Adapter Valve 975 001
(Restraint Valve or Proportioning Pressure Regulator with Straight Characteristic Curve)

Purpose

The adapter valve retains the input pressure within its setting range of between 0.3 and 1.1 bar.

In the partial braking position, this causes the larger brake cylinders on the trailer's front axle to receive, in keeping with the lesser axle weight transfer, less pressure than the smaller brake cylinders on the rear axle.

The valve also has a quick-release function.

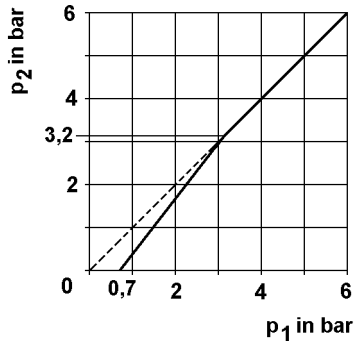
Design types

975 001

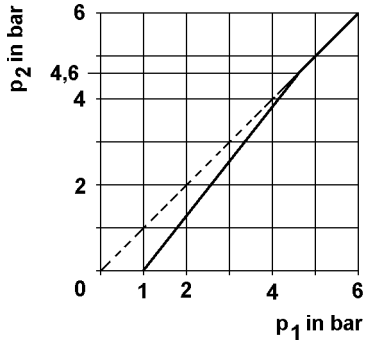
Adapter valves are supplied with different factory settings. The valves can be set to any value between 0.3 and 1.1 bar.

The deviation 975 001 500 0 is additional equipped with a test connection for the output pressure.

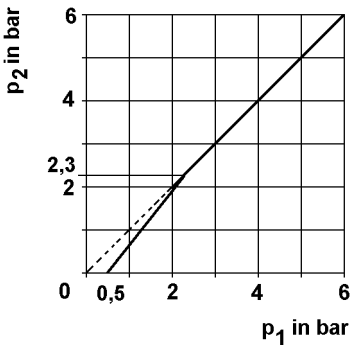
Ordering number	975 001 000 0	975 001 001 0	975 001 002 0	975 001 500 0
Operating Pressure	max. 8 bar			
Range of Adjustment	0.3 to 1.1 bar			
To be set at	0.7 ± 0.1 bar	1.0 ± 0.1 bar	0.5 ± 0.1 bar	0.7 ± 0.1 bar



Variant 000 and 500



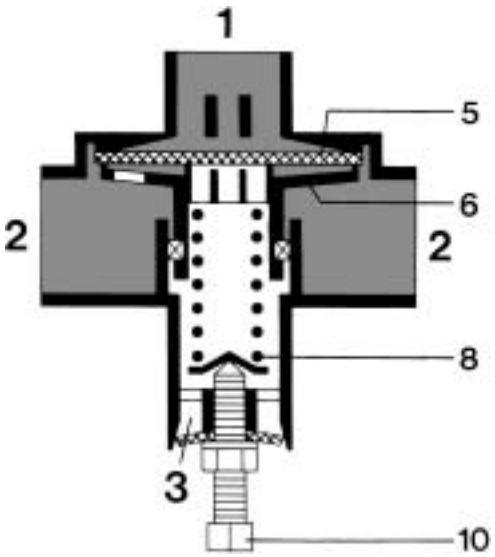
Variant 001



Variant 002

Operation of Adapter Valve 975 001

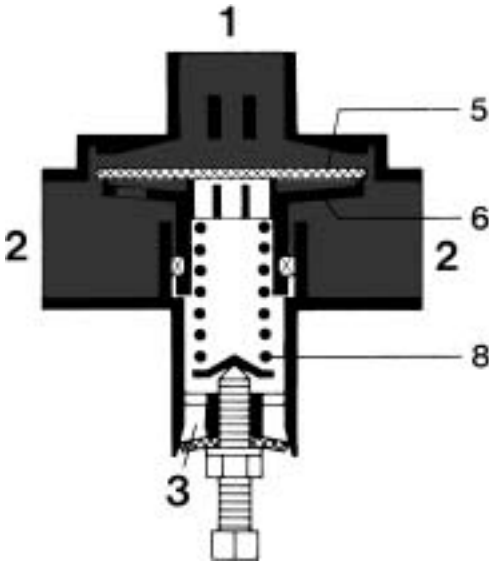
a. Driving and Retaining Position



Since ports **(1)** and **(2)** are pressureless in the driving position, the force of the spring (8), via the piston, (6) keeps the diaphragm (5) closed.

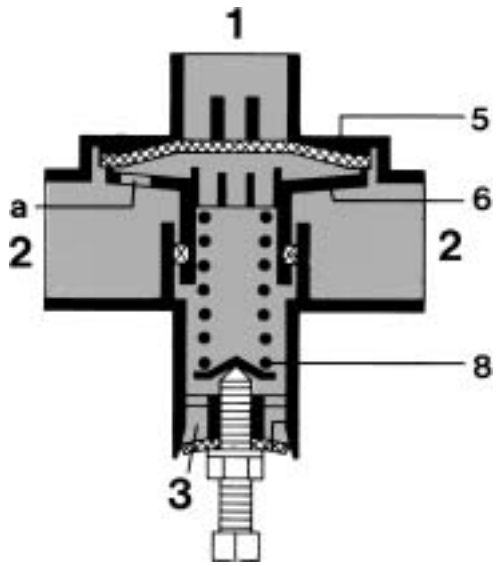
When the sustained action brake is switched on, the pressure flowing to the larger brake cylinders on the front axle reaches port (1) of the control valve. The pressure building up on the diaphragm (5) is not capable of pressurizing ports **(2)** since the preset force of the spring (8), via the piston (6), does not allow the outer edge of the diaphragm (5) to rise. This retention is achieved depending on the preset tension of the spring (8) between 0.3 and 1.0 bar, depending on the position of the adjusting screw (10).

b. Neutralizing the Retention Process



If the pilot pressure in port (1) continues to rise above the diaphragm (5), the build-up of compressed air is greater than the force of the spring (8), and the piston (6) moves downwards. Via the outer edge of the diaphragm (5), the compressed air flows to ports **(2)**. When port **(1)** is fully pressurized, the piston (6) rests on the housing.

c. Release position



In the release position, port **(1)** is vented. This allows the spring (8) to return the piston (6) with the diaphragm (5) to their original positions, and the brake cylinder pressure in ports (2) raises the diaphragm (5) via hole (a). This causes the connected brake cylinders to be exhausted via vent (3).

