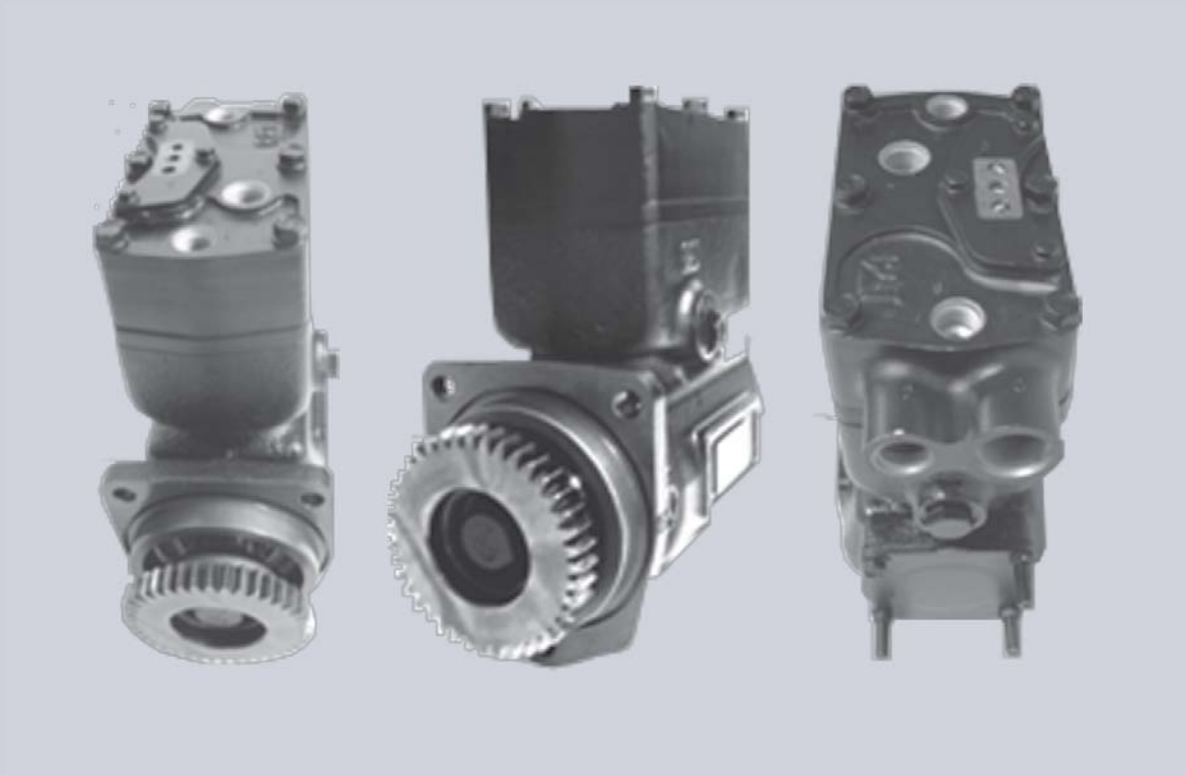


INSTALLATION GUIDE



EL365 Compressors

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Innovative Vehicle Solutions

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Haldex EL365 Compressors - General Specifications

ROBUST & RELIABLE DESIGN

The Haldex 365 is a two-cylinder compressor design that raises the bar for demanding new Truck Engine Applications. The Haldex 365 boasts the highest drive-thru capacity, and the highest turbo-charged inlet pressure capability in the market. The Haldex 365 functions seamlessly with most engines' emissions system.

