Table of Contents

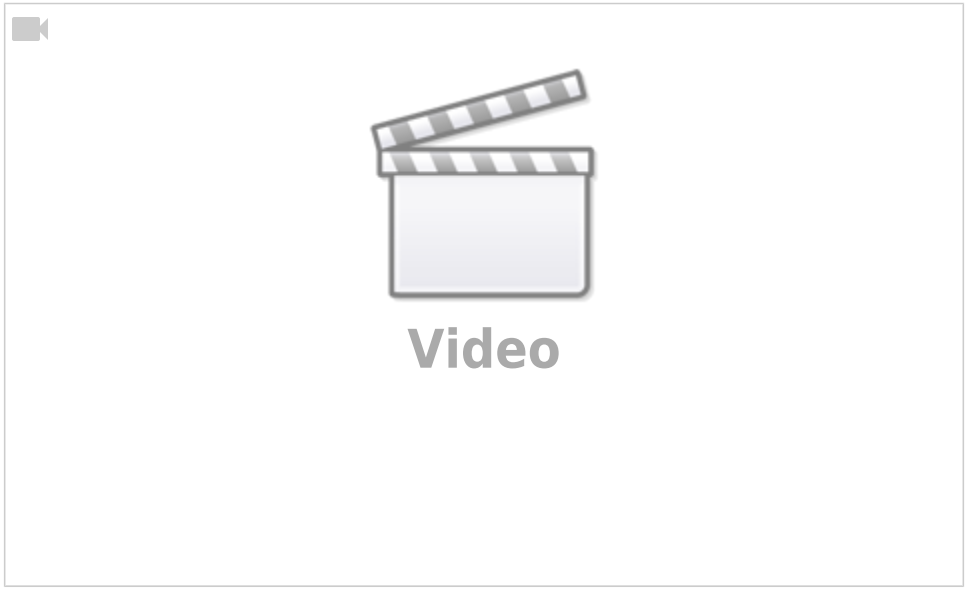
Air Compressor

The following guide is only for vehicles that use desiccant air dryers. The guide consists of an introduction to air brake charging system components, a table showing recommended vehicle maintenance schedules, and a troubleshooting symptom and remedy section with tests to diagnose most charging system problems.

Advanced Troubleshooting Guide for Air Brake Compressors

Overview

The air compressor is located on the engine and operates only when the engine is running. Clean, filtered, turbocharged pressurized air from the intake manifold is force-fed into the air compressor. The compressor maintains the air system whenever the system's pressure falls below preset parameters. When the maximum pressure is reached, the compressor output is diverted. An air governor is used to maintain the air pressure from 85 to 125psi.



Introduction to the Air Brake Charging System

Powered by the vehicle engine, the air compressor builds the air pressure for the air brake system. The air compressor is typically cooled by the engine coolant system and lubricated by the engine oil supply.

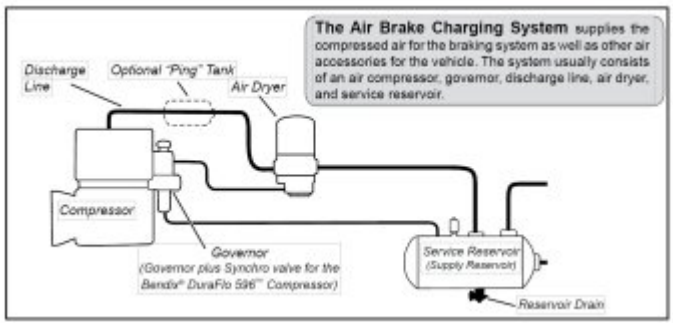
As the atmospheric air is compressed, all the water vapor originally in the air is carried along into the air system, as well as a small amount of the lubricating oil as vapor.

The compressor's unloader mechanism and governor (along with a synchro valve for the Bendix® DuraFlo 596™ air compressor) control the brake system air pressure between a preset maximum and minimum pressure level by

monitoring the pressure in the service (or “supply”) reservoir. When the air pressure becomes greater than that of the preset “cut-out”, the governor controls the unloader mechanism of the compressor to stop the compressor from building air and also causes the air dryer to purge. As the service reservoir air pressure drops to the “cut-in” setting of the governor, the governor returns the compressor back to building air and the air dryer to air drying mode.