Maintenance

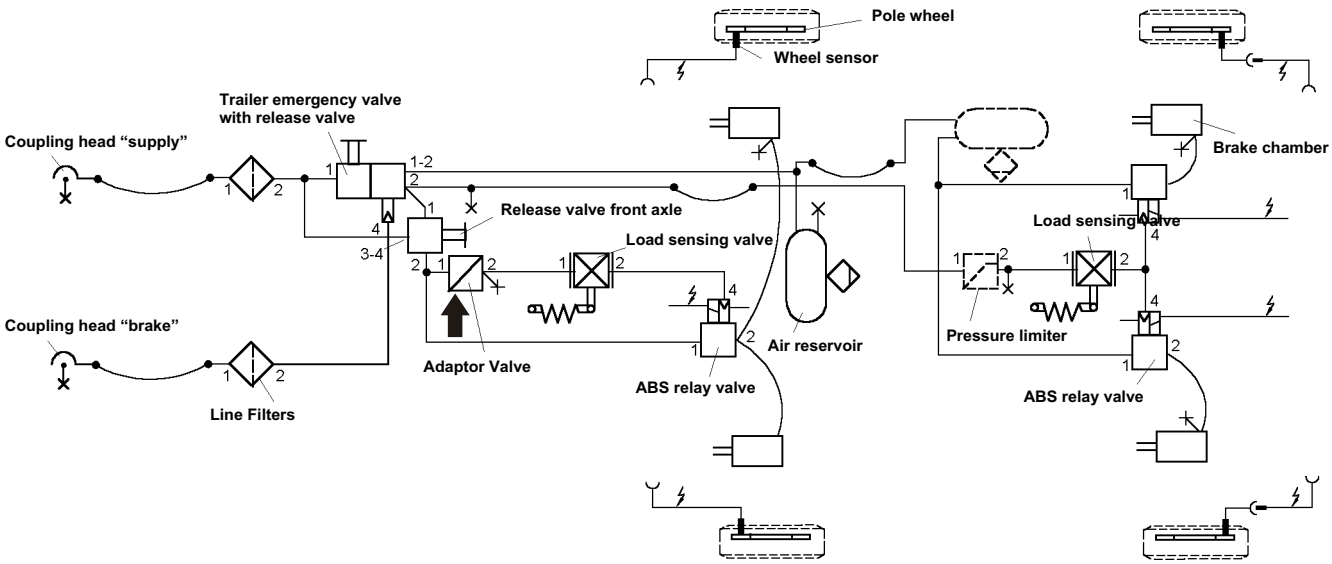
No special maintenance is required.

Testing

When fully pressurized, the control valve must allow the input pressure to pass through in full. At the same time the valve is checked for any leakages.

The retaining pressure must be checked to make sure that it corresponds to the value prescribed by the vehicle or axle manufacturer. When venting port **(1)**, the downstream components must be exhausted rapidly via **(3)**.

Schematic for Testing and Installation



Adapter Valve 975 002 (Constant Pressure Regulator or Proportioning Pressure Regulator with Drop Characteristic Curve)

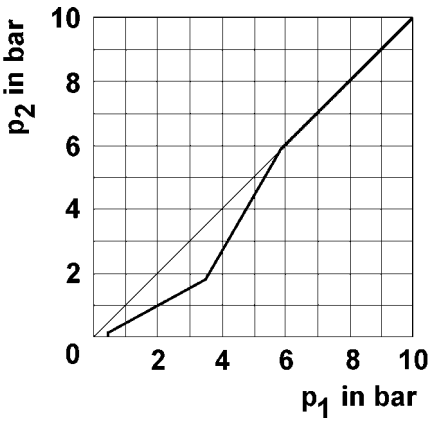
Purpose

Its purpose is to reduce the pressure from the brake valve in the partial braking position. Because of the comparatively slow dynamic axle weight transfer in the partial braking position, this prevents overbraking of the front axle. At the same time the adapter valve also has a quick-release function.

Design types

975 002

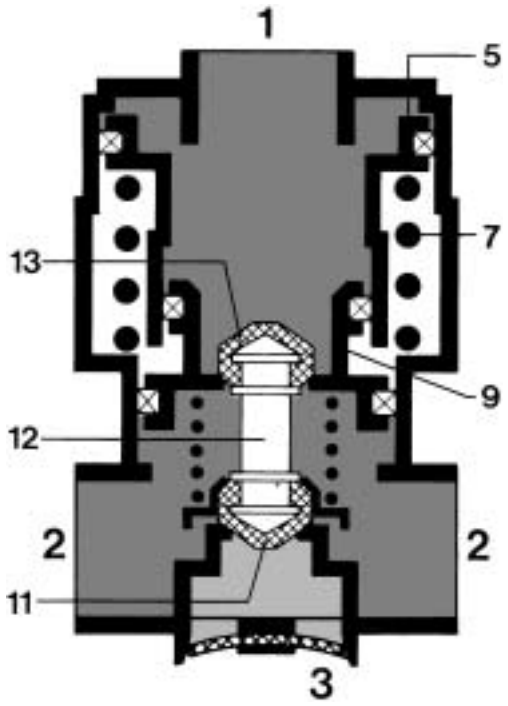
Adapter Valve with pressure reduction as listed below:



Order number	Input pressure at port (1) in bar	Output pressure at port (2) in bar (± 0.2 bar)
001 0 002 0 012 0	3.5 5.5	1.8 5.5
003 0	2.5 4.5	1.4 4.5
005 0	2.0 3.5	1.1 3.5
017 0	1.8 3.6	1.2 3.6
069 0	2.7 4.5	2.0 4.5