GENERAL SPECIFICATIONS

Swept Volume (cc)	365
Piston Diameter (in).....	2.75
Stroke (in).....	1.87
Flow Capacity (cfm) @ 1800 RPM and 125 PSI.....	10.5
Horsepower (HP) @ 1800 RPM and 125 PSI	
Loaded HP.....	4.5
Unloaded HP.....	1.4
Inlet Pressure	Naturally Aspirated to 60 PSI Turbo
Drive-Thru Capacity (ft-lb)	150 (11 tooth spline)
Number of Cylinders.....	2
Weight (lbs)	47
Maximum RPM.....	3000
Length (in).....	12.11
Height (in)	12.22
Width (in)	5.43

FEATURES

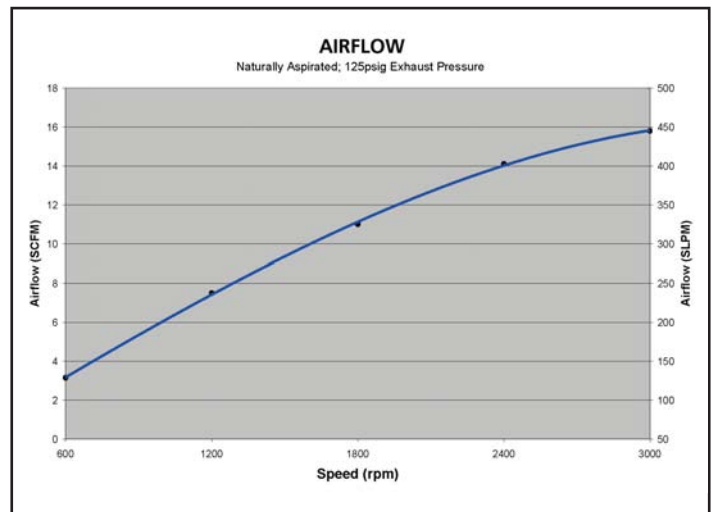
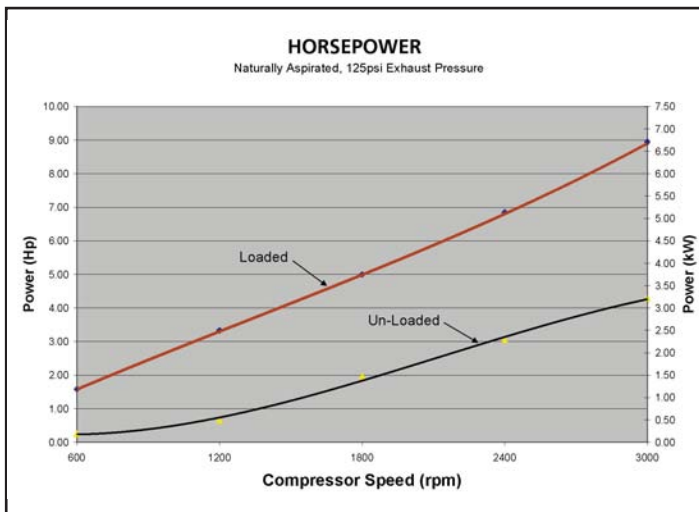
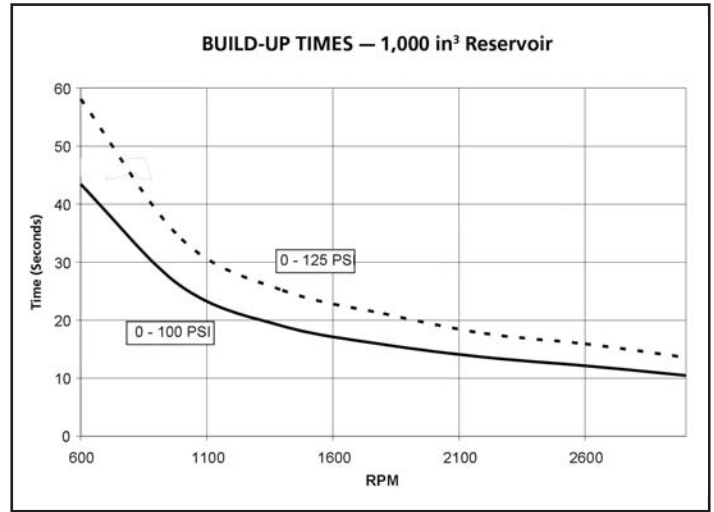
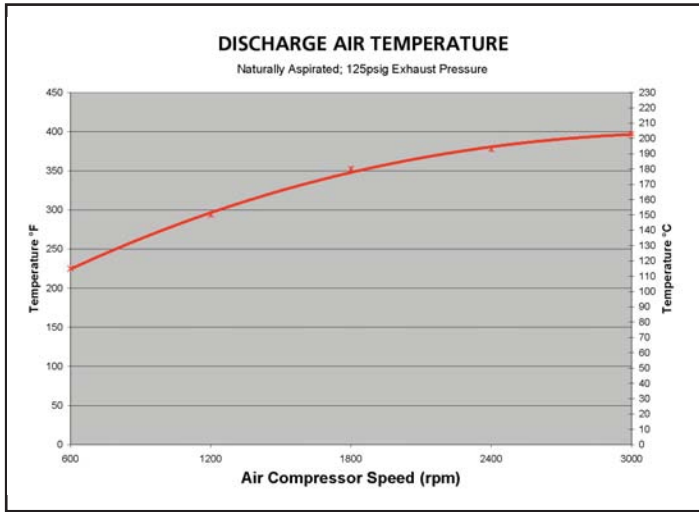
High Air Output
Twin Cylinder
Aluminum Head
Reed Valves
Thru-Hardened Crank
Water Cooled
Robust Crankcase
Turbochargable
Inlet Check Valve

