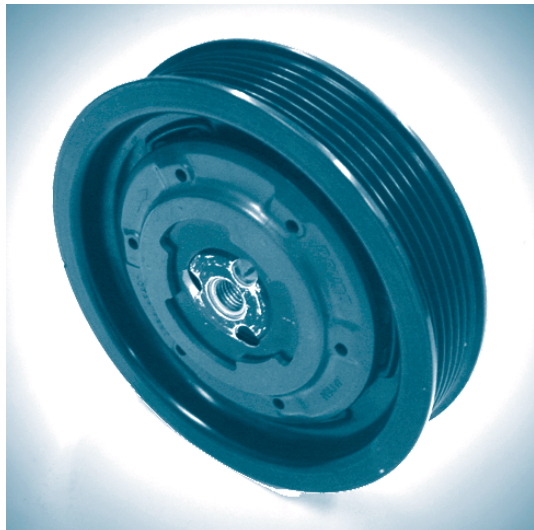


DENSO

SERVICE

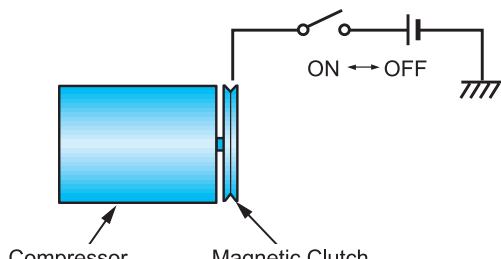
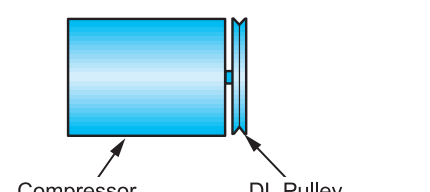
DL (DAMPER & LIMITER) PULLEY



OUTLINE

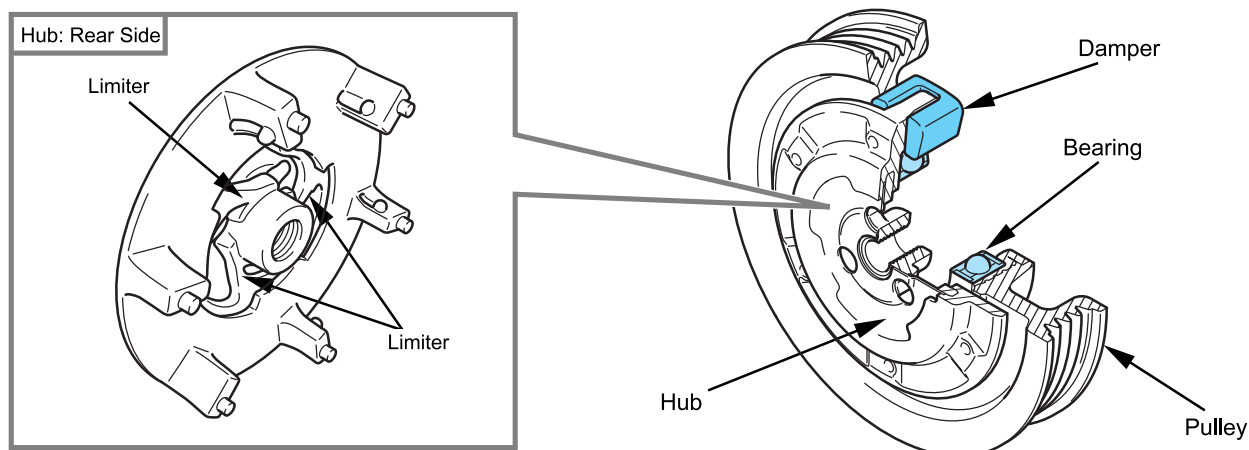
Recently, continuously variable capacity (from 0 to 100%) compressors have started to be used in order to improve fuel consumption, power consumption, acceleration performance and to reduce ON/OFF shock. Because the capacity is varied continuously, there is no need for a stop/ start mechanism for the magnetic clutch between the engine and compressor.

However, a damper is needed to absorb variations in the compressor torque, and a limiter is needed to protect the belt should the compressor lock. The use of DL (Damper & Limiter) pulleys that include these functions has increased recently. This section describes the DL pulley, including precautions required when replacing the compressor.