Operation of Adapter Valve 975 002

a. Partial Braking Position



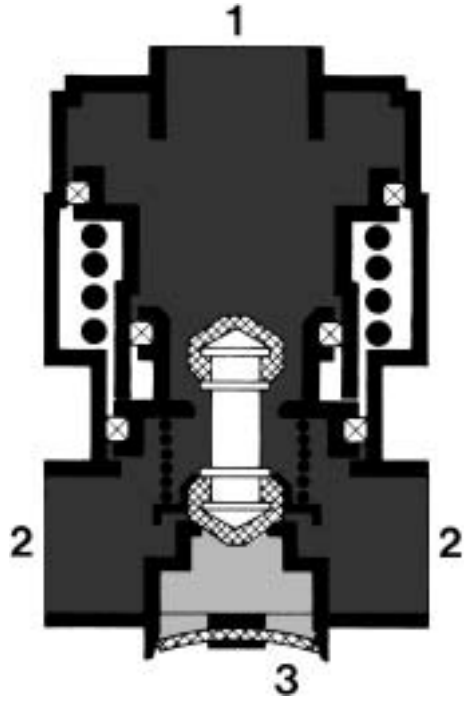
When port **(1)** is pressurized, piston (5) which is held in its upper end position by the force of spring (7) cannot be effective. On the other hand, the step piston (9) which is pressurized at the same time is forced downwards, together with bell-shaped valve (12), thereby closing the outlet valve (11) and opening the inlet valve (13). The compressed air in port **(1)** thus flows into ports **(2)** and from there to the connected brake cylinders.

At the same time the pressure flowing through beneath the step piston (9) builds up as a counter-force to the upper piston surface. When the forces are balanced and the pressure is reduced at the same time, the step piston (9) is raised once again, closing the inlet valve (13). A partial braking position has now been reached.

b. Affecting Pressure Reduction

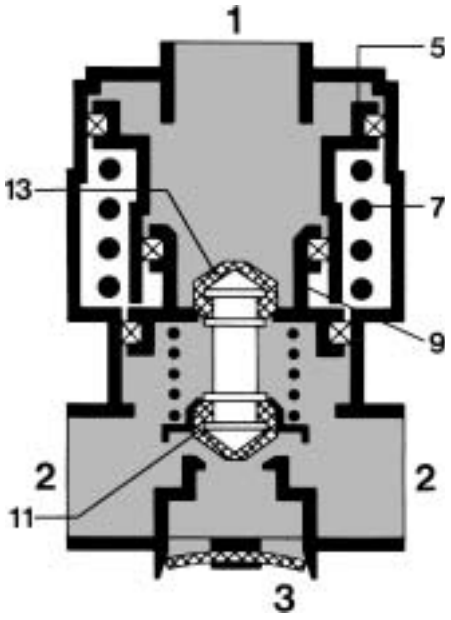
If the pressure in port **(1)** exceeds a certain value (see “Types“), piston (5), after overcoming the force of the spring (7), is added to the step piston (9). This serves to diminish the pressure reduction which was subject to proportional control until that point.

c. Full output



When an input pressure of between 3.5 and 5.5 bar has been reached, depending on the variant used, the pressure reduction is neutralized, And the input pressure passes at a ratio of 1:1.

d. Release Position



When port **(1)** is vented, the pressure in ports **(2)** is capable of raising pistons (9) and (5), taking into account the force of spring (7), thereby closing the inlet valve (13) and opening the outlet valve (11). Via the vent **(3)**, rapid venting of the brake cylinders now commences.

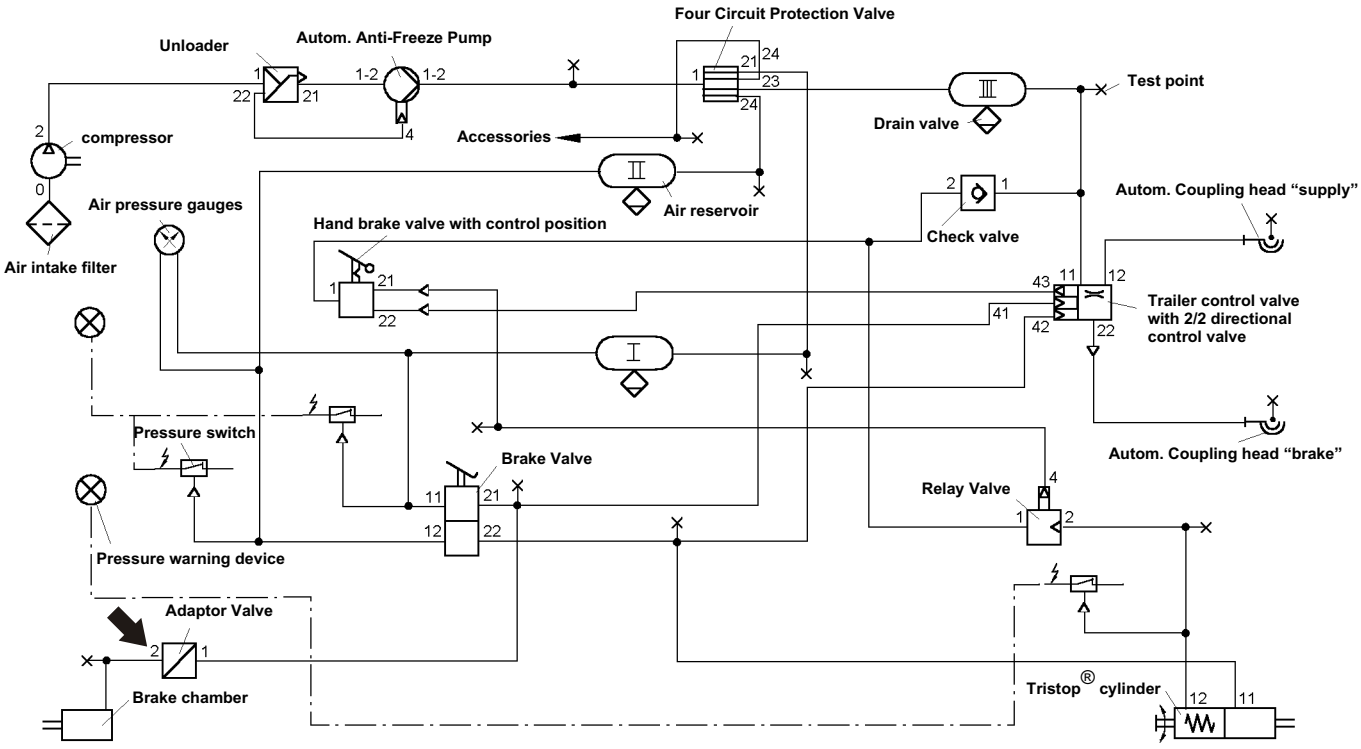
Maintenance

No special maintenance is required.