BENEFITS

Provides Adequate Air Supply For Demanding Applications
Provides Less Vibration, Less Pulsation: Longer Durability
Reduces Weight and Operating Noise
Provides Higher Volumetric Efficiency
Provides Durability for High Drive-Thru Torque Capacity
Water Cooled Block & Head Provide Lower Exhaust Temperatures
Provides Excellent Bore Geometry Through-Out Operating Conditions
Naturally Aspirated or Turbocharged Operation
Selected Models - Reduces Excessive Oil Passing Due to High Vacuum at the Inlet

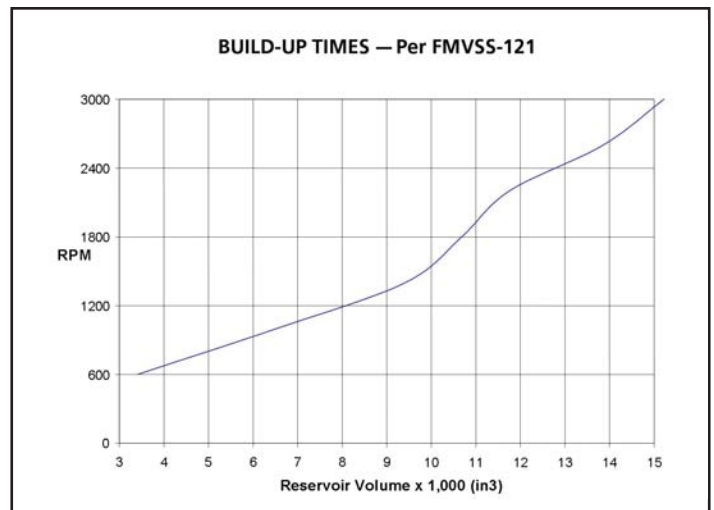
Haldex EL365 Compressors - Product Performance

PRODUCT PERFORMANCE



Conditions for Graphs, except where noted:

- Naturally Aspirated Inlet at 30-32°C (86-89.6°F)
- 8.6 bar (125 PSI) Exhaust Pressure
- 99°C (210°F) Oil @ 2.4 bar (35 PSI)
- 88°C (190°F) Coolant @ 0.83 bar (12 PSI)



Compressor speeds required to raise pressure from 85 PSI to 100 PSI in 25 seconds for various reservoir volumes.

Haldex EL365 Compressors - Installation Guidelines

LUBRICATION SYSTEM

An adequate supply of a clean, high quality lubricating oil is necessary for trouble-free extended compressor life. Oil not only lubricates and cools the bearings, but also helps cool the piston and cylinder walls. Another important function is removing carbon and other particles from the crankcase and carrying them to the oil filter.

In order to ensure that the oil performs all of these functions satisfactorily, the following precautions must be taken:

Oil Cleanliness

The pressurized diesel engine oil should be taken from a point after the oil filter. Filtration should limit particle size to 40 microns. Contaminated oil can result in excessive bearing wear or excessive oil consumption due to ring wear.

