

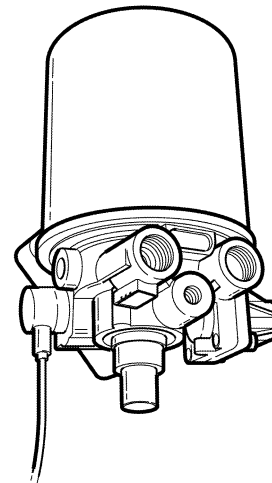
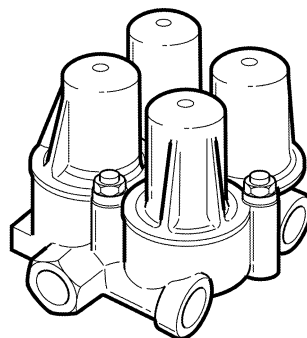
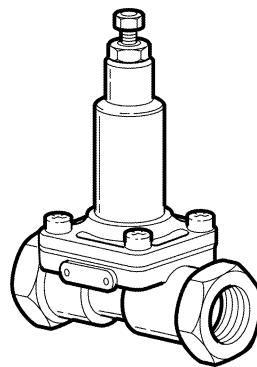
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Issue 2 en

Supply circuit, components

Function and Work description



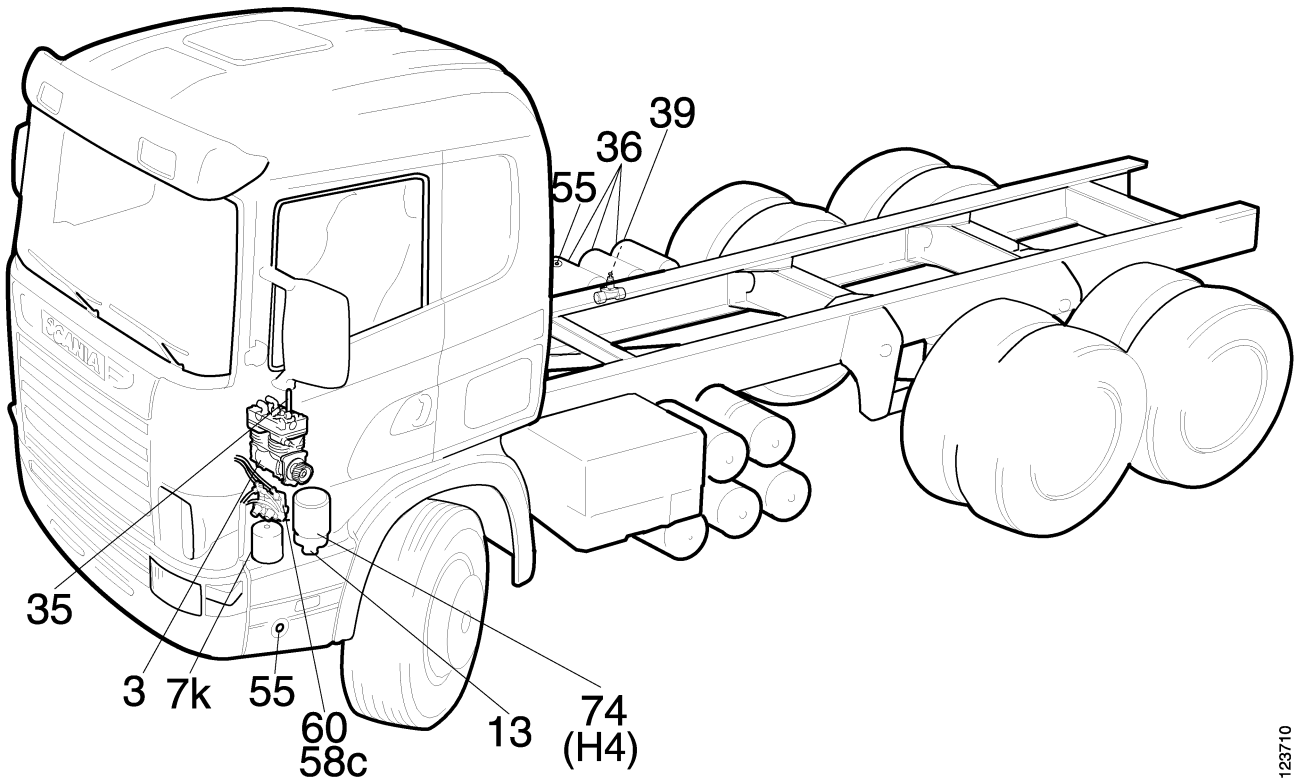
123709

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Description of operation

Location of components



123710

3 Air compressor

7k Regeneration tank

13 Safety valve (14.3 bar)

35 Safety valve (19 bar)

36 Air tank, air suspension

39 Bypass valve

55 Test connection / Filler nipple

58c Pressure limiting valve (9.3 bar), two-stage, vehicle with full air suspension

60 Four-circuit protection valve

74(H4) Air dryer with integrated pressure regulator

Air dryer

General information

The air dryer is used to prevent water and moisture in the compressed air system.

The air dryer works in two phases: drying and regeneration.

IMPORTANT! When topping up air, it is important that it is charged through the correct filler nipple. If air is topped up after the air dryer, it can introduce condensation into the system and generate ice. The air tanks must not contain any water. If they contain water, the desiccant insert should be immediately changed.

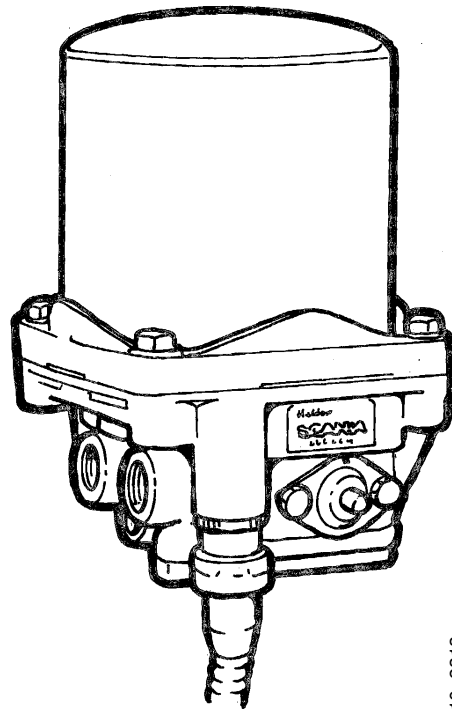
The life of the desiccant depends on air quality from the compressor. If it contains a great deal of oil, its service life will be short.

The air dryer has no volume of its own for regeneration. For this reason, an external tank is used for the regeneration air.

The air dryer and regeneration tank are located behind the left-hand footstep in front of the wheel.