Testing

The valve's response pressure must not exceed a value of between 0.3 and 0.5 bar. The pressure reduction operating within the lower range must correspond to the readings shown under "Types", with a tolerance of ± 0.2 bar. The same also applies to the output of the various valve variants. Grading is between 0.2 and 0.3 bar. When venting port **(1)**, the connected brake cylinders need to be exhausted rapidly via vent **(3)**.

Schematic for Testing and Installation



Purpose

Their purpose is to limit the intitial pressure for the downstream components to the limit preset by means of the adjusting screw. Pressure limiting valves are used in both motor vehicles and trailers.

On air-sprung lorries, semitrailer-tractors and motor coaches the valve is fitted upstream from the quadruple-circuit protection valve if the unloader's cut-off pressure lies above the operating pressure of the braking system.

In trailer braking systems, a pressure limiting valve is often used on the rear axle of trailers to prevent locking of the rear wheels when dynamic axle loads are transferred rapidly during the braking process.

Design types

475 015 ... 0

1. On the Motor Vehicle

Pressure limiting valve with integrated safety valve. It is available in numerous variants with different limiting and safety valve pressures.

475 010 0 . . 0

2. On the Trailer

a. Pressure Limiting Valve with Mounting Flange

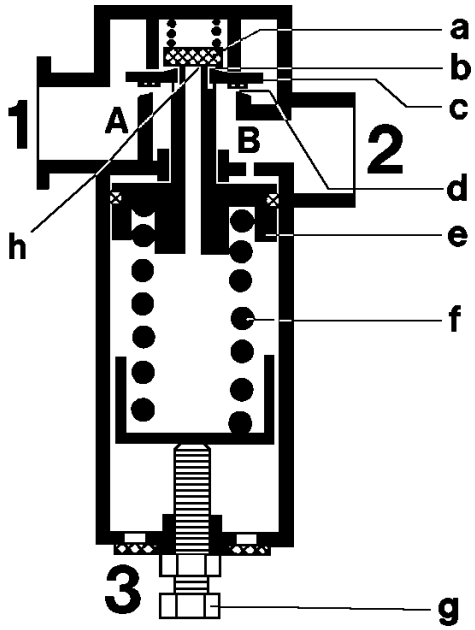
The valve can be fastened directly to the flange facing of the relay emergency valve. The pressure is set by means of the adjusting screw at the bottom of the valve.

475 010 3 . . 0

b. Pressure Limiting Valve - New Generation

This valve has been developed as the successor for 475 010 0.. 0. The level of the limiting pressure can again be set by means of the adjusting screw at the bottom of the valve.

Operation of Pressure Limiting Valve 475 010



The compressed air reaching chamber (A) via port **1** (high pressure) flows through inlet (d) into chamber (B) and on to port **2** (low pressure). At the same time, piston (e) is pressurized but is initially held in its upper end position by the pressure spring (f).

When the pressure in chamber (B) has reached the level preset for the low-pressure side, piston (e) is moved downwards against the force of the pressure spring (f). Valves (a and c) close inlet (b and d). When the pressure in chamber (B) has risen above the preset value, the piston (e) will continue to move downwards, thus opening outlet (h). The excess compressed air now escapes to atmosphere via the center hole in piston (e) and vent **3**. When the preset pressure has been reached, outlet (h) is closed once more. In the event of a leakage in the low-pressure line and thus a loss in pressure, piston (e) will, due to the fall in pressure, raise valve (a). Inlet (b) opens and a corresponding additional amount of compressed air is fed in.

When port **(1)** is vented, the higher pressure in chamber (B) raises valve (c) and with it valve (a). Inlet (d) opens and the low-pressure line is vented via chamber (A) and port **(1)**. In this process, piston (e) is returned to its upper end position by the force of the pressure spring (f).

The preset pressure limit can be adjusted within a certain range by changing the initial tension of the pressure spring (f) by turning the adjusting screw (g).

Maintenance

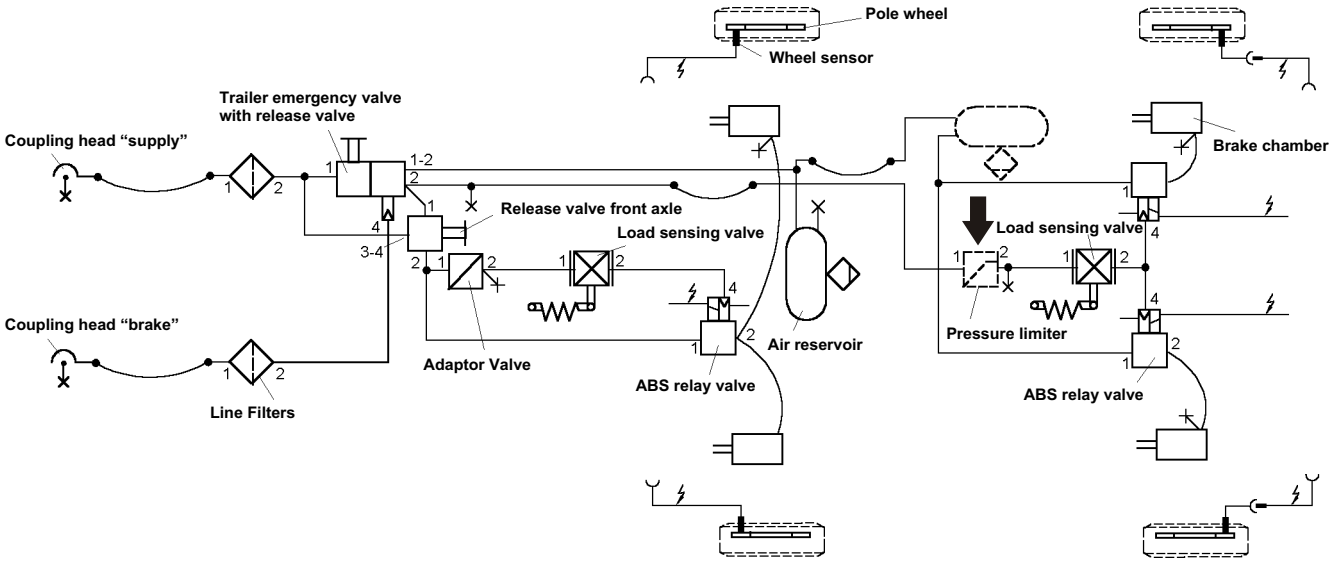
No maintenance is required beyond the checks required by law.

