

# AC Diagnostics - measuring pressures

The working pressures diagnostics method, is an easy and cost effective way to troubleshoot major problems within the AC system. The temperature and pressure variations taking place inside the loop and within an AC cycle, are crucial for the refrigerant's change of state, enabling the system to operate and to produce cool air inside the cabin. Reading the pressures, is a reliable and easy way to determine the most common malfunctions of the system or components.

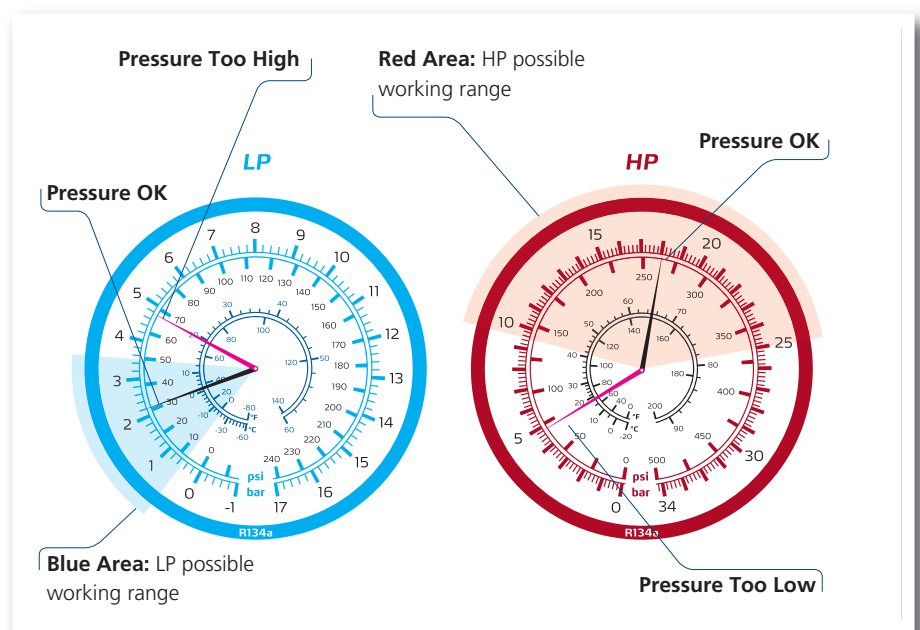
Operating pressures on the high and low-pressure sides need to remain within a particular range to ensure optimal performance of the AC system. Having either the Low Pressure (LP) or High Pressure (HP) reading outside of their preferred ranges can mean an array of problems that need to be found and eliminated. Typically, the most common result of various malfunctions is poor performance of the system, meaning that there is not enough cool air delivered in the vehicle's cabin.

### Testing Procedures

To perform an effective pressure diagnostics, several crucial conditions must be observed. First, use of the right tools - a separate pressure gauges manifold or gauges integrated with a filling station are recommended. LP and HP gauges must be connected correctly to the vehicle's system, respectively to the low and high-pressure side's service ports.

Before the test, make sure the system is in an operational condition. This requires a correct level of refrigerant charge, with at least 1,5 bar/25 PSI of static pressure to run the compressor. This static pressure should be read before starting the engine and will depend on the ambient air temperature. Refer to a static pressures table, applicable to R134a, if you suspect that the static pressure is incorrect. The LP and HP pressure gauge indications should be very nearly to equal on both sides. Static pressure that is too low indicates a low system charge, and probable leak that must be found and repaired.

After the static pressures test is passed, operational pressures can be measured. For reliable outcomes, the vehicle must achieve its operational characteristics. The engine must be running at idle and maximum cold air setting selected, and around 70% of the blower power must be set for the AC system. The engine must be at normal operational temperature of 80-90°C/180-200°F.



**Operational pressure values for R134a (Other refrigerants may operate at different pressures)**

Now the LP and HP gauge readings need to be considered. To determine failures, the gauges' indications must be referred to a table with R134a operating pressure values for HP and LP. Please note that the values will vary depending on conditions such as ambient temperature and compressor type (fixed/variable displacement).

### Typical System Faults

- System improper charge – too low or to high amount of refrigerant
- Improper use of additives – mainly excessive use of UV dye causing system overpressure
- Component and system inner blockages and restrictions – caused by impurities, debris, moisture or corrosion in the system, improper use of additives (leak stop agents), consequence of overheating and carbonized lubricant particles – mostly exposed to clogs are the expansion valve, receiver dryer and

condenser (thin micro tubes)

- Malfunction of condenser fan
- Malfunction of air circulation system – cabin filter, interior blower, heater, thermostatic valve, etc.
- Malfunction of compressor – steering – clutch/valves, power drive or operation in general
- Malfunctioning condenser – restricted heat exchange caused by missing fins, fin corrosion, soiled surface, leakages, bent tubes and fins, etc.

More precise troubleshooting related to the system operational LP/HP pressures, as well as for listing of the proper operational pressures, are shown on Nissens' AC System Operating Pressures (R134a) poster.

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