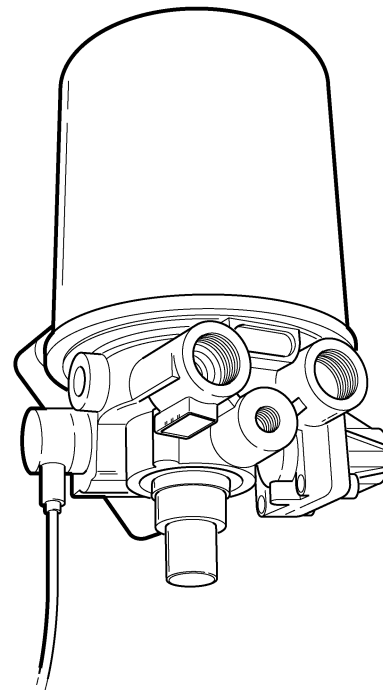
The air dryer principally consists of a cast housing, a valve unit and a compression-moulded desiccant container.

The air dryer can dry approximately 800 dm³ air per minute.



10_2313

Air dryer, Haldex



12878

Air dryer, Wabco

Charging the system

Air from the intake goes up through the desiccant container, passes the desiccant and then to the outlet through the check valve. Meanwhile, a partial flow passes a restriction out to the air tank for regeneration air.

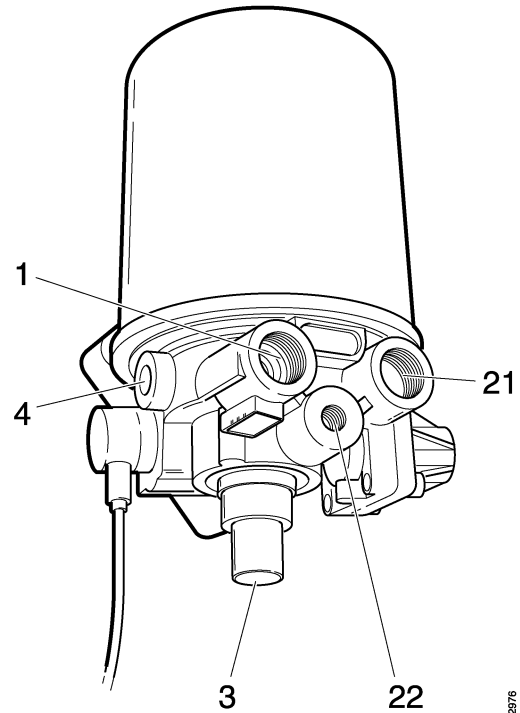
When the pressure in the system rises to the set relief pressure, the pressure regulator plunger will lift. This acts on the diaphragm for the drain plunger causing the drain valve to open.

Relieving pressure

When the pressure in the system rises to the set relief pressure, an intake valve will open.

The drain plunger opens the drain valve, whereby the airflow from the compressor is drained through the outlet. The drain plunger acts also as a relief valve; the drain valve opens when the pressure becomes too great.

As the pressure in the system drops, the intake valve and drain valve will close and the system can start to charge again.



122976

Air dryer, Wabco

1 Intake

4 Governing pressure

3 Vent port

22 Outlet to regeneration tank

21 Outlet

Heating the air dryer housing

There is a heater inside the air dryer housing. It has an integrated thermostat that governs the temperature range within which the heating coil is to be active.

Regeneration tank

A regeneration tank containing dry air is used to remove the moisture from the desiccant.

Moisture is drawn from the desiccant while the pressure regulator relieves the pressure in the air compressor. It is the air from the regeneration tank that passes back through the desiccant, taking with it the moisture out into the open air via the drain valve.

Pressure regulation

All the pressure regulating and regenerating components are located in a valve housing underneath the air dryer housing (Haldex) or inside the air dryer housing (Wabco).

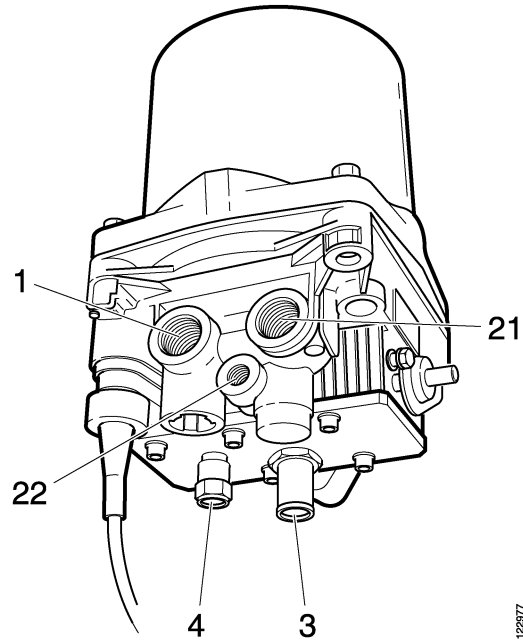
Air dryer, Haldex

Haldex air dryers have been used for 12.2 bar air systems and have been used for 9.3 bar air systems up to and including chassis numbers SSS1225361, SNL4339714 and SAN9019256. Haldex air dryers for 9.3 bar air systems are fully interchangeable with Wabco air dryers for 9.3 bar air systems.

Heating the air dryer housing

There is a heater inside the air dryer housing. It has an integrated thermostat that activates the heating coil when the temperature in the dryer drops below $+7^{\circ}\text{C}$. It is deactivated again at $+30^{\circ}\text{C}$.

Problems with the heater cutting out have been experienced with the Haldex air dryer. This is due to the heater not being able to withstand voltage peaks over 24 V. In order to rectify this problem, a new heater with a maximum voltage of 30 V has been introduced in production from SSS1234281, SNL4368985 and SAN9027020. The new heater has part number 1 414 345.



Air dryer, Haldex

1 Intake

22 Outlet to regeneration tank

4 Governing pressure

3 Vent port

21 Outlet

Relieving pressure

Pressure in the Haldex dryer is relieved in two stages, significantly reducing noise level.

During the first stage, the drain plunger will lift so that the compressor airflow is drained via the outlet. At the same time as the drain valve opens, air under pressure will be exhausted to the compressor relief mechanism. Meanwhile, the air in the regeneration tank will come out through the desiccant, taking with it the stored moisture. The system is not emptied because there is a check valve in the outlet.

During the second relief stage, the drain valve will be pressed against the valve seat by the compressed air from the regeneration tank. When the pressure in the air dryer has dropped, the drain valve will be opened by the force of the spring and the remaining air will be evacuated.

When the pressure in the system drops, the force of the pressure will reset the pressure regulator plunger at a certain pressure, while air is drained out under the drain plunger diaphragm via the plunger spindle and the spring housing. The drain valve closes and the system is recharged.