Magnetic Clutch	DL Pulley
<p>The rotation of the compressor is stopped/started by switching the magnetic clutch between ON and OFF.</p>  <p>Compressor Magnetic Clutch</p>	<p>The compressor can vary capacity from 0 to 100%, so unlike the magnetic clutch, there is no need to stop or start compressor rotation. (The compressor and DL pulley always rotate together with the engine.)</p>  <p>Compressor DL Pulley</p>

CONSTRUCTION

The DL pulley is constructed from 3 parts. The pulley itself has an internal bearing and receives power from the engine through the belt. The hub transmits power to the compressor. The damper joins the pulley and the hub. The hub is equipped with a limiter in order to protect the belt should the compressor lock.

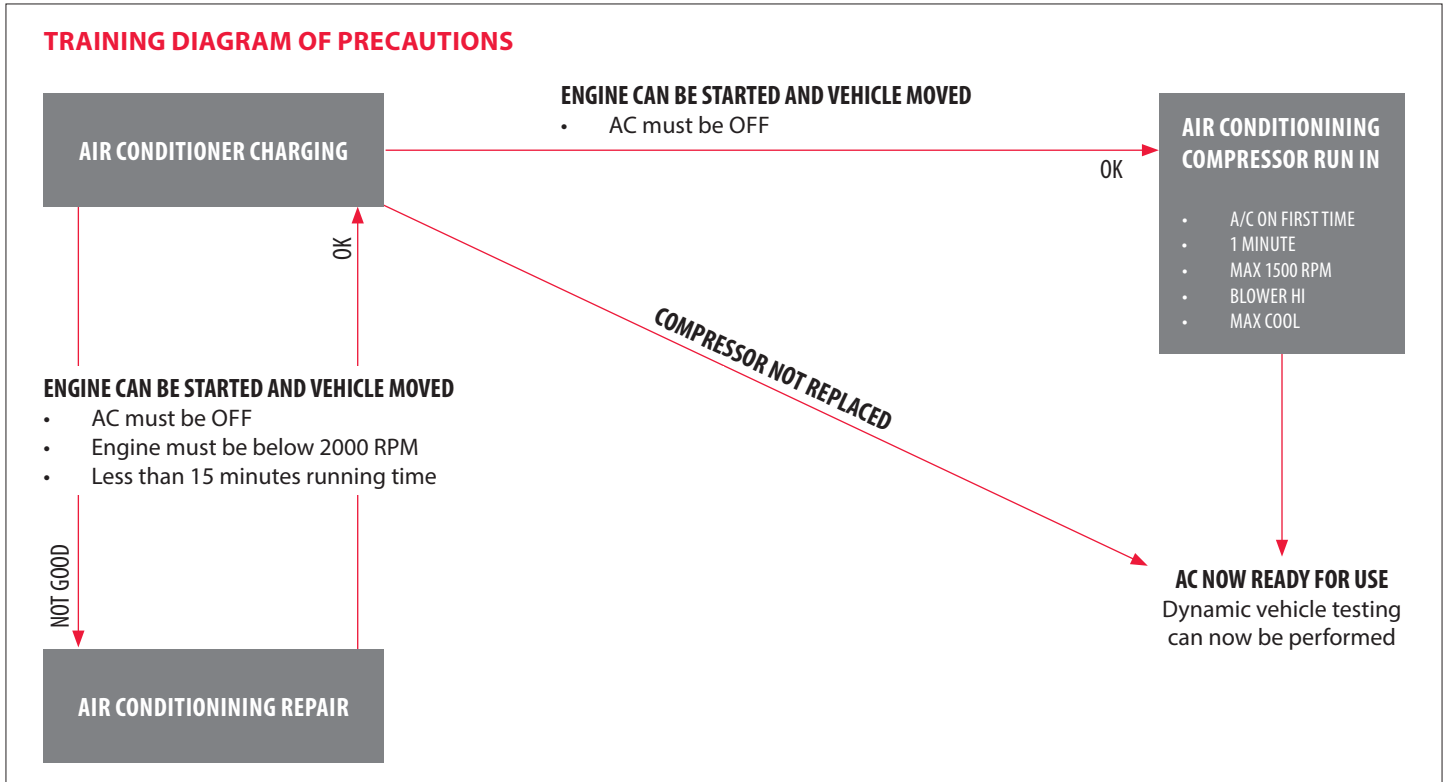


DENSO

SERVICE

DL PULLEY COMPRESSOR RUN IN

TRAINING DIAGRAM OF PRECAUTIONS



BACKGROUND

Variable type compressors are being utilized in more and more vehicles. The change of design for these compressors is significant and additional precautions should be highlighted when servicing A/C system of this type.