Oil Supply Temperature

Oil entering the compressor must not be higher than 266°F (130°C). Excessive oil temperature will cause the oil to break down and lose its lubricating properties. Hot oil also contributes to ineffective piston and cylinder wall cooling.

Oil Supply Pressure

The oil pressure at port 8.1 must be at least 14.5 PSIG (100 kPa) at engine idle speed. The maximum allowed supply pressure is 65 PSIG (450 kPa) at maximum engine speed.

Oil Supply Line Size

The minimum oil supply line Inside Diameter must be 1/8" (3.2mm). This is to ensure an adequate supply of oil to prevent early bearing failure. The line must also be free of restrictions and sharp bends.

Oil Draining

When the compressor is flange mounted, the oil is drained through the mounting flange to the engine.

INSTALLATION TILT & ROTATION

The compressor is able to drain oil during its normal performance at the following tilt conditions:

Rotation About Crankshaft Centerline

30° Maximum Clockwise or Counter Clockwise rotation from the compressor's vertical centerline. Note: 0° is when compressor head is up and level.

Fore / Aft Tilt From Compressor Center of Gravity

10° Maximum tilt fore or aft at static engine conditions.

During dynamic driving conditions: 30° tilt fore or aft is permitted up to a maximum of 10 minutes.

COOLING SYSTEM

The process of compressing air results in high temperatures which are transmitted to the cylinder block, cylinder head and pistons. If this heat is not removed by some external means, the compressor will experience very short life due to excessive carboning, piston seizure, or valve breakage.

Coolant Flow

Minimum flow rate at 2400 RPM = 2.5 gpm (9.5 L/min)

Coolant inlet should be into the cylinder head or cylinder block at one end and taken out of the cylinder head at the opposite end. By no means should the coolant outlet be from the same end as the coolant supply, or should the water outlet be from the cylinder block.

Coolant Temperature

Coolant supply to the compressor must not exceed 266°F (130°C) and should be from a point as close to the water pump outlet as possible to ensure relatively cool temperatures. Maximum cooling efficiency is obtained with lower temperatures of the coolant.

Coolant Line Size

The minimum coolant supply line Inside Diameter must be at least 1/2" (51mm). The line must also be free of restrictions and sharp bends.

AMBIENT TEMPERATURE

The allowable compressor ambient (under-hood) temperature range is -40°F to 250°F (-40°C to 121°C).

Haldex EL365 Compressors - Installation Guidelines

AIR INDUCTION SYSTEM

20" H₂O Maximum Restriction

The maximum restriction measured at the compressor must not exceed 20 inches of water (20" H₂O) with the compressor pumping to atmosphere at 2400 RPM. If intake vacuum exceeds 20" H₂O, the intake filter must be changed. If problems with high vacuum at the inlet persist, head kits with inlet check valves are available.

Filter Incoming Air to 40 Micron (μ) Maximum

The minimum filter efficiency is 99.6% and must meet ISO5011 test requirements. Clean air is necessary to prevent excessive cylinder and ring wear. It is also necessary for proper operation of valves in the brake system.

Inlet Turbo-Charging and Temperature

Due to the robust bearing and power cylinder design, the air compressor will operate normally with either naturally aspirated or turbo-charged inlet plumbing. The air pressure at the inlet port of the compressor must be between 20" H₂O vacuum and 60 PSIG. The inlet temperature must not exceed 250°F (121°C). Naturally Aspirated applications must have a minimum of a 1 inch (25.4mm) Inside Diameter air inlet line.

AIR DISCHARGE SYSTEM

The air discharge line must transmit high pressure air from the compressor to the air reservoir where it becomes available for air brake applications. The discharge line could have an effect on compressor life if restrictions exist. Restrictions in the discharge line will cause the compressor to have extremely high peak pressures and overheat. To guard against this occurrence, the discharge line shall have a minimum of 0.547 inch (13.9mm) Inside Diameter and a 2 inch (51mm) bend radius.