Desiccant container

The older type of desiccant container with a loose spring between the metal cap and the dryer cartridge has been discontinued. A new dryer cartridge has been introduced without a loose spring where the function of the spring has been integrated.

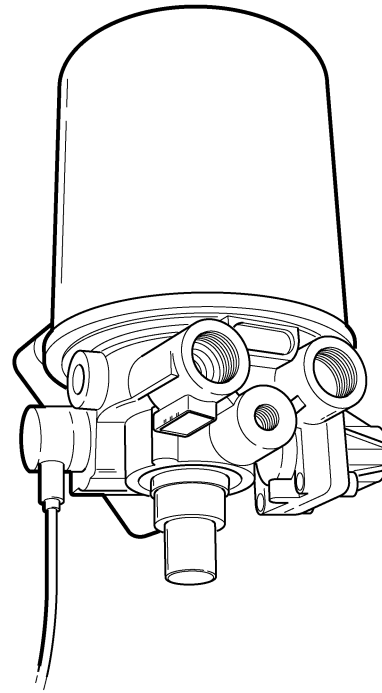
Air dryer, Wabco

Wabco air dryers are used on 9.3 bar air systems from chassis numbers SSS1225361, SNL4339714 and SAN9019256. Wabco air dryers are fully interchangeable with Haldex air dryers for 9.3 bar air systems.

Heating the air dryer housing

There is a heater inside the air dryer housing. It has an integrated thermostat that activates the heating coil when the temperature in the dryer drops below +6°C. It is deactivated again at +30°C.

A new switch has been introduced for the heater from chassis numbers SSS1256268, SNL4424458 and SAN9048434. The new switch is better protected against moisture.



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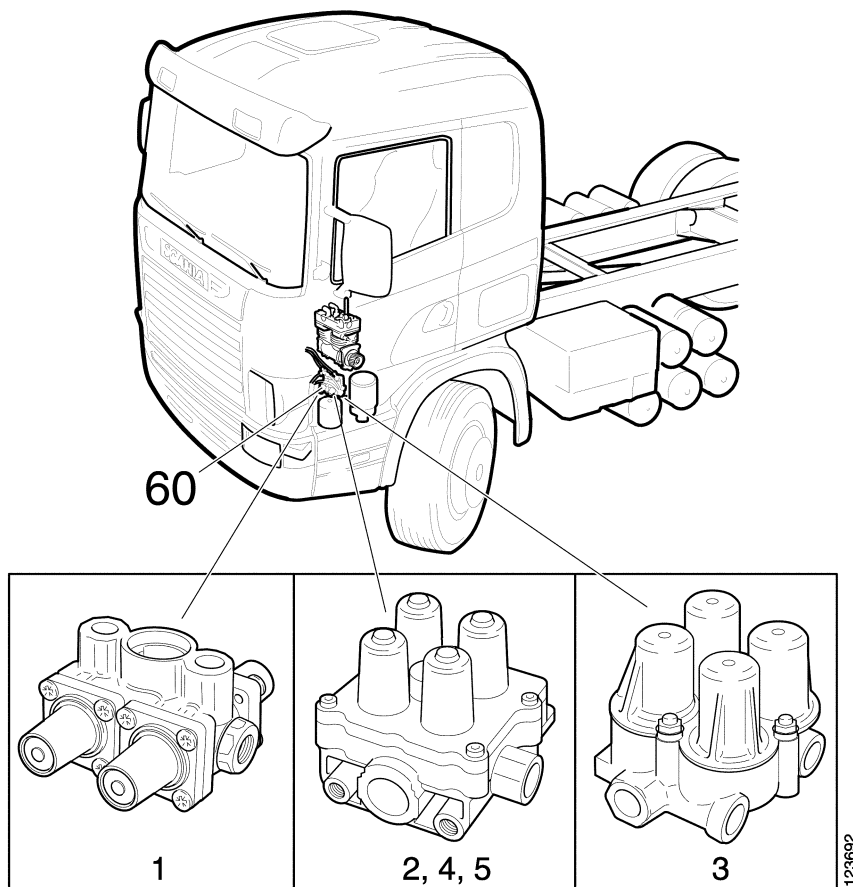
Air dryer, Wabco

Four circuit protection valve

General information

If pressure is lost in any of the circuits (e.g. due to a broken line), the four circuit protection valve will prevent the remaining circuits from losing pressure. The valve circuit has priority.

When filling the system, the front and rear circuits and the extra equipment circuit are filled first and then the parking brake circuit. This is done so that the parking brake will not be released until the front and rear circuits have sufficient air for braking.



Four-circuit protection valve location.

Versions

There are five alternative versions of the four-circuit protection valve. Type 1 has a horizontal tower, types 2, 3, 4 and 5 have a vertical tower.

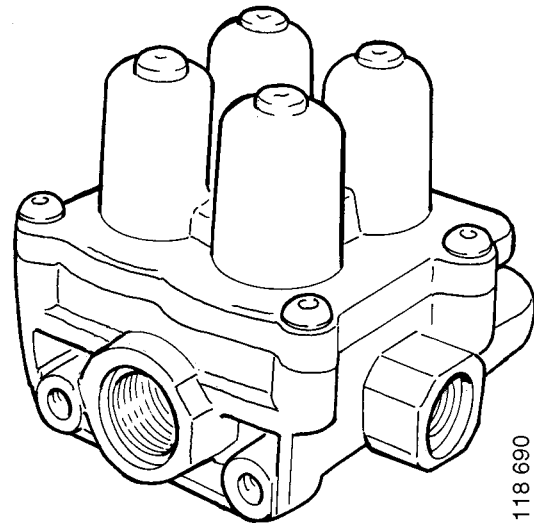
Types 2, 4 and 5 have a similar appearance. The difference between them is that types 4 and 5 have a bypass function that drains the parking brake circuit via a restriction if the rear circuit becomes empty. Type 5 has an increased opening pressure and is fitted on T-vehicles.

Type 2 was introduced in production from chassis number SSS1233805, SNL4382359 and SAN9027088.

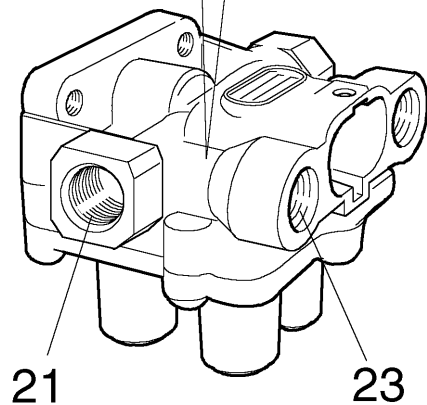
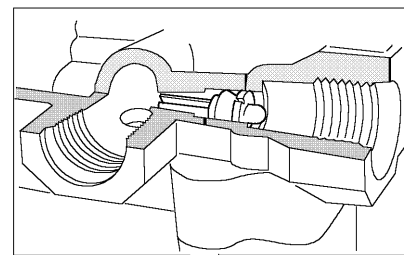
Type 3 is fitted from chassis numbers SSS1241108 and SNL4395108.