Testing

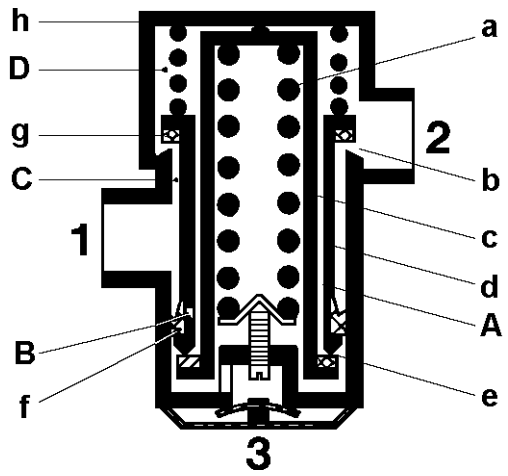
The valve must be checked for any leakages, and for adherence to the limiting pressure.

The limiting pressure can be adjusted by means of the adjusting screw on the bottom of the valve.

Schematic for Testing and Installation



Operation of Pressure Limiting Valve 475 015



The setting of the pressure limiting valve is such that only a pressure of a certain level is output on the low-pressure side **(port 2)**. Spring (a) constantly acts on pistons (c and d), holding piston (c) in its upper end position where it is in contact with the housing (h). Inlet (b) is open. The supply pressure entering at port **(1)** flows from chamber (C) into chamber (D) and, via port **2**, on to the downstream components.

When the pressure building up in chamber (D) overcomes the force of pressure spring (a), pistons (c and d) move downwards. Valve (g) closes inlet (b), and a final position has been reached.

Due to the air consumption on the low-pressure side, the balance of pressures on piston (c) is neutralized. Spring (a) forces pistons (c and d) upwards again. Inlet (b) opens and more air is fed in until the preset pressure has been reached and the balance has been established once more.

In the event of the pressure on the low-pressure side exceeding the preset value, piston (c), designed to act as a safety valve, opens outlet (e). Any excess pressure can now escape to atmosphere via vent **(3)**.

If the pressure in chamber (C) falls below that in chamber (D), it will open valve (f). The compressed air from chamber (D) now flows back to port **(1)**, through hole (B), until the force of spring (a) is once again greater and inlet (b) opens. The pressure between ports **(2)** and **(1)** is balanced.

Maintenance

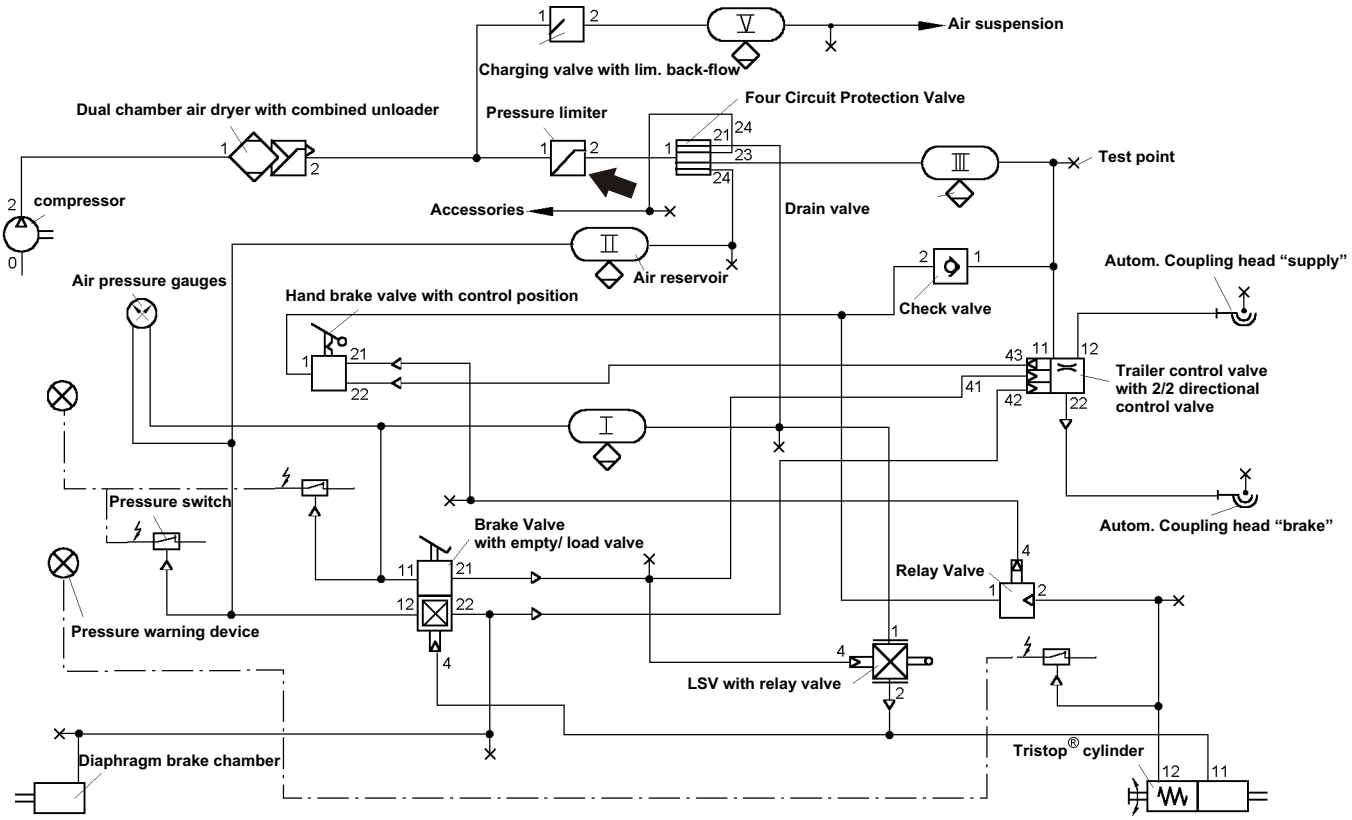
No maintenance is required beyond the checks required by law.

