

ELEKTRO PARTNER

BULLETIN

MAKE / MODEL:

All

YEAR:

1992

ENGINE CODE:

All

SUBJECT / SYMPTOM / TROUBLE CODE:

A/C system - Troubleshooting R134a, R1234yf, performance test, low-pressure, high-pressure, thermal camera

SOLUTION:

Always start by carrying out a performance test of the air conditioning system.**If ambient temperature is higher than 30°C, you should set the climate control system to recirculation. Let the system run for approx. 10 minutes before carrying out the measurement.****Use a thermometer like this to measure the input temperature.****You should place the thermometer on the centre injectors, if they are in the car.****Please also note whether sufficient air exits the injector. For example, in case of a clogged pollen filter.****You check the performance as follows:**

- The blower speed in the car must be 1
- The temperature must decrease below 7°C
- Then set the blower to max speed
- This increasingly puts the evaporator under load as the quantity of air to be cooled increases, and the pressure switch lets in more refrigerant
- The cabin temperature may increase 5°C max
- If it increases more than this, it indicates a fault or an incorrect filling



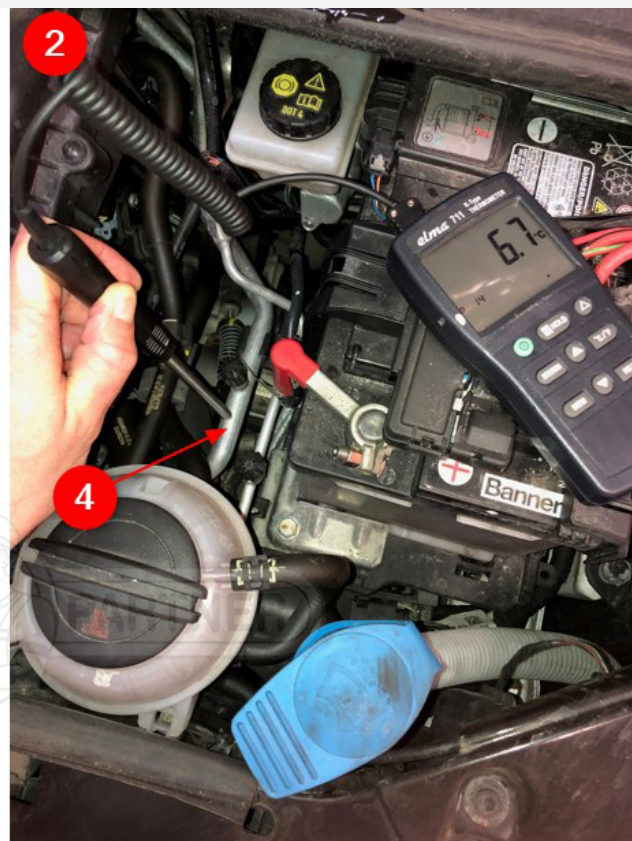
SOLUTION CONTINUED:

This temperature gauge can also measure the temperature of the pipes in case of additional troubleshooting.

A temperature check of the pipe from the expansion valve to the compressor will reveal whether an evaporation has taken place.

The temperature must be approx. 5°C when the system is cooling (picture 2).

Small drops of water often occur on the pipe to low-pressure (condensation).



3. Pipe to high-pressure (thin)

4. Pipe to low-pressure (thick)

If the temperature is inconsistent, you should check the system pressure and read out fault codes, if possible.

Please note that a fault in the sensor to high-pressure may be stored in either the engine control unit or the climate control unit. If necessary, perform a complete readout of all control units.

You also have to note parameters used by the control unit to the climate control system.

An incorrect reading of a temperature sensor in an air duct or a faulty ice sensor to the evaporator also cause an incorrect temperature adjustment.

If pressure is insufficient, you should drain refrigerant and then fill the quantity prescribed by the manufacturer.

If the system has no pressure, you should check for leaks. See bulletin No. 5754 for this.

Please also check whether both low-pressure and high-pressure display approx. 5 bars. This indicates that the compressor is inactive. See explanation in bulletin No. 5747.

SOLUTION CONTINUED:

High-pressure:

Normal pressure is between 8 and 12 bars when the system operates.

The high-pressure side (the thin pipe) is where the highest pressure is, and thus also the highest temperature.

The compressor creates a high pressure, which makes the refrigerant condensate (gas-fluid) and emit heat in the condenser.

The high-pressure side starts at the compressor and ends at the expansion valve. A drop of pressure occurs after the expansion valve due to the fact that fluid/gas meets the 'bottleneck' where it is vaporised before it reaches the evaporator.

The high-pressure depends on the ambient temperature.

A rule of thumb says ambient temperature plus 15° on the dial gauge.