Type 4 is fitted from chassis number SSS1261040.

Type 5 is fitted from 2001-09, T-vehicles.



Four-circuit protection valve types 2, 4 and 5.



Bypass function on types 4 and 5.

21 Rear circuit

23 Parking brake circuit

Safety valve

Specifications

Safety valve on air dryer (13)	14.3 bar
Safety valve on air compressor (35)	19.0 bar

General information

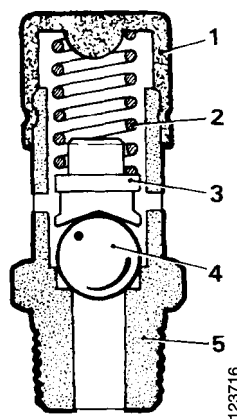
The safety valve on the air compressor protects the compressor against breakdowns, e.g. if the cooling coil should freeze.

The safety valve on the air dryer protects the brake system against excessive air pressure if a fault should occur e.g. in the air dryer pressure regulator.

Function

If air pressure below the spring-loaded ball becomes too high for any reason, the ball will lift from its seat and the air can then flow out through the hole in the valve housing.

When a sufficient quantity of air has escaped, the spring force will counteract the force of the compressed air, pushing the ball back against its seat and closing the valve.



- 1 Cap
- 2 Spring
- 3 Guide
- 4 Ball
- 5 Housing

Overflow valve

General information

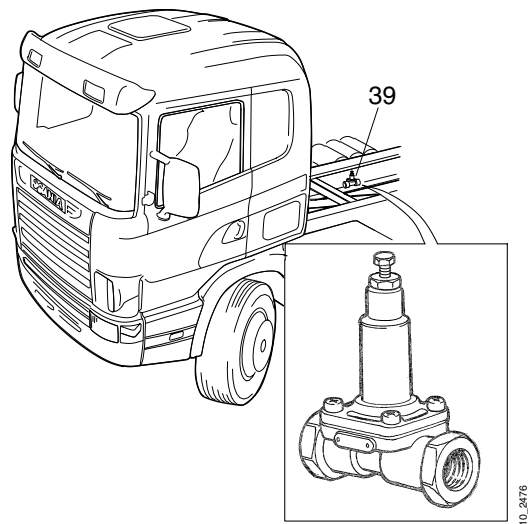
An overflow valve is used in trucks with extra load handling tanks for air suspension.

The overflow valve is located between the first and second load handling tanks for air suspension.

The overflow valve is available in two versions, version 1 on vehicles from start of production and version 2 on vehicles manufactured from Feb. 1996.

The function of the valve is to protect the brake system if pressure is lost in the suspension system. The valve keeps closed the connection between the first and second load handling tanks until the pressure in the first tank has risen to 10 bar on version 1 and to 9 bar on version 2. In this way, the truck brake system is filled before the air suspension load handling tanks.

The valve also acts as a check valve when the pressure in the other load handling tanks is higher than in the first tank.



Overflow valve location.

Pressure limiting valve

General information

The pressure limiting valve with two-stage function is only available on vehicles with full air suspension and relief pressure of 12.2 bar. The valve limits the pressure in the brake system to 9.2 bar.

Additional pressure limiting valves are fitted for other equipment and for the exhaust brake.

Charging

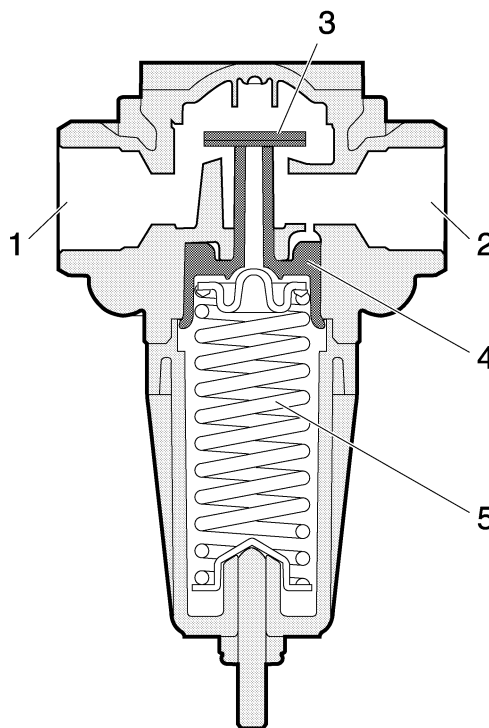
The compressed air flows from the intake to the outlet. The plunger is under load but is initially maintained in its upper position by a spring.

Pressure limitation

When the pressure on the outlet side reaches the set value for pressure limitation (9.2 bar), the air pressure will overcome the spring pressure of the plunger, the plunger and valve will move down and the valve plate will prevent a further increase in pressure in the outlet.

Valve opening

If pressure in the outlet is lost, the spring will press up the plunger with the valve plate. The pressure must drop to 8 bar, however, before the spring can overcome this higher pressure above the valve plate and open for further pressure increase in the outlet. The pressure in the brake system will therefore vary between 8 and 9.2 bar.



123696

- 1 Intake (high pressure connection)
- 2 Outlet (low pressure connection)
- 3 Valve plate
- 4 Plunger
- 5 Spring

Work description

Air dryer

General information

Specifications

Air dryer, Haldex

Heater 140 W, current consumption	approx 5 A
Thermostat, connection temperature	+ 7°C

Air dryer, Wabco

Heater 100 W, current consumption	approx 3.5 A
Thermostat, connection temperature	+ 6°C



WARNING!

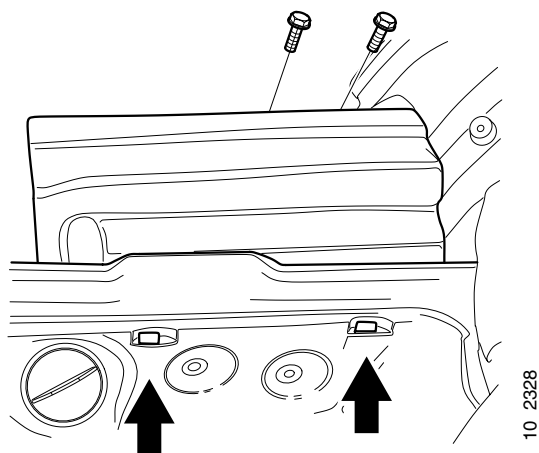
Work on the brake system may only be carried out by personnel with sufficient training and knowledge for the task. If problems arise, contact your nearest supervisor for assistance.