HANDLING PRECAUTIONS

1. DL Pulleys Used In Place Of Clutches Are More Fragile

These compressors should not be handled by the pulley. Also these compressors are sensitive to being knocked or dropped. DL pulley design requires that compressors using this system be handled with greater care than clutched systems and should not be picked up from the pulley. The compressor should not be Knocked or dropped. The DL pulley is not a serviceable part and once broken requires replacement of the compressor as an assembly.

2. Do Not Start Engines Without Gassing

Do not start the vehicle without first charging the system with the specified amount of refrigerant. If the vehicle must be moved ensure that all of the following conditions are met:

- The A/C must be switched OFF
- The RPM needs to be kept low and not exceeded 2000 RPM
- The maximum running time is 15 minutes

3. Run-in Requirement

After charging the A/C system with refrigerant, to the specified amount run-in the compressor as follows:

- Start engine and allow engine to idle at less than 1500 RPM
- Turn A/C Switch ON
- Adjust temperature control to Max Cold
- Turn fan speed to High
- Idle engine for at least two minutes

DENSO

SERVICE

FAILURE OF DAMPER LIMITER-PULLEYS FOR EXTERNAL CONTROLLED COMPRESSORS

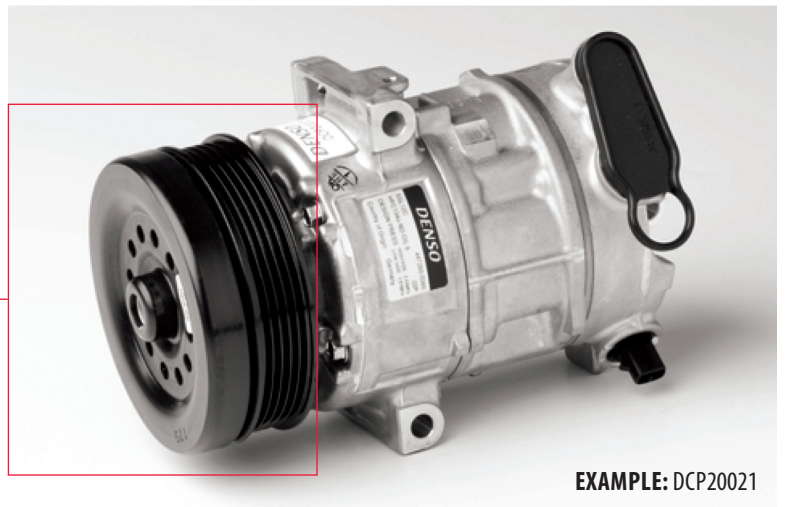
OUTLINE

This bulletin is to inform you, how to diagnose DL-Pulley failure, for external controlled compressors.

APPLICABLE PRODUCT

All external controlled compressors with a DL-Pulley.