Maximum Pressure

The maximum working exhaust pressure is 190 PSIG (13 bar).

Maximum Duty Cycle

It is recommended that the compressor duty cycle not exceed 25% loaded and the average charge duration should not exceed 90 seconds.

AIR DISCHARGE SYSTEM (cont'd)

Downward Flow of Discharge Air

All air brake air compressors use a certain amount of oil. This oil is discharged out of the compressor via the discharge line where it may collect and, along with high discharge temperature, gradually turn to carbon. As the compressed air cools in the discharge line, moisture will also condense in the line. The discharge line should, therefore, slope downward (without traps) so any moisture and oil passing through the line will flow down into the vehicle's air brake system air dryer. The contamination will then be processed correctly through the air dryer.

Maximum Temperature

The temperature of the air compressor exhaust air temperature does not exceed 400°F (204°C) at normal operating temperatures.

MOUNTING FLANGE SEAL

Precaution must be taken with mounting flange seal to assure a full opening to the oil drain holes. **DO NOT use form-in-place gasket material.**

CYLINDER HEAD ROTATION

The head assembly of any Haldex 365 air compressor can be rotated 180° with respect to the block by removing the six (6) bolts around the periphery of the head. When the cylinder head is rotated, a new block gasket must be used and proper torquing procedures must be followed.

DRIVE SYSTEM

The compressor installation and drive system has an influence on compressor life. The compressor is designed to operate with certain speeds and mountings. If the operating speed is too slow, insufficient air supply may result. On the other hand, a very high speed will shorten compressor life.

Maximum Speed

The air compressor is most efficient at 1800 RPM. However, the air compressor will function normally up to 3000 RPM continuously and brief intermittent overspeeds up to 3300 RPM.

DRIVE SYSTEM CONTINUED ON PAGE 5

Haldex EL365 Compressors - Installation Guidelines

DRIVE SYSTEM (cont'd)

Accessory Drive-Thru Torque Capacity

The 'drive-thru' model air compressor has the ability to transmit continuous power to auxiliary accessory drive items like: Fuel Transfer Pump, Power Steering Pump, Hydraulic Motor, etc.

The compressor is capable of transmitting a continuous torque up to 150 lb-ft (203.4Nm) torque. The mounting flange for these accessories is SAE 'A' 2 bolt.

AIR GOVERNOR INSTALLATION

Normally the governor is mounted to the compressor head. However, occasionally the governor is remote mounted, and the following precautions should be taken:

Keep Unloader Line Volume Under 50 cubic inches

Keep Away From Engine Hot Spots

AIR GOVERNOR INSTALLATION (cont'd)

Supply Line Must Be 1/4" (6.4mm) Inside Diameter Minimum

When the governor opens, air passes through the governor to pressurize the unloader line and activate the unloader pins, causing the compressor to cut-out (unload). If the governor supply line is restricted, a pressure loss at the governor supply may close the governor valve and exhaust the air from the unloader. As soon as pressure builds up again at the governor, it will open once again. This cycle will continue at a high rate. To avoid this "fluttering", use a short line with 1/4" (6.4mm) Inside Diameter. Make sure the line is not restricted by fittings or sharp bends.

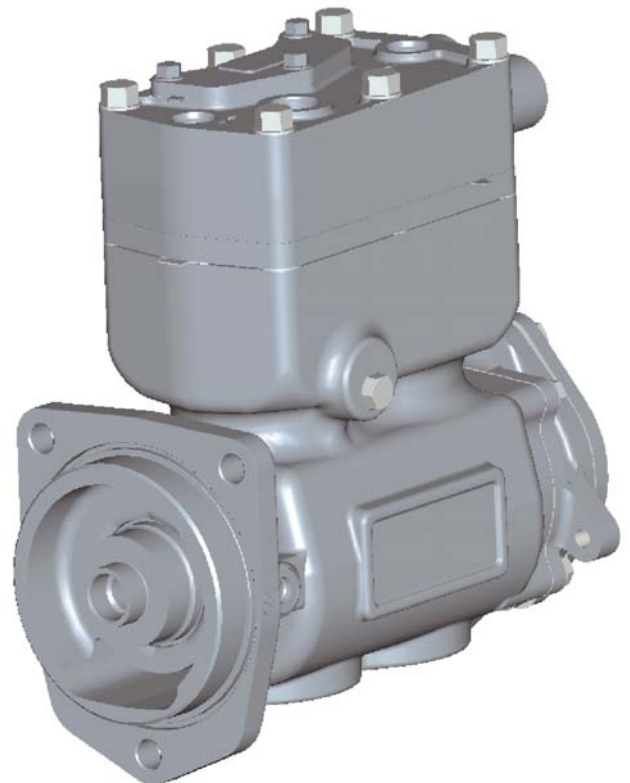
Haldex EL365 Compressors - General Operation