The duty cycle is the ratio of time the compressor spends building air to the total engine running time. Air compressors are designed to build air (run “loaded”) up to 25% of the time. Higher duty cycles cause conditions that affect air brake charging system performance which may require additional maintenance. Factors that add to the duty cycle are: air suspension; additional air accessories; use of an undersized compressor; frequent stops; or excessive leakage from fittings, connections, lines, chambers or valves, etc.

The discharge line allows the air, water-vapor, and oil-vapor mixture to cool between the compressor and air dryer. The typical size of a vehicle's discharge line, (see column 2 of Table A on page 3) assumes a compressor with a normal (≤ 25%) duty cycle and operating in a temperate climate. See Bendix and/or other air dryer manufacturer guidelines as needed.



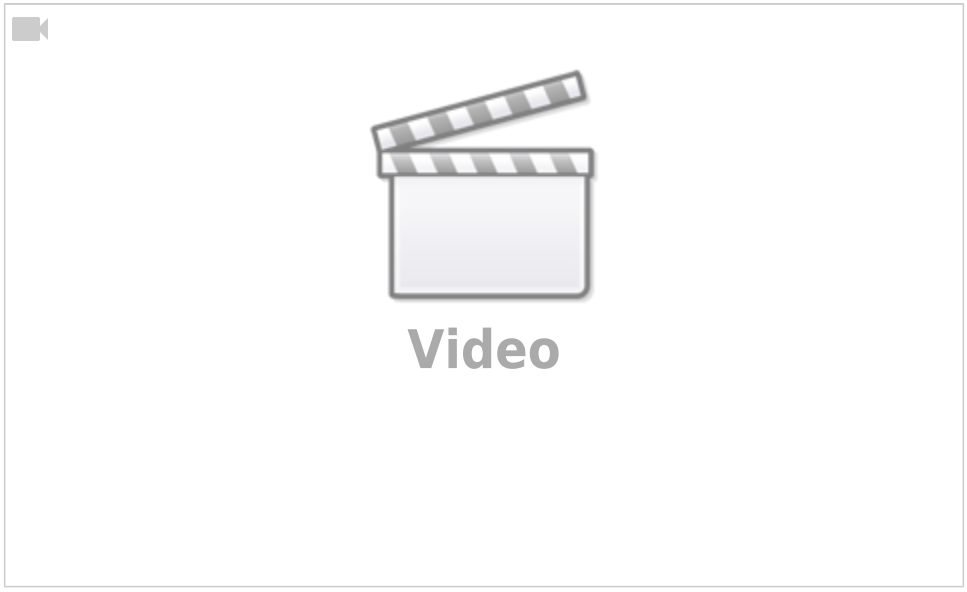
When the temperature of the compressed air that enters the air dryer is within the normal range, the air dryer can remove most of the charging system moisture. If the temperature of the compressed air is above the normal range, oil — as oil-vapor — is able to pass through the air dryer and into the air system. Larger diameter discharge lines and/or longer discharge line lengths can help reduce the temperature.

The discharge line must maintain a constant slope down from the compressor to the air dryer inlet fitting to avoid low points where ice may form and block the flow. If, instead, ice blockages occur at the air dryer inlet, insulation may be added here; or if the inlet fitting is a typical 90 degree fitting, it may be changed to a straight or 45 degree fitting. For more information on how to help prevent discharge line freeze-ups, see Bendix Bulletin TCH-008-021 (available on www.bendix.com). Shorter discharge line lengths, or insulation, may be required in cold climates.

The air dryer contains a filter that collects oil droplets, and a desiccant bed that removes almost all of the remaining water vapor. The compressed air is then passed to – and stored in – the air brake service (supply) reservoir. The oil droplets, and the water collected, are automatically purged when the governor reaches its “cut-out” setting and sends a signal to the air dryer.

For vehicles with accessories that are sensitive to small amounts of oil, we recommended installation of a Bendix® PuraGuard ® oil coalescing filter, designed to further minimize the amount of oil present.

Compressor Maintenance Guidelines



Air pressure build up test.

Continue to let the air pressure build; it should not take more than four minutes for the air pressure to go from discharged (5-20 psi) to between 120 and 130 psi.

Governor cut-in/cut-out test.

When air pressure gets between 120-130 psi, the governor should cut out. The dash gauge needle stops moving and you will hear the air dryer purge. When the needle stops, pump the brake pedal to reduce the air pressure to ~80 psi, release the brake pedal, the compressor starts pumping air (cutting in)! watch for needle movement. The air governor causes the air compressor to cut in between (85-90 psi).