When working on the brake system, it is important to follow the instructions in order to avoid accidents and personal injury.

It is also important to use the correct components when carrying out work on the brakes. A brake system which fails due to faulty components can have disastrous consequences on the road.

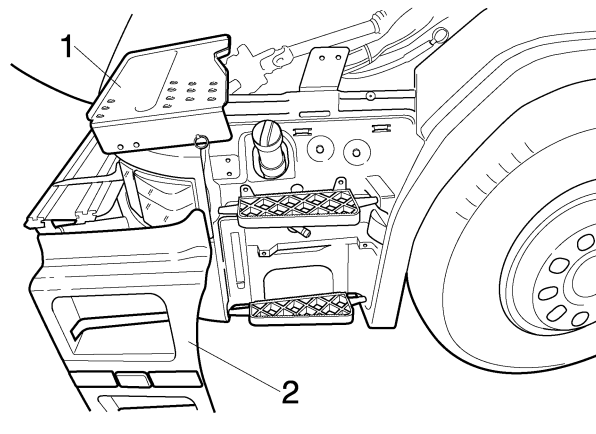
Uncovering the air dryer

- 1 Evacuate the air from the system.
- 2 Release any remaining air in the air dryer via the brake system filler nipple. Use a screwdriver.
- 3 Tilt the cab or open the bonnet.
- 4 Loosen the bolts, push in the snap locks and remove the protection cover. (Does not apply to newer vehicles with metal tread plate. Does not apply to T trucks).



Additional work on T-trucks

- 1 Remove the service platform 1.
- 2 Remove the plastic cover on the footstep 2.



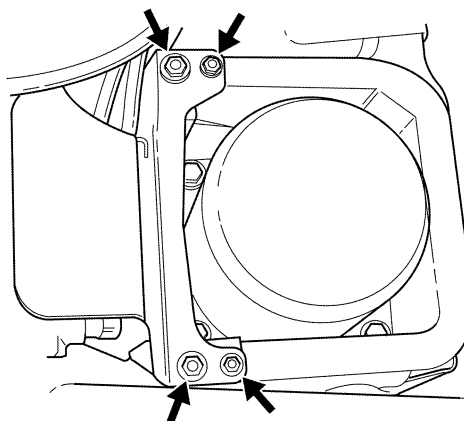
Fitting

Assemble in reverse order.

Renewing the air dryer

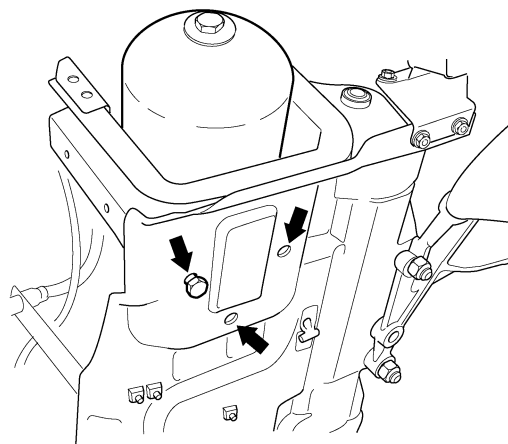
Removal

- 1 Uncover the air dryer according to “Uncovering the air dryer”.
- 2 Remove the front part of the wing liner.
- 3 Remove the footstep.
- 4 Remove the four screws holding the four-circuit protection valve bracket and the tread plate (the tread plate is not fitted on older models).



123705

- 5 Detach all the pipe connections from the air dryer.
- 6 Unplug the connector to the heater.
- 7 Remove the bolts holding the air dryer to the wing. Push forward the four-circuit protection valve and lift up the air dryer.



123712

Fitting

- 1 Assemble in reverse order.
- 2 Test the relief function and integrity of the pipe connections.

Renewing desiccant in Haldex air dryer



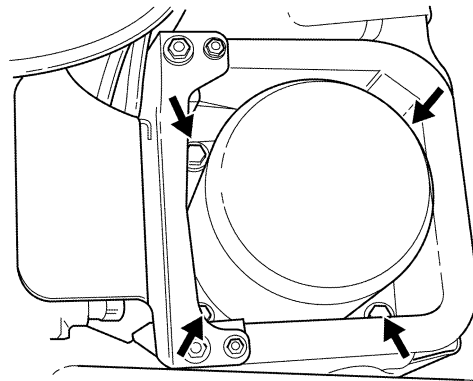
WARNING!

There is a risk of injury if the instructions below are not followed.

Removal

- 1 Uncover the air dryer according to “Uncovering the air dryer”.
- 2 Remove the four bolts securing the desiccant container and remove it.

Note: On trucks with chassis numbers lower than 1 218 254, the nuts will be loose in the housing. They may fall out and are difficult to refit. The nuts are secured on trucks with higher chassis numbers.

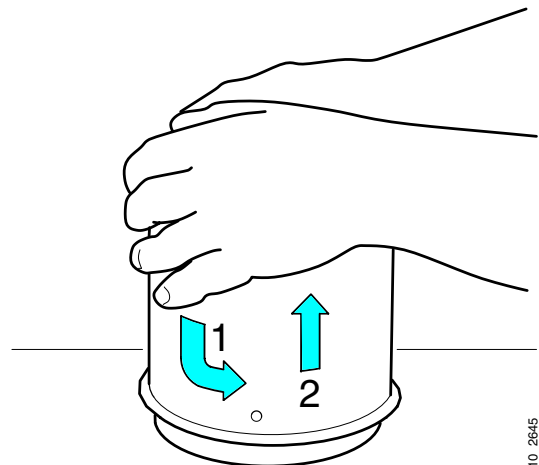


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- 3 Place the container on a workbench, metal cap face up. Press down the metal cap approximately 5 mm and turn anti-clockwise approximately 10°. Lift it up.

Note: On older trucks, there is a loose spring between the desiccant cartridge and the metal cap. The new desiccant cartridge does not have a loose spring, the spring function is integrated instead.

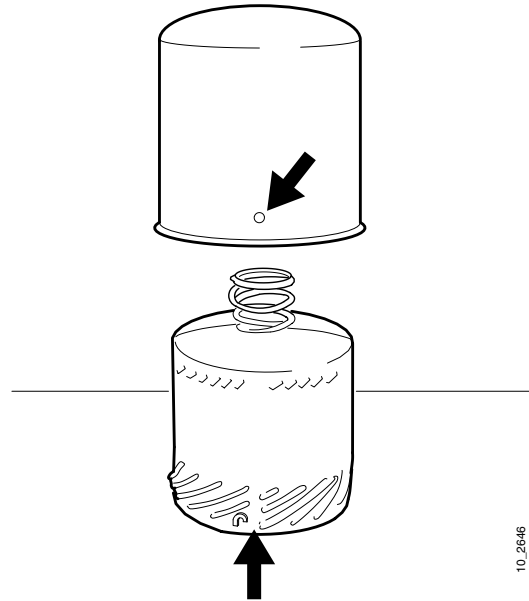
- 4 Clean the metal container and housing.