The Haldex 365 is a two cylinder, water cooled, and engine oil-lubricated air compressor. The compressor has a rated capacity which is the piston displacement in cubic feet per minute (CFM) at 1250 RPM. The 365 has a rated capacity of 16.1 CFM.

The flange mounted air compressor utilizes a sleeve-type main bearing in the front and ball bearing in the rear. The unit is designed with a one-piece crankshaft for high drive-thru capability. The pistons are made from a high grade cast iron. Each piston has 3 compression rings above the pin and a 3-piece chrome plated oil ring below. Nylon buttons are used at both ends of the piston pin to retain the floating pin. Connecting rod main bearings are a replaceable insert type.

All valve and components are installed within the aluminum head. The design utilizes a unique reed design to maximize air compressor volumetric efficiency and cooling. The unloader components are installed in the top of the head, while the inlet and exhaust valves are installed in the bottom of the head on the reed plate.

The governor, which controls the minimum and maximum air pressure supplied by the compressor, can be mounted on top of the head or remotely.



Haldex EL365 Compressors - General Operation

AIR COMPRESSOR OPERATION - LOADED

During the down stroke of each piston, air is drawn into the cylinder through the inlet valve in the cylinder head. As each piston begins an upstroke, the inlet valve closes and the air above the piston is compressed.

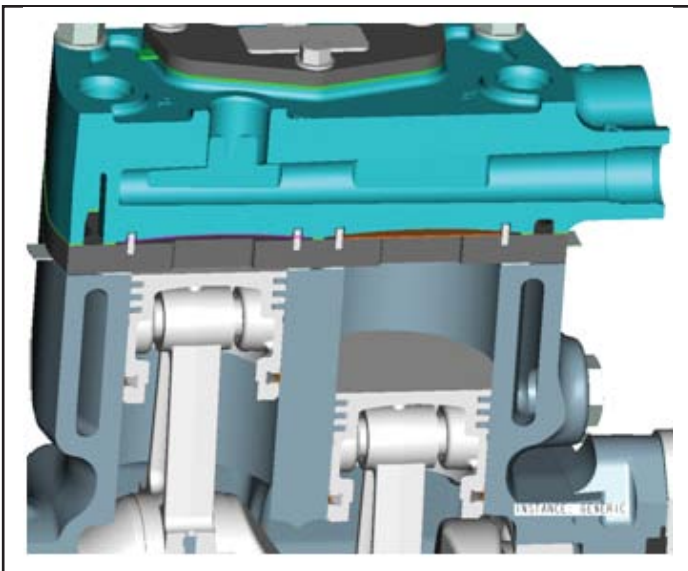
When the cylinder air pressure becomes greater than the system pressure in the cylinder head above the exhaust valve, the exhaust valve is forced open. Air passes through the exhaust valve into the head cavity and into the air line leading to the air reservoir.

As the piston starts a down stroke, the exhaust valve returns to its seated position. Compressed air is prevented from returning to the cylinder and the intake and compression cycle is repeated.

GOVERNOR OPERATION

The governor, operating in conjunction with the air compressor unloading mechanism, automatically controls the air pressure in the air-brake system between the vehicle's maximum and minimum pressure settings.