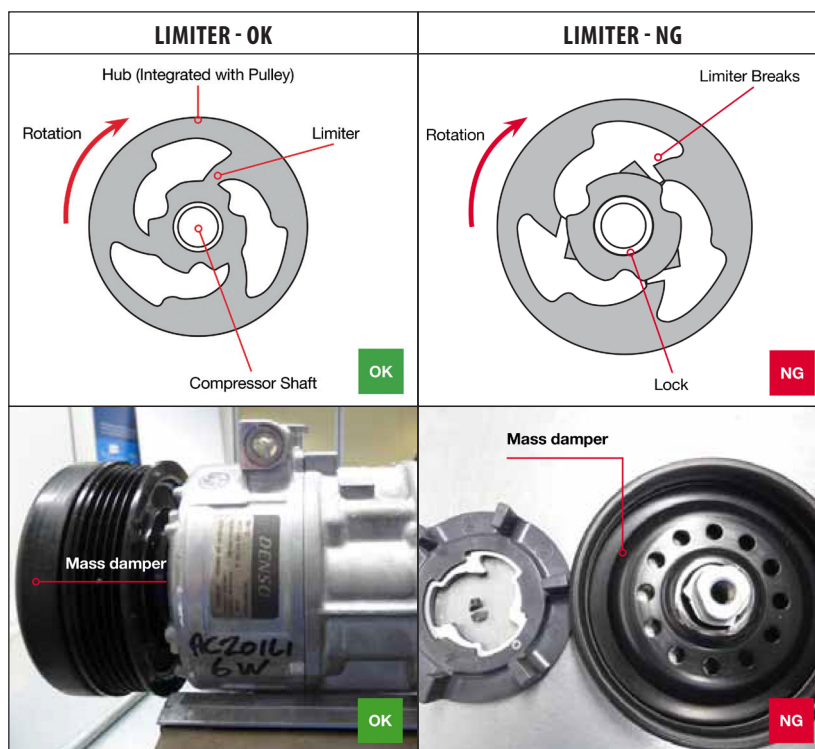
DAMPER LIMITER - PULLEY



EXAMPLE: DCP20021

PURPOSE OF THE LIMITER AND (OPTIONAL) MASS DAMPER

The limiter of the DL-Pulley is a safety mechanism, which prevents the multi belt from breaking, after, for example, the compressor is locked. When the limiter breaks, the pulley can run freely, so the multi belt will not lose his drive function. The mass damper is (optional) installed too dampen variations in engine speed.



DENSO

SERVICE

FAILURE OF DAMPER LIMITER-PULLEYS FOR EXTERNAL CONTROLLED COMPRESSORS

WHY DO LIMITERS BREAK OR DOES THE (OPTIONAL) MASS DAMPER COMES LOOSE?

The main reasons, why the limiter of the DL-pulley breaks or the mass damper comes loose are:

1. Excessive negative force on the DL-pulley, due to too much drive belt movement.
2. Continuously changing force on the DL-pulley, due to severe rotation speed fluctuation.
3. Excessive force on the DL-pulley, due to too much engine torque.
4. Liquid lock of the compressor, due to excessive refrigerant, incorrect charging of refrigerant, expansion valve problems or too much compressor oil.
5. Too much friction of internal compressor parts.
6. Vacuum lock, caused by running the engine, when the refrigerant system is vacuumed.

HOW TO CHECK?

Carry out inspection with the engine idling, engine speed increase and engine speed decrease. Check by visual inspection, if the drive belt has too much movement. In case of too much belt movement, inspection and or replacement of the following parts is required. Carry out inspection with the engine idling, engine speed increase and engine speed decrease. Check by visual inspection, if the drive belt has too much movement. In case of too much belt movement, inspection and or replacement of the following parts is required.

- Various pulley's, like alternator free run pulley, crankshaft pulley and idler pulley
- Automatic belt tensioner (check the damper)
- Dual mass flywheel

DO NOT INSTALL IMITATION PARTS

EXPLANATION

1. Negative force, caused by the drive belt, is one of the main issues. This negative force can be caused by several parts of the accessory belt drive system
2. Severe rotational speed fluctuation of the engine can be caused by the fuel injection system, ignition system, exhaust emission control system or camshaft timing. (rough idling – rough running)
3. Too much engine torque, due to enhanced torque output. (chip tuning)
4. Liquid lock is usually caused by charging a liquid refrigerant to the low pressure side, of the vehicle A/C system. Another cause could be the creation of "refrigerant mist" inside the low pressure side of the A/C system, which ultimately, also can cause liquid lock of the A/C compressor. This creation of mist is usually caused by a faulty expansion valve or excessive amount of refrigerant. Too much compressor oil is another reason, which can cause liquid lock. All new DENSO compressors are pre-filled with compressor oil. Please read the "Compressor Installation Guide" very carefully, before replacing the compressor. The "Compressor Installation Guide" is enclosed with the new compressor or can be downloaded, in different languages, from the DENSO After Market website. www.denso-am.eu
5. Too much friction of internal compressor parts, can be caused by the use of the wrong type of compressor oil, too much or wrong UV-dye, insufficient oil and refrigerant amount or insufficient cleaning of the refrigerant cycle. For details, see "Compressor Installation Guide"
6. Vacuum lock can be caused when the A/C system is under vacuum and the engine is started. Because of the vacuum in the A/C system, the swash plate, inside the compressor is moved over the maximum displacement position. When the engine is running in this condition, the pistons will hit the front end of the drive plate and the compressor locks.