switch is switched off until the temperature drops below 117 ° C. The electromagnetic clutch then cuts in once again at a rate of 100%.

Full load cutout

In order to shorten the rev-up time of the engine from idle up to full load, the electromagnetic clutch is switched off for a limited period of time at full throttle. The cutout time is between 7 and 10 s depending on the type of engine.

Full load condition: Speed signal < 14 km/h and acceleration

Idle increase (anti-stall)

To ensure smooth operation is not impaired by the compressor load, the control lines AC and KO are provided for activation of the DME by the air conditioning control unit.

When the air conditioning system is switched on, the air conditioning control unit output AC requests an idle increase from the DME. When the signal is active, the DME increases the idle speed by 110 - 200 rpm irrespective of the electromagnetic clutch.

The idle increase function (anti-stall) is additionally possible by means of coding.

Option 1: After switching on the rear window defogger, the blower in maximum setting, low beam or high beam.

Option 2: When undervoltage detected. The idle increase function is activated at terminal 30 < 11.4 V and deactivated at terminal 30 > 12.2 V.

Compressor activation

The air conditioning function is activated by pressing the A/C button. This is followed by idle increase. By way of the output KO, the air conditioning control unit informs the DME that it intends to switch on the compressor. Consequently, the DME implements an interfering variable circuit, i.e. it moves the throttle in the direction "more air" while at the same time increasing the injection quantity.

By way of the KOREL signal (compressor relay), the DME sends a feedback message to the air conditioning control unit instructing it to switch on the A/C compressor. If all conditions for switching on the A/C compressor are fulfilled, the A/C compressor is activated directly by the control unit.

To avoid excessive water discharge from the evaporator, after the air conditioning system has been switched off while driving, the compressor is switched on and off at set intervals for 15 minutes. In this way, the evaporator temperature is slowly brought to the value of the outside temperature.

Auxiliary fan stage 1

The air conditioning system cuts in stage 1 of the auxiliary fan by means of relays when the compressor clutch is active and the outside temperature is greater than 10 ° C. The auxiliary fan cuts out when the compressor clutch has switched off or the outside temperature is less than 8 ° C.

For safety reasons, a thermostat switch also causes stage 1 to cut in at a temperature of 91 ° C irrespective of the instruction given by the air conditioning control unit.

Auxiliary fan stage 2

Stage 2 of the auxiliary fan is not cut in by the air conditioning control unit.

If the cooling water exceeds a value above 99 ° C or if the medium pressure switch has closed, stage 2 cuts in by means of a relay.