Testing

The valve must be checked for any leakages, and for adherence to the limiting pressure as stipulated by the vehicle manufacturer.

The limiting pressure can be adjusted by means of the adjusting screw on the bottom of the valve after first removing the exhaust cap.

Schematic for Testing and Installation



Purpose

Charging valves are separate individual parts of the compressed air system. On the motor vehicle it's purpose is increasingly fullfilled by the quadruple-circuit protection valves.

Design types

Depending on their function, we differentiate between the following types of charging valves

434 100 0.. 0

Charging Valves with Return Flow are used to initially separate the air reservoirs of the service braking system up to the level of the preset pressure. This causes the first air reservoir to be filled rapidly, thereby making the vehicle operable more quickly. When the preset pressure is exceeded, the pressures in the air reservoirs are balanced (return flow).

434 100 1.. 0

Charging Valves without Return Flow initially meet the same purpose. However, they do not permit any return flow from the auxiliary to the main air reservoir. The various air consumers are thus independent from each other, and thereby secured.

434 100 2.. 0

Charging Valves with Limited Return Flow also do not open until the preset overflow pressure has been exceeded. A balance in pressures, i. e. limited return flow from the air reservoirs connected to the valve, is possible up to the level of the closing pressure. If the pressure falls below the preset value, the connection between the auxiliary air reservoirs is abolished.

Please note

The differnet charging valves are listed by following tables

Valve varints

a. Charging Valve with Return Flow

Ordering number	Overflow Pressure in bar (tolerance minus 0.3)
434 100 020 0	3.0
434 100 021 0	3.5
434 100 022 0	4.5
434 100 023 0	5.5
434 100 024 0	6.0
434 100 025 0	6.5
434 100 026 0	1.0
434 100 027 0	0.5
434 100 028 0	5.0
434 100 029 0	4.0
434 100 030 0	6.7
434 100 031 0	5.2
434 100 033 0	7.3

b. Charging Valve without Return Flow

Ordering number	Overflow Pressure in bar (tolerance minus 0.3)
434 100 120 0	3.5
434 100 121 0	4.0
434 100 122 0	4.5
434 100 123 0	5.0
434 100 124 0	5.5
434 100 125 0	6.0
434 100 126 0	6.5
434 100 127 0	6.7
434 100 129 0	5.2 + 0,3
434 100 130 0	7.0

c. Charging Valve with Limited Return Flow*

Ordering number	Overflow Pressure in bar (tolerance minus 0.3)
434 100 220 0	4.5 *
434 100 221 0	5.0 *
434 100 222 0	6.2 *
434 100 223 0	4.0 *
434 100 224 0	1.7 *
434 100 225 0	6.8 *
434 100 226 0	5.2 * + 0,3
434 100 227 0	5.5
434 100 228 0	6.4
434 100 232 0	8.5
434 100 233 0	7.0

Please note

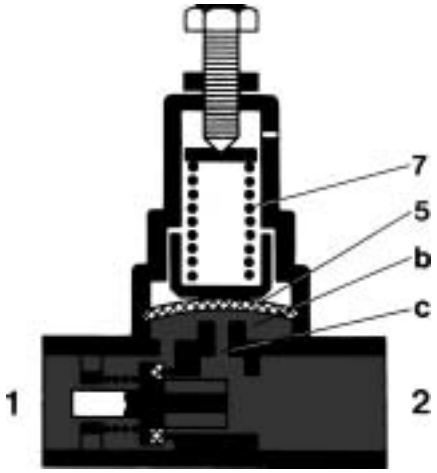
* closing pressure = opening pressure –15%

Operation of Charging Valve with Return Flow 434 100 0... 0

a. Retaining Position

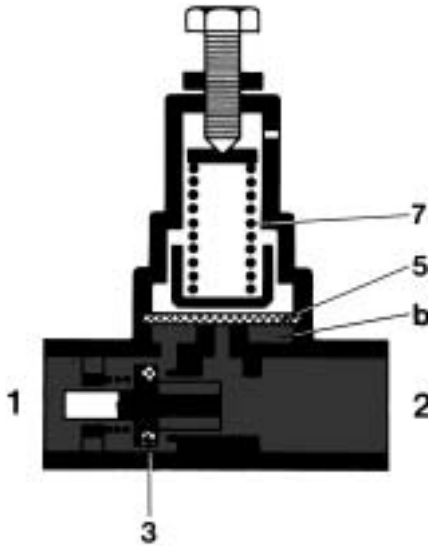
The compressed air from the first reservoir enters the valve at port **(1)**. The check valve (3) is kept closed by the force of the spring (4) and by the incoming air pressure. The compressed air flows through hole (a) into annular duct (b). Since the diaphragm (5) keeps hole (c) closed through spring-loaded piston (6), the compressed air cannot overflow.

b. Overflow Position



As soon as the force of the setting spring (7) can be overcome by the compressed air in annular duct (b), the diaphragm (5) is raised, allowing the compressed air to flow through hole (c) and port **(2)** to the second air reservoir.

c. Return Flow Position



When the pressure in the first reservoir falls, the higher pressure in the second air reservoir can flow back via the opened diaphragm (5) and the opening check valve (3). If the pressure in the annular duct (d) falls below the opening pressure, the force of the setting spring (7) closes the diaphragm (5). Return flow is then only possible via the check valve (3).