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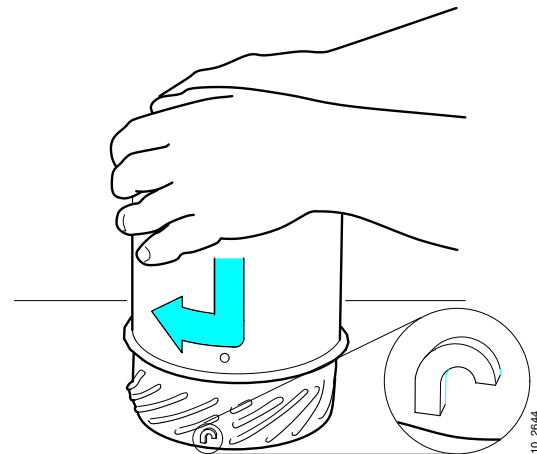
Fitting the desiccant cartridge, model with loose spring

- 1 Place the desiccant cartridge on a workbench. Make sure the guide in the metal cap is directly above the gap between the fins on the desiccant container.

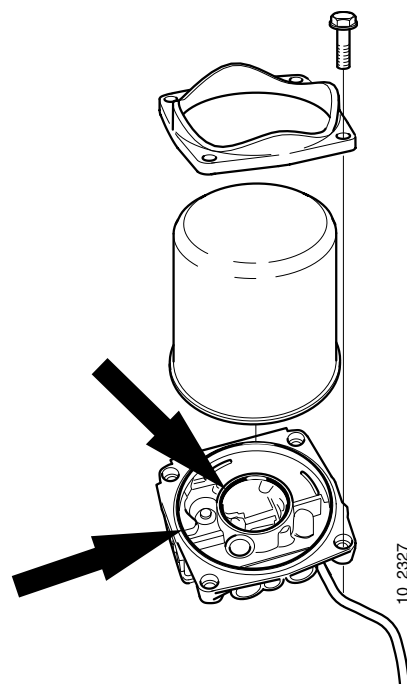


- 2 Press down the metal container as far as possible and turn clockwise about 10°.

IMPORTANT! Make sure that the guide in the metal container does not damage the fins on the desiccant container.



- 3 Fit new O-rings. Lubricate the new O-rings with brake grease 319 308.



- 4 Fit the container on the housing and tighten the bolts.

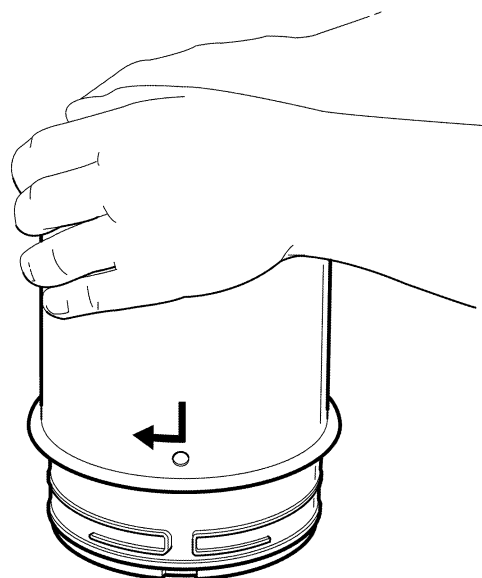
Tightening torques

Bolts, metal container	40 Nm
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- 5 Fit the remaining parts in reverse order.
- 6 Start the engine. Run the engine until the compressor is relieved and the dryer is drained. Check that no leaks occur during this time.

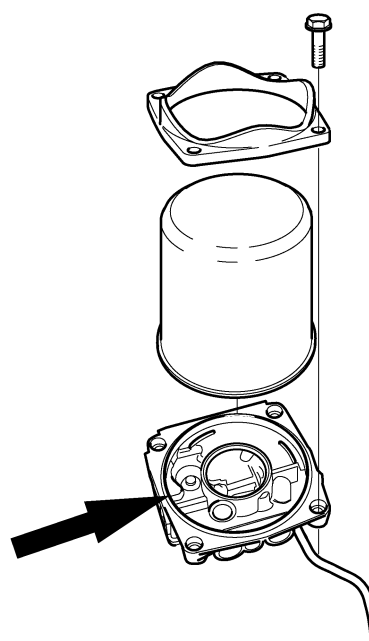
Fitting the desiccant cartridge, model with integrated spring action

- 1 Fit the new desiccant cartridge, press down as far as possible and turn clockwise until it locks.



123707

- 2 Fit a new O-ring. Lubricate the new O-rings with brake grease 319 308.



123706

- 3 Fit the container on the housing and tighten the bolts.

Tightening torques

 Bolts, metal container

40 Nm

- 4 Fit the remaining parts in reverse order.
- 5 Start the engine. Run the engine until the compressor is relieved and the dryer is drained. Check that no leaks occur during this time.

Renewing the desiccant container on Wabco air dryer

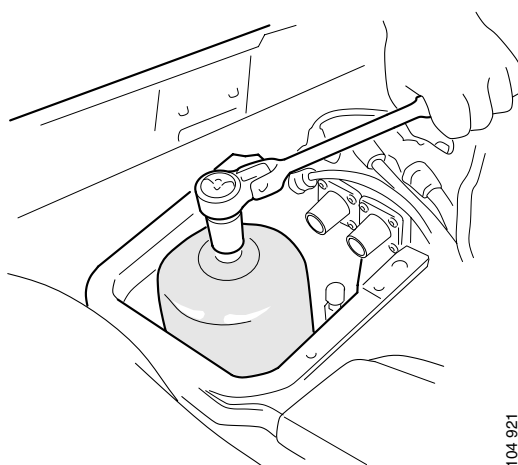


WARNING!

There is a risk of injury if the instructions below are not followed.

Removal

- 1 Uncover the air dryer according to “Uncovering the air dryer”.
- 2 Remove the desiccant container.
- 3 Renew the O-ring and lubricate it using brake grease 319 308.
- 4 Clean the contact surface on the container rubber gasket.
- 5 Lubricate the container rubber gasket using brake grease. Screw on the container by hand until it bottoms and then a further 1/3 turn.
- 6 Fit the remaining parts in reverse order.
- 7 Start the engine. Run the engine until the compressor is relieved and the dryer is drained. Check that no leaks occur during this time.



