

AC System Diagnostics - Operating Pressures R134A/R1234yf



Working pressures diagnostics method is an easy and cost effective way to determine major AC system problems. However, to perform the right measurements, the system must be in operational condition. This requires a correct level of refrigerant charge (at least 1,5/25 Psi to run the compressor). Before the vehicle is started, the static system pressure should be read. Pressure values should be very nearly equal on both LP and HP gauges. The actual static pressure will depend on the ambient temperature. To ensure it is on the right level, refer to a static pressures table applicable for R134A/R1234yf refrigerant (N.B. not shown on this poster). A low static pressure means a too low system charge, indicating a leak that must be found and repaired. Bear in mind, that an average AC system loses up to 50 grams/2 oz. of refrigerant per year.

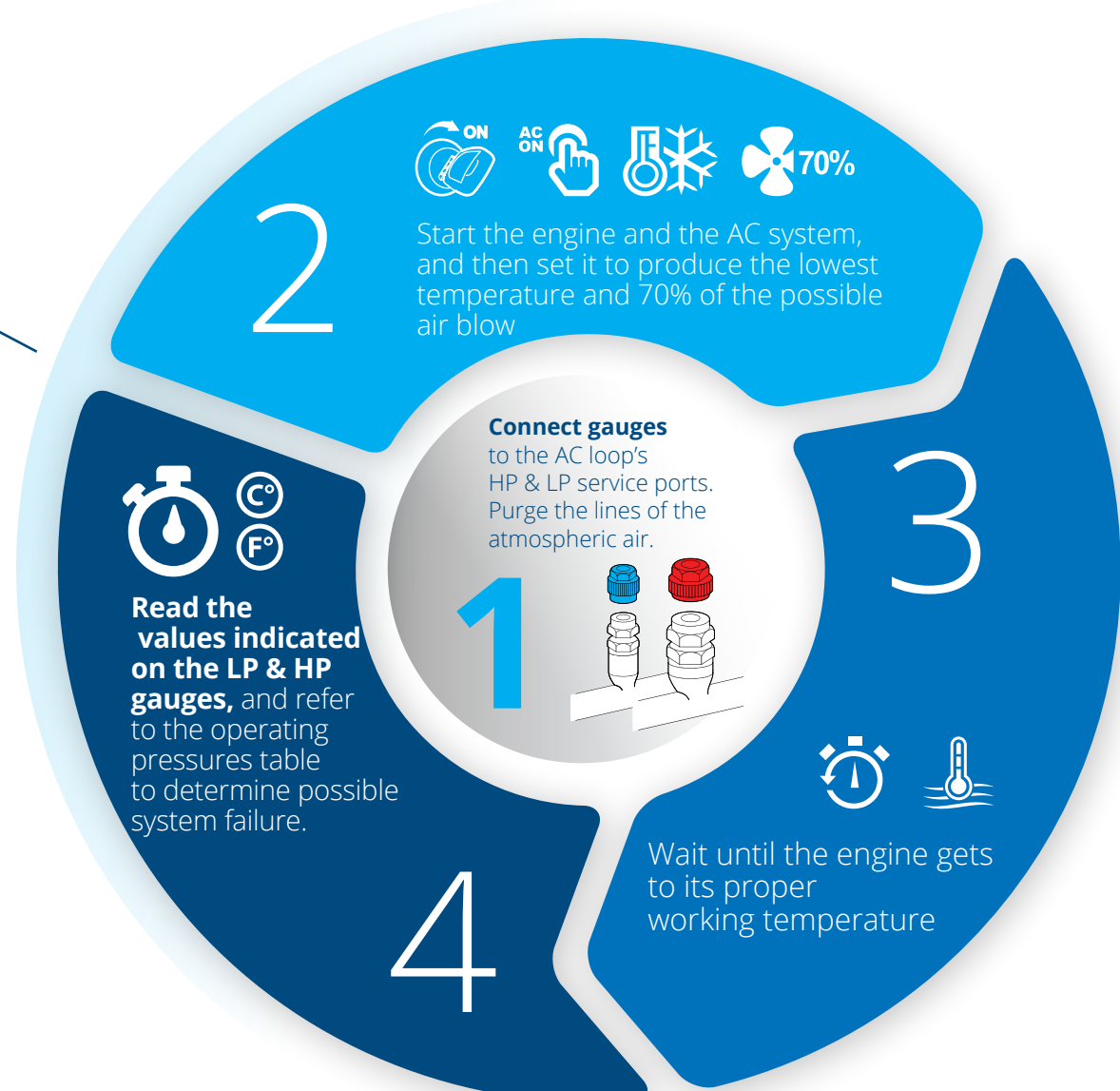
HOW TO PROCEED

FOR PROPER DIAGNOSTICS,
FOLLOW THE STEPS BELOW

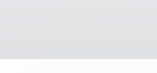
RECOMMENDED TOOLS

PROPERLY CALIBRATED
R134A/R1234YF GAUGES

GAUGES
MANIFOLD SET
FILLING STATION
WITH GAUGES



Important remarks for operation pressures diagnostics



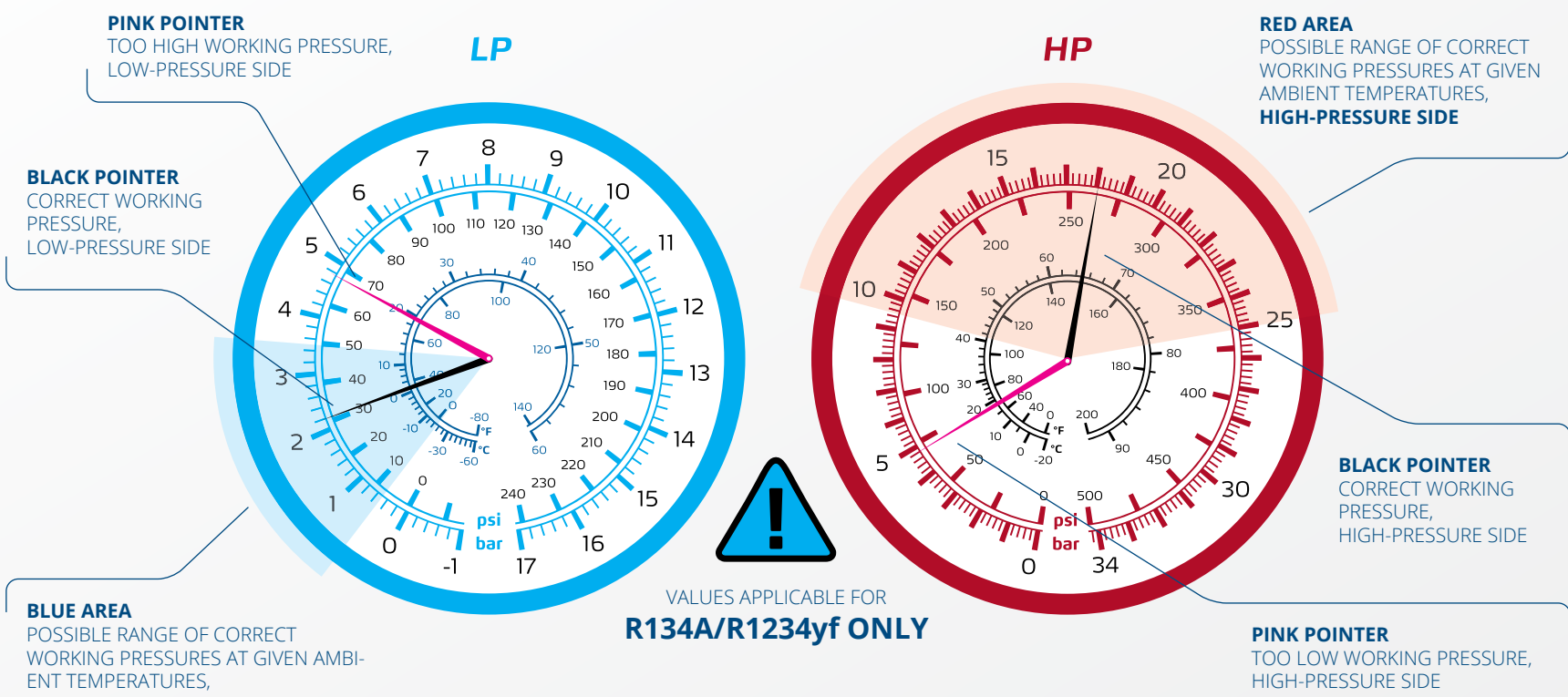
Air recirculation function must be disabled during the pressure measurements – set the air intake function as coming from outside the vehicle cabin!