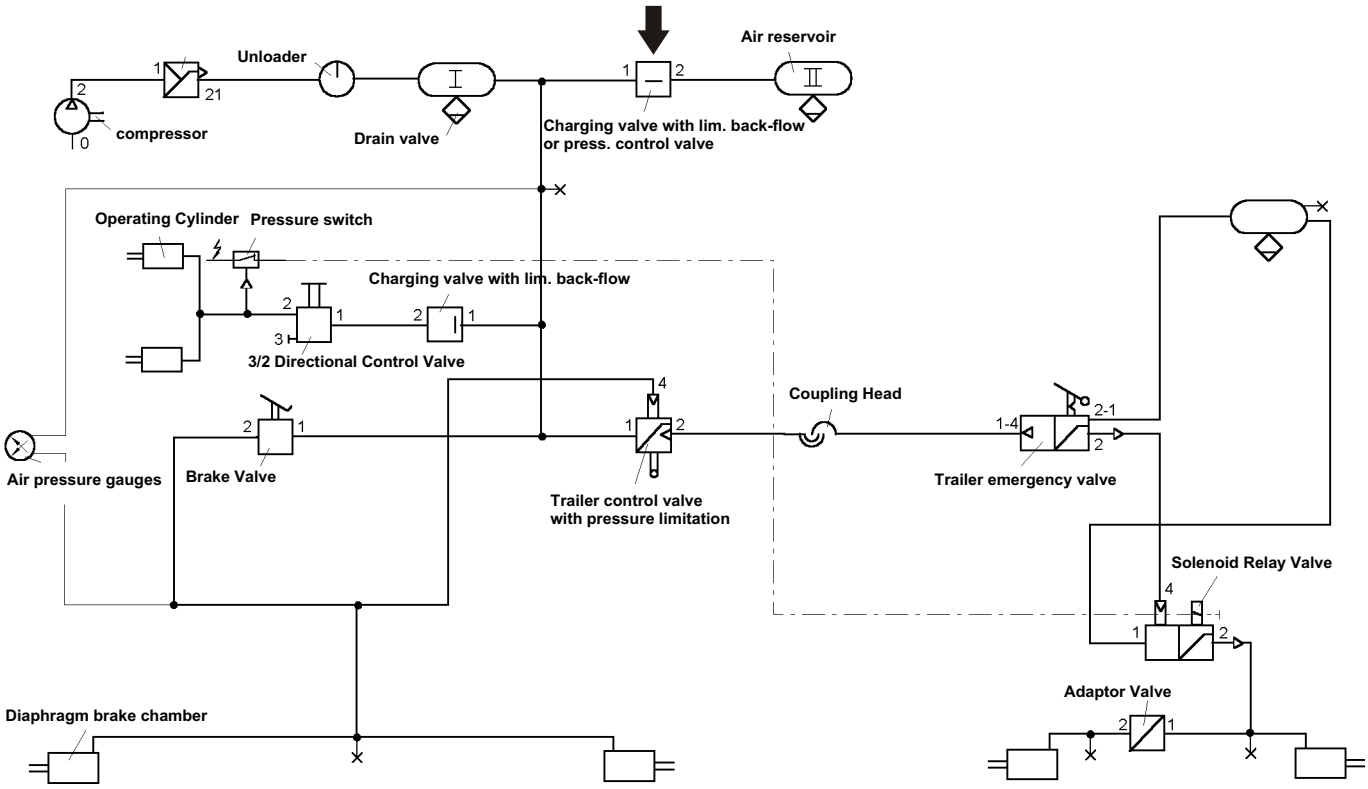
Maintenance

No maintenance is required beyond the checks required by law.

Testing

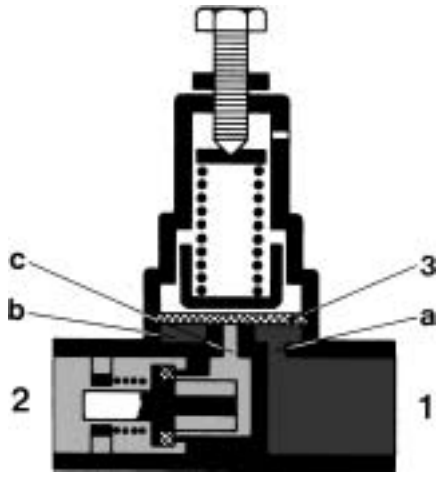
Up to the level of the preset overflow pressure, no compressed air may escape at port **(2)** when port **(1)** is pressurized. After the overflowing process, the pressures in the two connected air reservoirs must be identical. If the pressure in the first air reservoir falls, return flow from the second air reservoir must be properly achieved (balancing the pressures).

Schematic for Testing and Installation



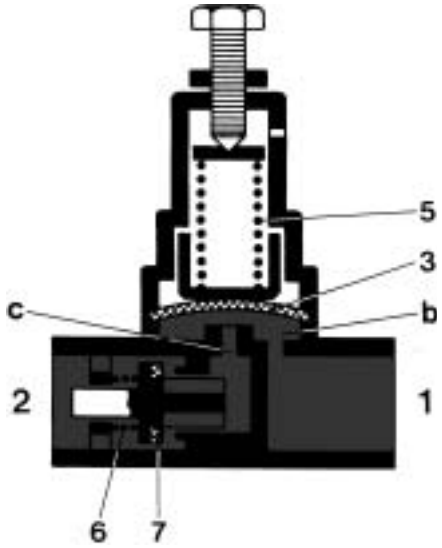
Operation of Overflow Valve without Return Flow 434 100 1.. 0

a. Retaining Position



The compressed air from the first reservoir enters the valve at port **(1)**. The compressed air flows through hole (a) into annular duct (b). Since the diaphragm (3) keeps hole (c) closed through spring-loaded piston (6), the compressed air cannot overflow.

b. Overflow Position



As soon as the force of the setting spring (5) can be overcome by the compressed air in annular duct (b), the diaphragm (3) is raised, pressurizing hole (c). After the small load of spring (6) has been overcome, the compressed air opens the check valve (7) and flows to the connected secondary consumer via port **(2)**.

Should the fall in pressure in the main air reservoir (port **(1)**) ever be greater than in the connected secondary consumer, the pressure in port **(2)** prevails, causing the check valve (7) to close immediately, preventing any return flow of the compressed air.