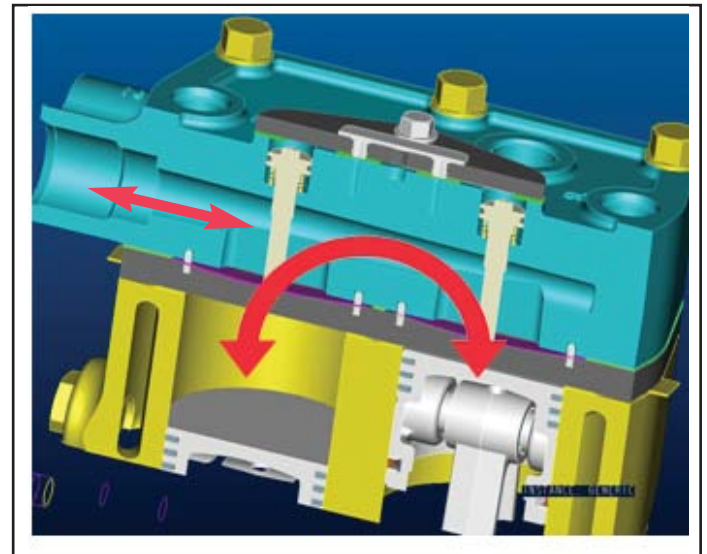
The compressor runs continually while the engine is operating. Compression is controlled via the governor. The compressor is in the compression mode (Loaded Phase – Figure 1) until system pressure is achieved.



Loaded Phase - Figure 1

AIR COMPRESSOR OPERATION - UNLOADED

When air pressure in the system reaches the maximum governor pressure setting, the governor sends an air pressure signal to the top of the unloader pins to hold the inlet reed valves in the open position against the reed plate stop (Unloaded Phase – Figure. 2). With the inlet valves open, air passes back and forth between the cylinders and intake cavity in the head stopping compression. When air pressure in the system is reduced to the governor cut-in setting, the governor operates by releasing the unloader pins which allows the inlet reed valves to function normally permitting air compression.



Unloaded Phase - Figure 2

Haldex EL365 Compressors - Troubleshooting

Compressor fails to maintain sufficient pressure or adequate air supply.

Dirty air cleaner.	Clean or replace element as necessary.
Restriction in compressor cylinder head intake discharge cavity or line.	Repair or replace as necessary.
Leaking or broken inlet or exhaust valves.	Repair or replace as necessary.
Excessive Wear.	Repair or replace compressor as needed.
Drive belt slipping.	Adjust or replace drive belt.
Excessive system leakage.	Check all fittings and connections.
Defective governor.	Repair or replace governor as needed.
Governor with improper setting.	Adjust governor as necessary.
Gauge defective.	Replace gauge as necessary.

Noisy Operation

Loose drive pulley.	Tighten, repair, replace pulley as needed.
Restrictions in cylinder head or discharge.	Repair or replace as needed.
Worn or burned out bearings.	Replace bearings as needed.
Compressor not getting proper lubrication	Service lubrication system as needed.
Excessive wear.	Replace compressor.

Compressor fails to unload (excessive pressure)

Defective unloader pins or seals.	Replace pins and seals as needed.
Defective governor.	Repair or replace governor as needed.
Reservoir line to governor is restricted.	Repair or replace lines as needed.
Unloader mechanism binding or stuck.	Repair unloader as needed.
Gauge is defective.	Replace gauge as needed.

Compressor passes excessive oil.

Excessive wear.	Replace compressor as needed.
Dirty air cleaner – ingestion of contamination.	Clean element and replace compressor.
High inlet vacuum (restricted inlet).	Service intake as needed -or- replace with inlet check valve equipped head.
Small or restricted oil return line flooding compressor crankcase. Or excessive duration high tilt.	Repair or replace return line for adequate draining - optional bottom drain tube is available for extended tilt applications.
Excessive oil pressure.	Service lubrication system as needed.
Excessive engine crankcase pressure.	Check engine system.