Set the air recirculation function ON **only** if the ambient temperature is above 30 °C / 86 °F and make sure that before the test is performed, the AC system operates for 10-15 mins., lowering the cabin temperature properly. It is not recommended to take the pressure measurement in an ambient temperature above 35 °C / 95 °F.

The most effective method of system troubleshooting is by pressure measurement, and consists of two reading phases – first, measurements are taken while the engine is idling, second, measurements are taken while keeping the engine at a constant speed of 1,500-2,000 RPM.

For vehicles equipped with spherical and automated AC systems (zonal climatronics), the measurement should be taken by different air production scenarios for available zones (i.e. at frontal zone, at rear zone, etc.).

HOW TO READ THE POSTER SCENARIOS:



ABBREVIATIONS
F APPLICABLE FOR FIXED DISPLACEMENT COMPRESSOR
V APPLICABLE FOR VARIABLE DISPLACEMENT COMPRESSOR

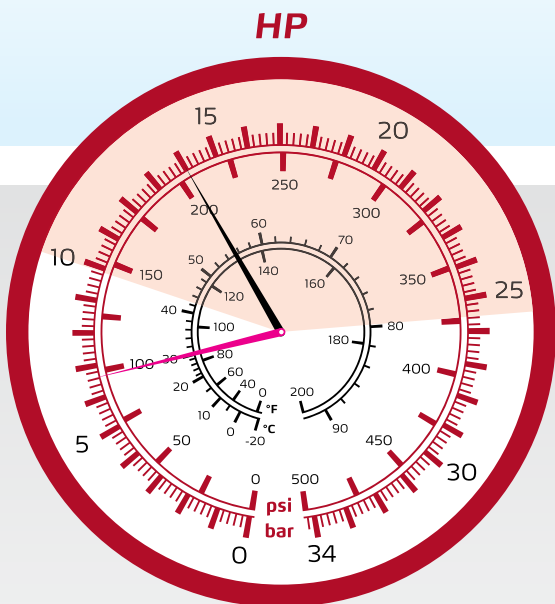
R134A/R1234YF OPERATING PRESSURES TABLE

AMBIENT TEMP. °C	VARIABLE DISPLACEMENT COMPRESSOR				FIXED DISPLACEMENT COMPRESSOR			
	LP (bar)		HP (bar)		LP (bar)		HP (bar)	
	min.	max.	min.	max.	min.	max.	min.	max.
15.5	1.5	2.3	9.5	13.0	0.5	3.0	9.5	13.0
21.0	1.5	2.3	12.5	17.5	0.5	3.0	12.5	17.5
26.5	1.5	2.3	14.0	20.5	0.5	3.0	14.0	20.5
32.0	1.5	2.5	16.0	24.0	0.5	3.5	16.0	24.0
38.8	1.5	2.5	18.5	25.5	0.5	3.5	18.5	25.5
43.0	1.5	2.5	22.0	28.0	0.5	3.5	22.0	28.0

SCENARIO 1



Low pressure:
too high



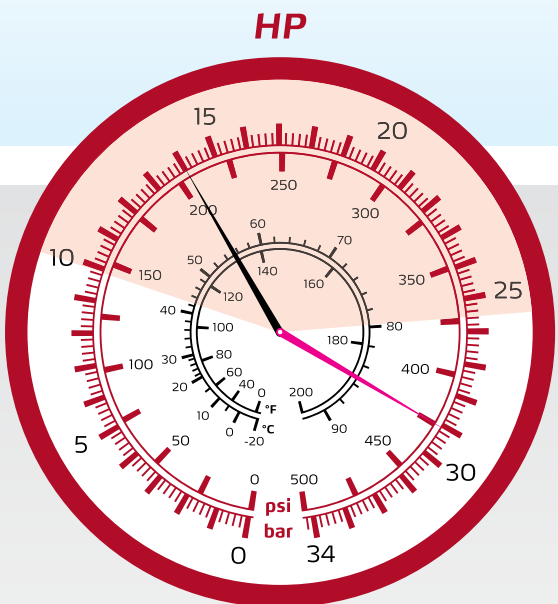
High pressure:
Normal or too low

- Improper connection of the suction and pressure lines on the compressor – reversed
 - The compressor magnetic clutch does not engage - hub slips on the pulley
 - The expansion valve is blocked in the open position
 - The compressor's ECV valve is defective or misses the correct regulation
 - The compressor is malfunctioning or damaged
- a. Too low refrigerant charge
 - b. Error on the power supply to the compressor's electromagnetic clutch
 - c. Wrong distance between clutch hub and pulley
 - a. Diagnose/replace the valve
 - b. Make sure the system is clean/ properly flushed
 - a. Diagnose the MCV/ECV valve
 - b. Replace the valve/compressor
 - c. Replace the compressor if damaged