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Renewing the valve unit, Haldex

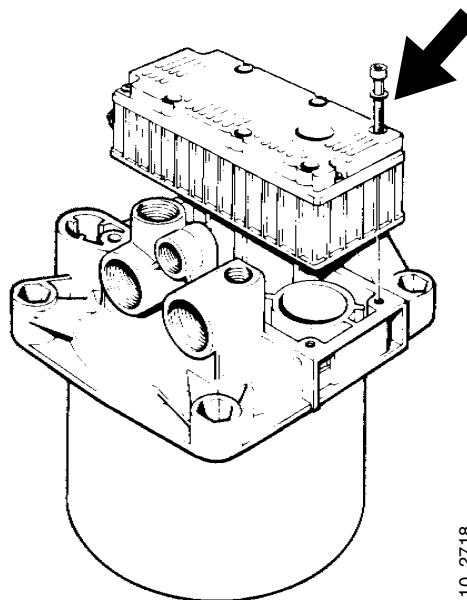
Specifications

Tightening torques

Bolts, valve unit	8 Nm
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Note: If pressure regulation or relief is not working, the valve unit cannot be repaired. In the case of fault, the entire valve unit should be renewed as follows:

- 1 Remove the air dryer according to “Renewing the air dryer, removal”.
- 2 Remove the bolts and take away the complete valve unit.
- 3 Clean the contact surface and check the O-ring.
- 4 Fit the new valve unit and tighten the bolts diagonally starting with the two centre bolts.
- 5 Assemble in reverse order.



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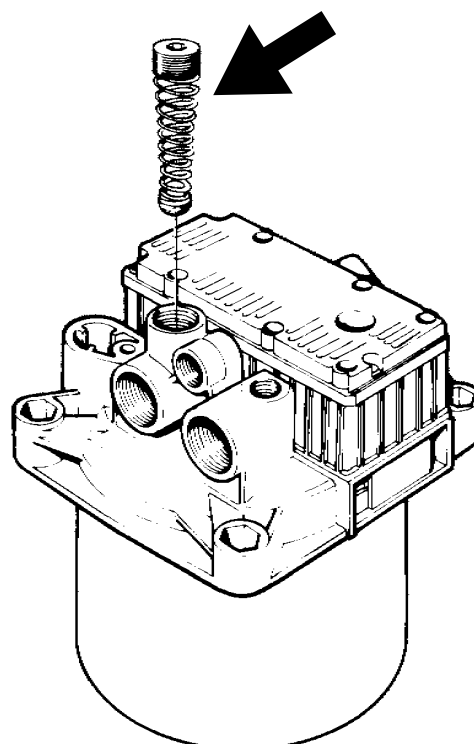
Cleaning and checking the check valve, Haldex

Specifications

Tightening torques

Plug for check valve	30 Nm
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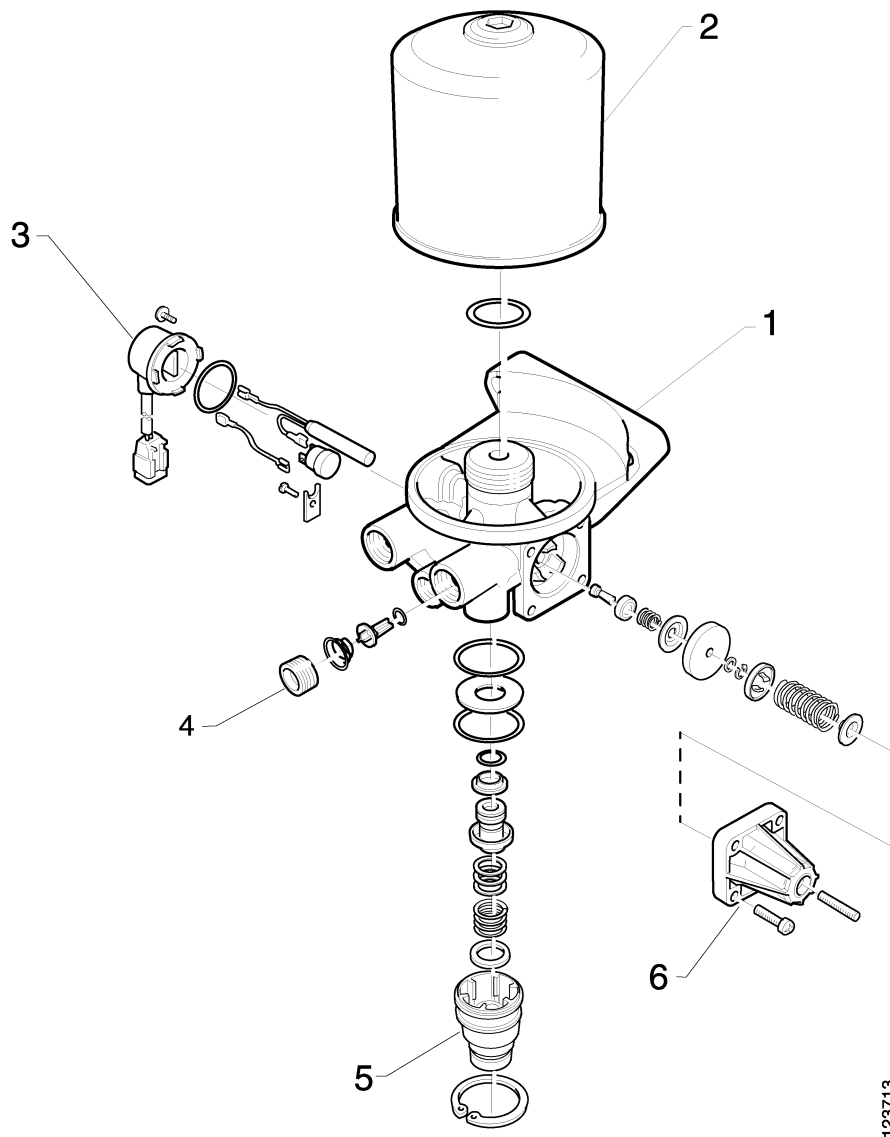
- 1 Remove the air dryer according to “Renewing the air dryer, removal”.
- 2 Remove the valve.
- 3 Clean and check valve and spring. Renew as necessary.
- 4 Fit valve and spring.
- 5 Fit the air dryer.



10_2719

Renewing the check valve and pressure regulator, Wabco

There are two repair kits and a number of parts available for the Wabco air dryer. The first parts kit includes O-rings for the air dryer and check valve. The other parts kit contains parts for repairing the pressure regulator.