Example:

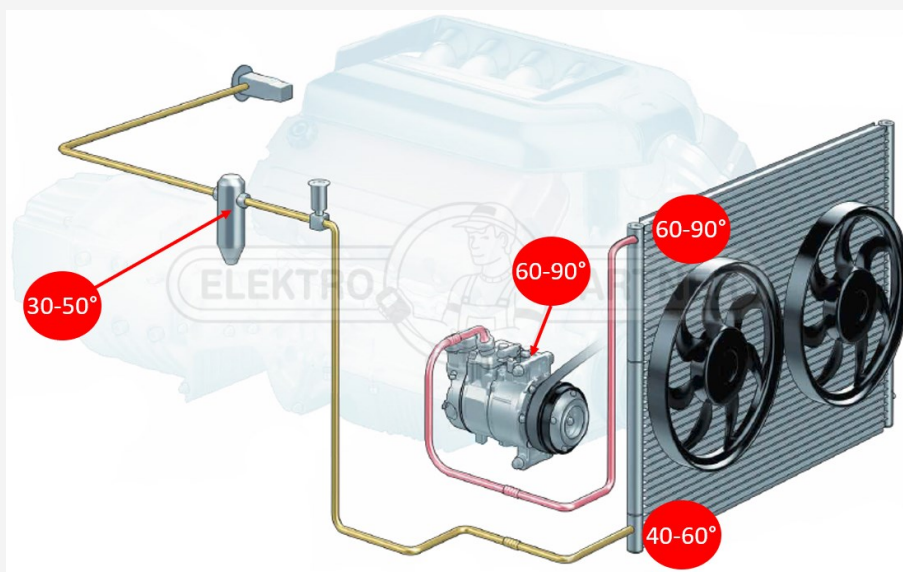
Ambient temperature 20°.

So, the calculation is: $20^{\circ} + 15^{\circ} = 35^{\circ}$, which corresponds to 8 bars on the pressure gauge.

The temperature difference of the condenser inlet and outlet should be 14-19°C in a serial condenser and 19-28° in a parallel condenser (1996-).

Typical faults if high-pressure exceeds 15 bars / 60°C:

- The fan does not work or cannot run at the highest speed (see % for activation in parameter measurement via diagnostic tool)
- Lack of / damage of condenser vanes
- Limited flow in the condenser or drier filter
- Lack of or incorrect lubrication of compressor
- Incorrect filling quantity of refrigerant
- Air in the A/C system
- Clogged expansion valve
- Incorrect control of compressor. E.g. the magnetic clutch constantly running
- Too much UV dye, which removes the oil layer. Today, most UV dyes are oil based, and if this is the case it has no significance



SOLUTION CONTINUED:

Low-pressure:

Low pressure = low temperature.

Normal pressure is between 1.5 and 2 bars when the system operates.

Low-pressure exists from the expansion valve through the evaporator to the compressor low-pressure side.

This is where heat is generated from the cabin air to the evaporator.

The last refrigerant particles (drops) evaporate as the refrigerant starts boiling.

This process transports the heat from the evaporator inside the car to the compressor and further on to the condenser.

The process of fluid turning into gas creates a pressure drop over the expansion valve.

The pressure drop creates cold, known from e.g. gas cylinders and gas grills.

The refrigerant acts as gas in low-pressure.

If a fault occurred in the low-pressure side, which caused fluid in the compressor, the compressor would have a 'fluidstroke'. In other words, failure due to fluid that cannot be compressed.

When the system operates, the temperature of the evaporator should be between 0-5°C.

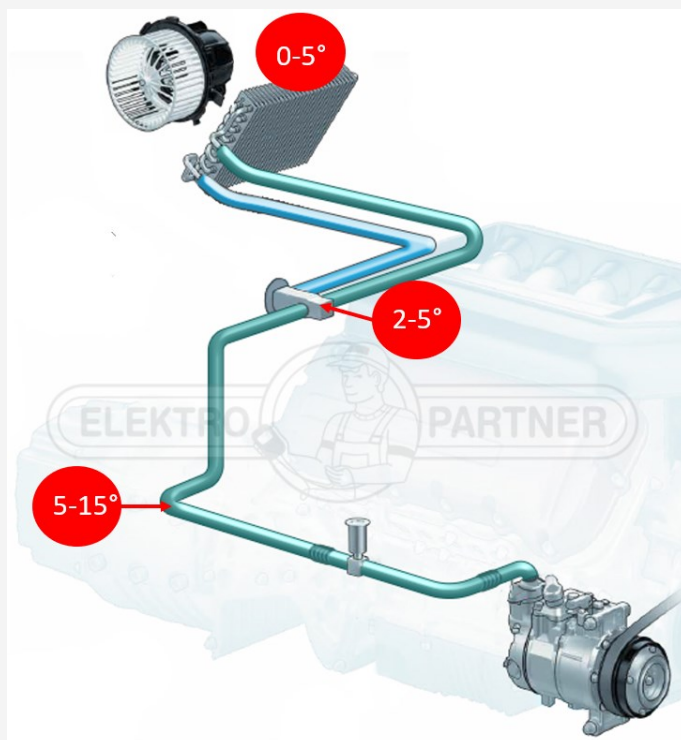
Typical faults in the low-pressure side when the temperature is **below 0°C** measured directly on the surface of the evaporator:

- Air in the A/C system
- Moisture in the A/C system (the moisture turns to ice crystals, which clog the passage)
- Fault in the control of the compressor e.g. an incorrect feedback from a faulty ice sensor in the evaporator
- Incorrect/contaminated refrigerant

When the system operates, the temperature in pipes to low-pressure measured just after the expansion valve should be 5-15°C.

Typical faults in the low-pressure side when the temperature is **below 5°C** measured directly on pipes to low-pressure at the expansion valve:

- Faulty expansion valve
- Frozen low-pressure hose
- Low refrigerant level
- Leak in the circuit
- Incorrect control of the compressor



SOLUTION CONTINUED:

Thermal camera:

Over time, more garages have acquired a thermal camera.
This camera is also suitable for troubleshooting an A/C system.
If the system is clogged somewhere, it is very clear with a thermal camera.
It is very useful, if you have a partially clogged condenser.