SCENARIO 2



Low pressure:
too low



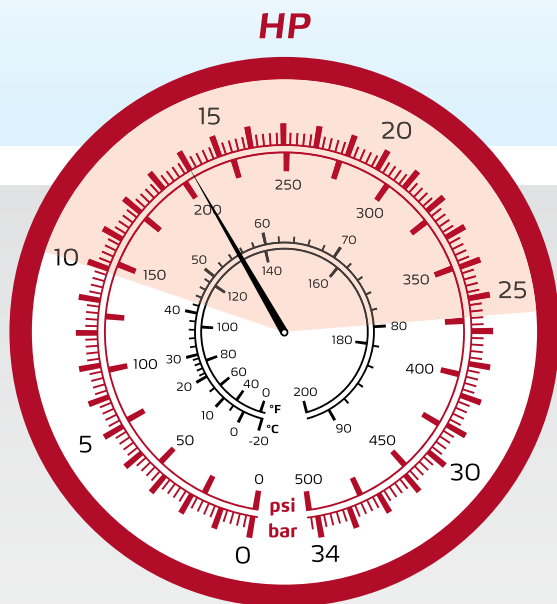
High pressure:
Normal or too high

- The thermostatic pressure valve is defective
 - The expansion valve is closed, i.e. blocked or clogged
 - Restriction in the refrigerant line between the receiver drier and the expansion valve
 - The compressor's suction valve (MCV/ECV) is blocked and does not allow flow of a high refrigerant volume
 - The receiver drier is malfunctioning – clogged or saturated
- Replace the valve/control icing protection probe on the evaporator
 - a. Diagnose/replace the valve
 - b. Make sure the system is clean/ properly flushed
 - a. Dirt/impurities in the AC loop. The system must be flushed.
 - b. Replace the valve/the compressor
 - c. Replace the receiver drier
 - a. Improper system charge – mainly overcharge
 - b. Improper vacuum/moisture in the system
 - c. Refrigerant contaminated by improper use of agents such as leak-stops, flushing agent residues, too much UV dye

SCENARIO 3



Low pressure:
Normal or too low



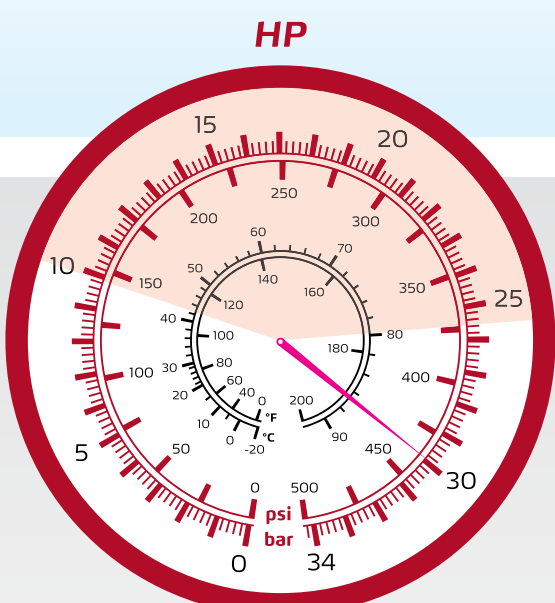
High pressure:
Normal

- Warm air getting into the evaporator's cassette/ compartment
 - Heater does not stop warming
 - Evaporator freezing
- a. Possible problems with the vehicle's air recirculation mechanism
 - b. Flaps/valves in the HVAC unit malfunctioning
 - a. Heater valve broken
 - b. Error in the heating system control mechanism
 - a. Thermostatic probe on the evaporator is malfunctioning
 - b. Interior blower malfunction
 - V Compressor's ECV/MCV malfunction