Haldex EL365 Compressors - Maintenance/Service Kits

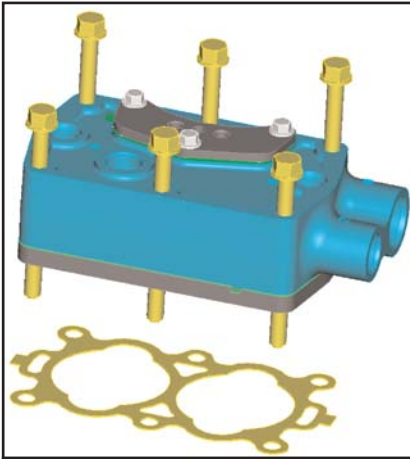
GENERAL MAINTENANCE

The Haldex 365 air compressor requires no specific periodic maintenance for the warranty period beyond assuring a clean unrestricted inlet air supply and clean lubricating engine oil.

The air intake filter should be cleaned or replaced when the filter causes a restriction exceeding 20 inches of water (20" H₂O). The restriction should be measured at the compressor inlet between the filter and air compressor while the compressor is pumping to atmosphere at 2400 RPM.

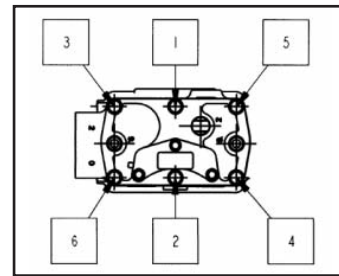
If the air compressor fails to maintain adequate air pressure, the governor and unloader components should be inspected.

Unloader components are serviced after removing the unloader cover plate on top of the head assembly. If wear or damage is evident, Unloader Repair Kit RN26KK is needed.

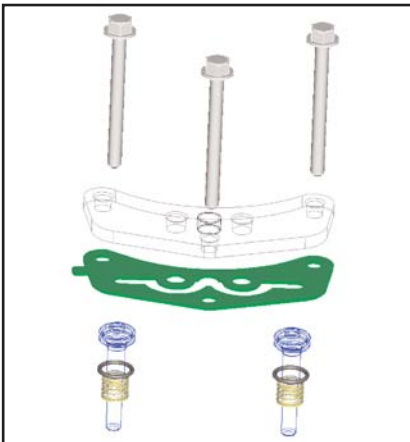


Cylinder Head Assembly
Part #RN26KLX

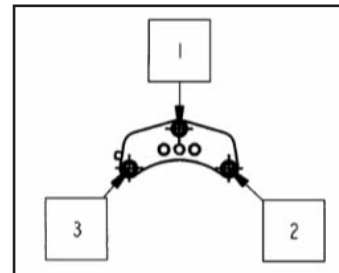
Cylinder Head Assembly with Inlet Check Valve
Part #RN26KNX



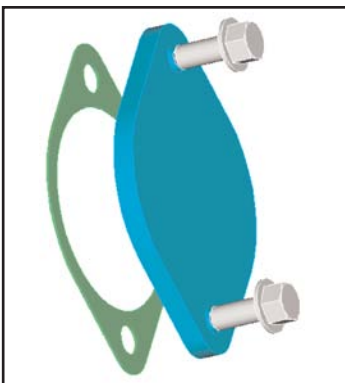
Cylinder Head Assembly Torque Specs
Tighten the head bolts to 10 ± 1 lb ft in the sequence shown. Then apply an additional 120° ± 4° rotation, in the same sequence, using a rotational gauge.



Unloader Repair Kit -
Part #RN26KK
"Phantom" (wire-frame) items not included.



Unloader Bolts Torque Specs
Tighten the unloader bolts to 106 ± 27 lb in in the sequence shown.



2 Bolt End Cover Seal Kit (shown)
Part #RN26KJ

3 Bolt End Cover Seal Kit
Part #RN26KF

Front Flange Seal Kit Available from Caterpillar

2 Bolt Flange
Part #135-9819

3 Bolt Flange
Part #223-3505

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Haldex develops and provides reliable and innovative solutions with focus on brake and air suspension products to the global commercial vehicle industry.

Listed on the Stockholm Stock Exchange, Haldex has annual sales of approximately 3.9 billion SEK and employs about 2,200 people.

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