- 1 Air dryer housing
- 2 Desiccant container
- 3 Heater
- 4 Check valve

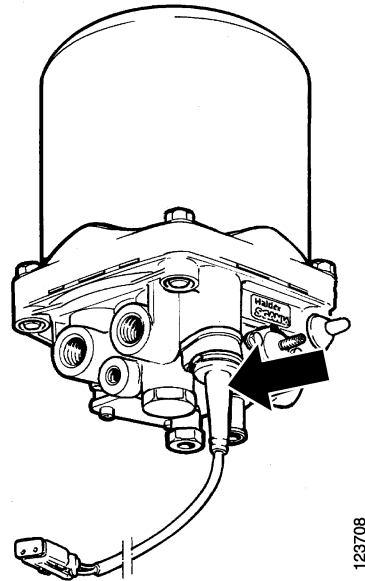
- 5 Drain valve
- 6 Pressure regulator

Renewing the heater, Haldex and Wabco

Removal

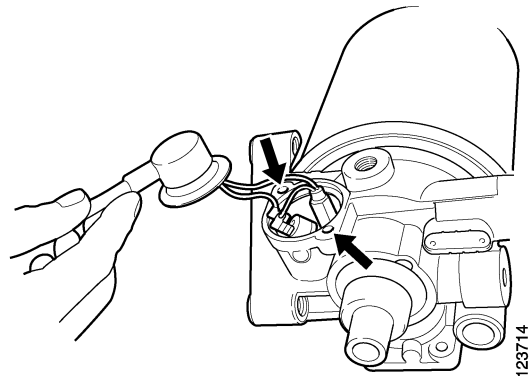
Haldex

- 1 Remove the air dryer according to “Renewing the air dryer, removal”.
- 2 Remove the bolts holding the thermostat in place.
- 3 Renew the heater.
- 4 Renew the O-ring.



Wabco

- 1 Remove the air dryer according to “Renewing the air dryer, removal”.
- 2 Remove the two bolts holding the cover over the heater and thermostat.
- 3 Remove the bolt and washer holding the thermostat.
- 4 Renew the heater.
- 5 Renew the O-ring.



Fitting

Assemble in reverse order.

Pressure adjustment, Haldex and Wabco

Specifications

Pressure range

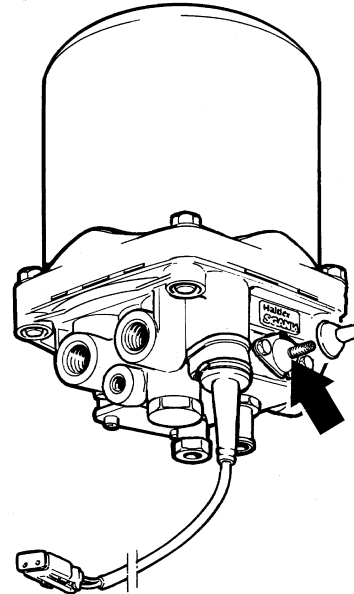
Haldex	12,2±0,2 - 11.1+0.5/-0 bar
Wabco	9,3±0,2 - 8.4±0.3 bar

The pressure relief adjusting screw on Haldex is located on one end of the valve unit, under a rubber cap. The pressure relief adjusting screw on Wabco is a internal hexagon bolt.

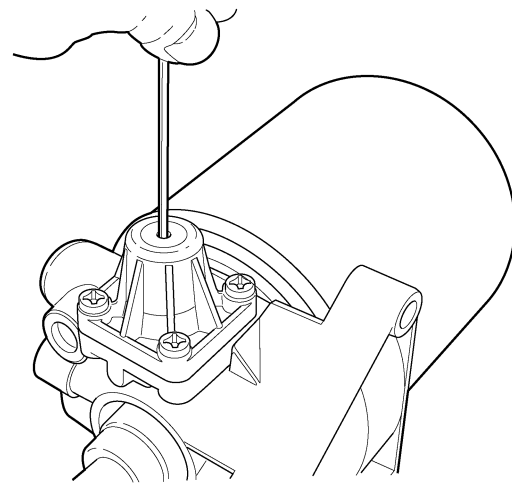
Screwing in the adjusting screw will increase the relief pressure and unscrewing it will decrease the relief pressure.

Adjusting range is ± 0.5 bar.

The relief pressure can be adjusted if it is outside specified limits.



Adjusting screw for relief pressure, Haldex.



Adjusting screw for relief pressure, Wabco.

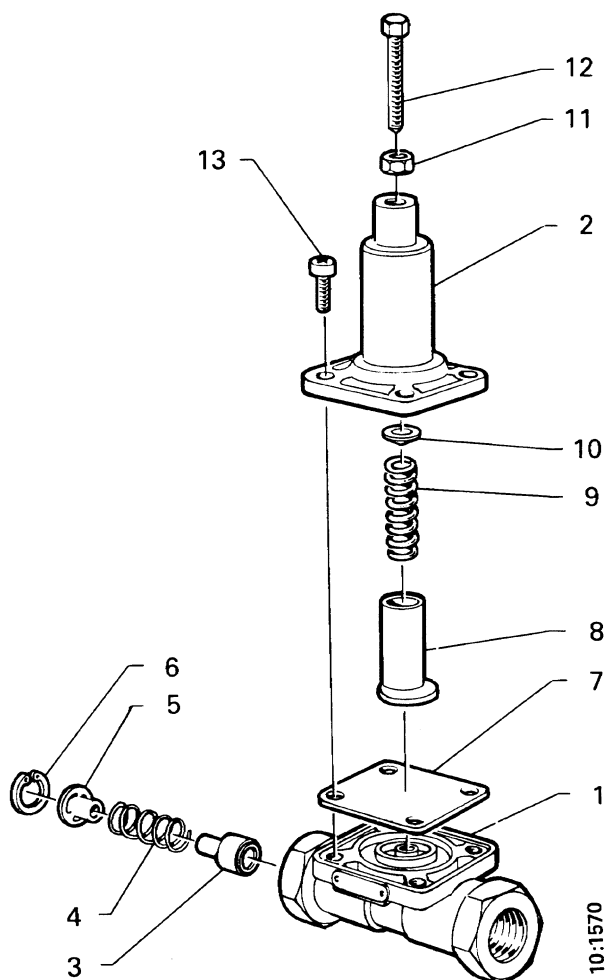
Overflow valve

Dismantling



WARNING!

Take care when dismantling, even small spring forces can cause injury if you are not careful.



- 1 Valve housing
- 2 Cover
- 3 Valve plunger
- 4 Compression spring
- 5 Spring seat
- 6 Retaining ring
- 7 Diaphragm
- 8 Cap
- 9 Compression spring
- 10 Spring seat
- 11 Nut
- 12 Adjusting screw
- 13 Bolt

Cleaning, checking and repairing

Specifications

Lubricant

Brake grease	319 308
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- 1 Clean all parts.
- 2 Check replaceable parts and renew them if damaged.
- 3 Lubricate all parts with brake grease before assembly.

Setting

Specifications

Pressure range

Opening pressure	9 bar
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The opening pressure can be increased by turning the adjusting screw clockwise and decreased by turning it anti-clockwise.

Refer to Main Group 10 Brake system testing for checking the opening pressure.