SCENARIO 4



Low pressure:
Normal or too high



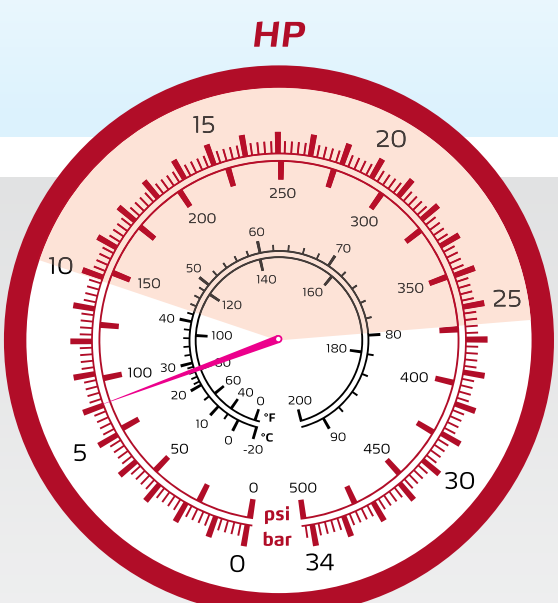
High pressure:
Too high

- System overcharge
 - ECV/MCV failure causing improper suction pressure
 - Condenser inner stoppage/ contaminations
 - High-pressure side clogged – stoppage around service port and in between compressor-condenser-filter
 - Ambient temperature above 40 °C / 104 °F
- Make sure that system is charged properly acc. to manufacturer's recommendation
 - Diagnose/replace the valve or replace the compressor
 - a. Make sure the system is cleaned/ flushed
 - b. Replace the condenser
 - a. Improper system charge – mainly overcharge
 - b. Improper vacuum/moisture in the system
 - c. Refrigerant contaminated by improper use of agents such as UV dye, leak-stops, flushing agents etc.
 - d. The system must be flushed.
 - e. Replace the receiver drier

SCENARIO 5



Low pressure:
Normal or too low



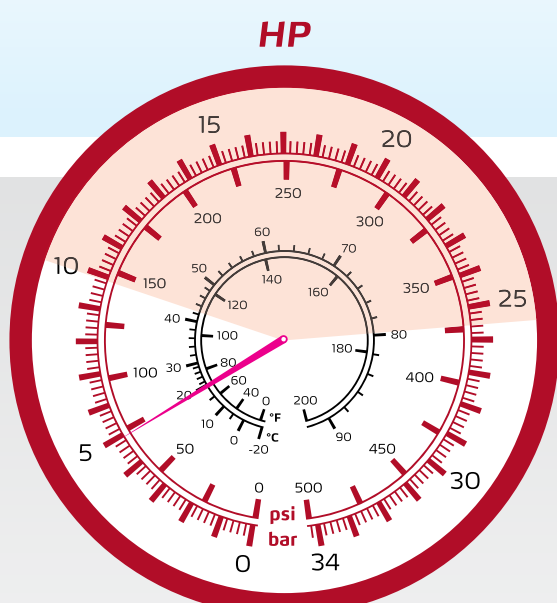
High pressure:
Too low

- Too low refrigerant level
 - Expansion valve failure – clogged or blocked
 - System stoppage between receiver drier and evaporator
 - High-pressure side stoppage
 - Low ambient temperature below 5 °C / 41 °F
- a. Make sure that system is charged properly acc. to manufacturer's recommendation
 - b. Diagnose the loop for possible leakages
 - a. Diagnose/replace the expansion valve
 - b. Dirt/impurities in the AC loop. Make sure the system is clean or is flushed.
 - c. Replace the receiver drier

SCENARIO 6



Improper Low & High pressure:
Pointers indicate same values on both gauges



- Compressor failure
 - Electromagnetic clutch of the compressor does not operate properly
 - Driving belt/compressor's pulley malfunction
 - ECV/MCV failure causing improper suction pressure
- a. Determine cause of the compressor failure
 - b. Replace the compressor
 - a. Error on the power supply to the compressor's electromagnetic clutch
 - b. Wrong distance between clutch hub and pulley – must be adjusted
 - a. Improper pulley alignment
 - b. Driving belt/belt tensioner excessive wear
 - Diagnose/replace the valve or replace the compressor

