

AC troubleshooting - expansion valve malfunction

The expansion valve controls refrigerant flow according to evaporator temperature and the load and cooling demand of the AC system. Nissens explains the symptoms of a failing expansion valve and what steps to take in diagnosing and repairing the fault.

AC system operation relies on 2 factors: flow of refrigerant throughout the AC loop and the refrigerant's change of state. One of the key components allowing the AC system to work properly, is the expansion control device. One of the commonly used designs is an expansion valve, which is usually installed at the evaporator inlet. Its main function is to convert liquid refrigerant into cold low-pressure gas and to regulate the flow of refrigerant through the vehicle's AC system.

Inside the valve, a moveable rod enables the valve to open and close a passage, allowing refrigerant to move inside the valve. It accurately meters the precise amount of refrigerant needed according to outside temperature and need for air conditioning.

Problem

The expansion valve is an advanced and fragile device. As it operates under high pressures and is temperature sensitive, improper working conditions, as well as impurities inside the loop, can cause deregulation and malfunction.

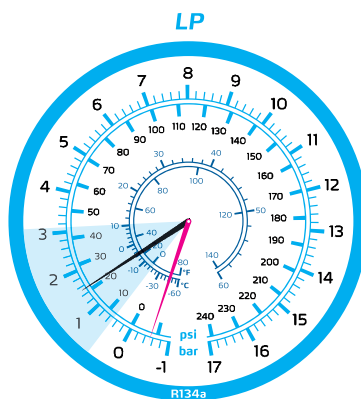
If the expansion valve is stuck open or clogged, the AC system will not cool properly. A clogged valve will lead to too little refrigerant, increasing the pressure in the system and causing the AC compressor to overheat. If the valve is stuck open, too much refrigerant is allowed to pass through the system and into the compressor.

If the expansion valve fails, it can cause problems with the functionality and performance of the AC system - and if ignored, the worst case scenario is expensive and irreversible damages of other system components, such as the AC compressor.

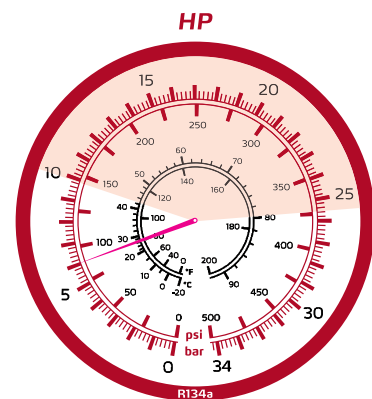
Recommended Solution

When suspecting malfunction of the expansion valve operation, it is recommended to perform a complete system diagnostics. Troubleshooting the system operating pressures, by means of pressure gauges, may reveal the most common issues with the expansion valve.

We recommend to follow a separate instruction to perform such diagnostics. Please consult Nissens' System Operating Pressures (R134A) poster. If a failure on the valve is concluded, the valve should be replaced.



Low pressure:
Normal or too low



High pressure:
Too low

One of possible symptoms of a faulty expansion valve is improper operating pressures



Frost on the expansion valve or vents can be caused by an expansion valve failure

Symptoms of a Failing Expansion Valve

- Poor AC System Performance or Warm Air - AC system underperformance may be a sign of a problem with the AC expansion valve. If the valve fails or has an issue, it can disturb the performance of the AC system, causing it to underperform. The AC system may begin to blow noticeably less cold than before and may even begin to blow warm air, depending on the severity of the problem.
- Frost on AC Evaporator or Vents - Another symptom of a potential problem with the vehicle's expansion valve is frost coming from the vehicle's vents. AC evaporator malfunction can cause refrigerant to flow unmetered through the vehicle's AC system, causing the evaporator to freeze over or frost to come from the vehicle's AC vents. Either symptom is a sign that the system is

getting too much refrigerant, ultimately lowering its efficiency and performance.

• Inconsistent Air Flow - Sometimes a bad expansion valve will provide an inconsistent performance in its ability to regulate the flow of refrigerant throughout the system. If this occurs, the air coming out of the vent may be too cold or warm. The air will likely alternate back and forth between different temperatures at various times. If the air varies between cold and warm, the expansion valve should be inspected at once.

• Excessive Temperatures Generated at some of the Loop Components - A faulty or blocked expansion device will cause the system to operate under improper pressures, generating excessive temperatures. The easiest way to diagnose these spots is at the high-pressure side's components: ducts from the compressor outlet to, and within and including, the receiver dryer. Temperatures above 50 °C will warn about potential blockages/malfunctions of the expansion valve.

• Improper System Operating Pressures - Too high or too low pressure gauge readings may be a sign of a bad expansion valve. Normal gauge readings should be between 2 and 3 bar on the low side and 14 to 24 bar on the high side.

