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Causes of overload protection tripping in air conditioning compressors

Air conditioning compressors have an overload protection feature that protects auxiliaries if the compressor jams. However, this fuse can trip even when there is no mechanical damage to the compressor.

A predetermined breaking point separates the shaft from the pulley when the air conditioning compressor is blocked, protecting the belt drive and other auxiliaries from consequential damage. As a result, they can continue to be driven even when the compressor is blocked.

Causes of overload protection tripping

Generally, the fuse trips when the compressor is blocked ("seized"). Sometimes, however, this happens when there is no mechanical damage. Here are some of the causes:

- Uneven vibrations in the belt drive
- Continuous and alternating application of force due to significant speed fluctuations

- Too much force has been applied due to excessive engine torque
- Hydraulic lock triggered by excess refrigerant or compressor oil

Vibrations and alternating application of force

Uneven vibrations are one of the main reasons that overload protection devices trip. Most often, defective components such as the overrunning alternator pulleys, the belt tension damper, or the crankshaft vibration damper are responsible. An excessive or alternating application of force can also trip the fuse. This can be caused, for example, by a rough running engine, abrupt gear shifting, or an increase in torque due to chip tuning. In rare cases, vibrations knock out the teeth of the pulleys on the compressor drive shaft without triggering the overload protection. The teeth continue to be eroded until the transmission of power and refrigerant delivery break down. This can be indicated by the belt pulley's central screw becoming loose or going missing.



Figure 1: Overload protection triggered

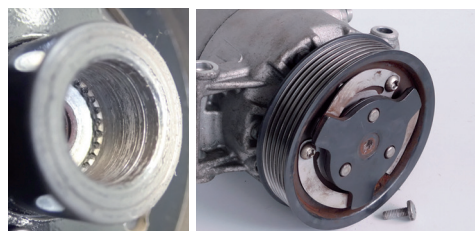


Figure 2: Broken teeth and loose screw on the belt pulley



Figure 3: Always check alternator freewheel clutch and belt tension damper.

Important!

If an air conditioning compressor has been damaged, always check its entire environment. In the event of mechanical damage, the air conditioning circuit must be flushed. Before installing the new compressor, ensure that the correct oil filling quantity has been used.

» For more information, check out TM 03/2020 and TM 04/2021.