If however the pressure in port **(2)** falls, the pressure in port **(1)** will fall simultaneously until diaphragm (3) closes.

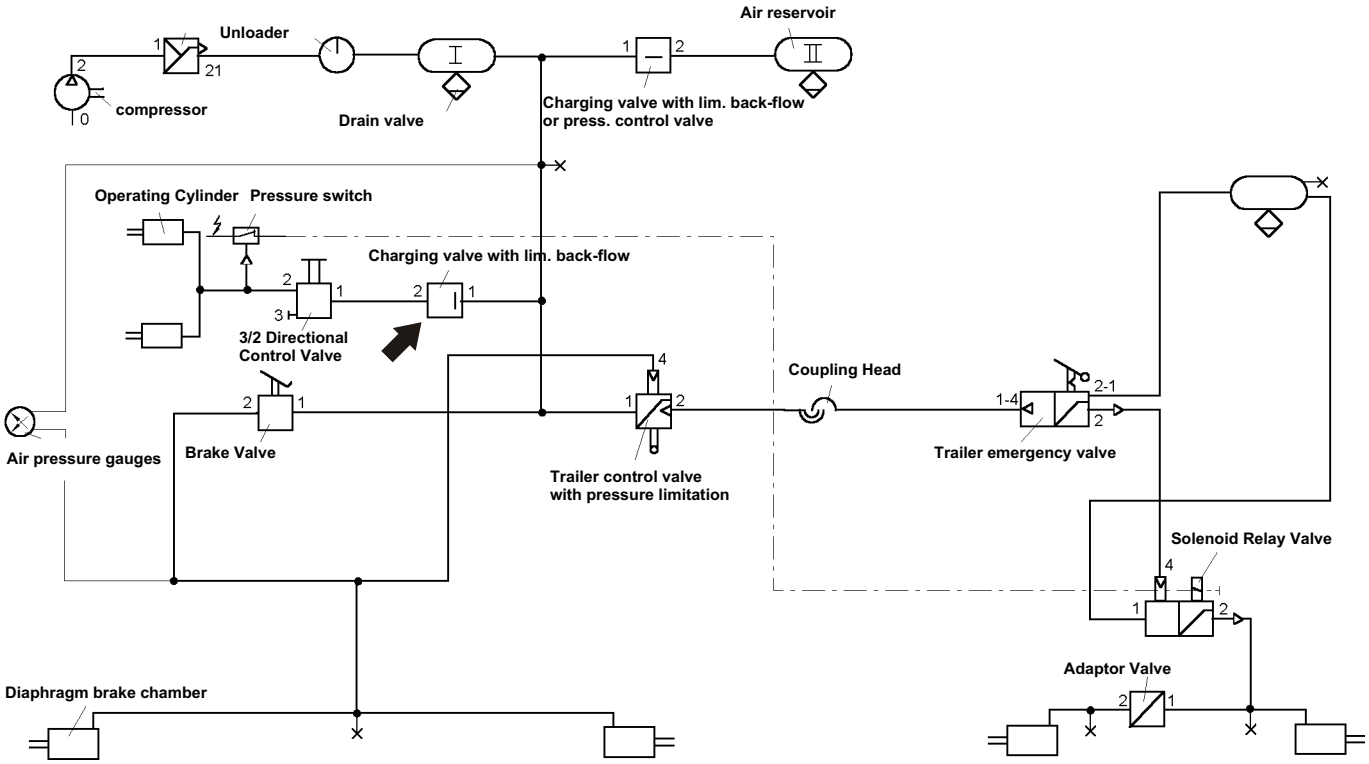
Maintenance

No maintenance is required beyond the checks required by law.

Testing

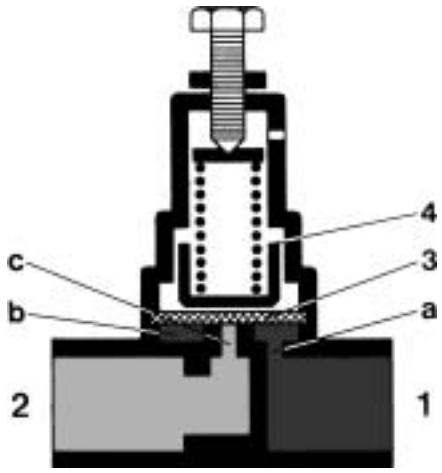
Up to the level of the preset overflow pressure, no compressed air may escape at port **(2)** when port **(1)** is pressurized. After overflowing, the pressures in the connected lines or air reservoirs must be identical. If the pressure at port **(1)** falls, the pressure in port **(2)** may not fall.

Schematic for Testing and Installation



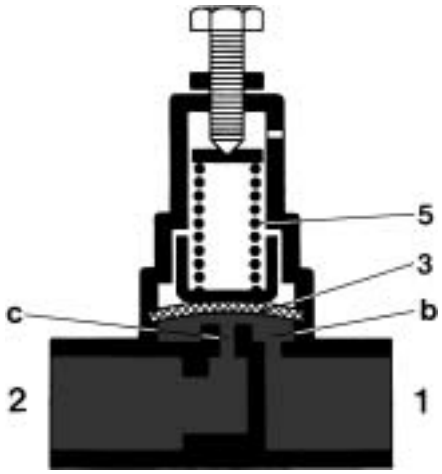
Operation of Charging Valve with Limited Return Flow 434 100 2.. 0

a. Retaining Position



The compressed air enters the valve at port **(1)** and flows through hole (a) into annular duct (b). Since the diaphragm (3) keeps hole (c) closed through spring-loaded piston (4), the compressed air cannot overflow.

b. Overflow Position



As soon as the force of the setting spring (5) can be overcome by the compressed air in annular duct (b), the diaphragm (3) is raised, allowing the compressed air to flow through hole (c) and port **(2)** to the connected consumers.

c. Limited Return Flow

When the pressure in port **(1)** falls, the pressure in (2) can initially flow back via the opened diaphragm (3). If the pressure falls below the opening pressure of the diaphragm (3), the force of the setting spring (5) once again closes the diaphragm (3). This means that a balance in pressures for the connected consumers is possible only to a limited extent.

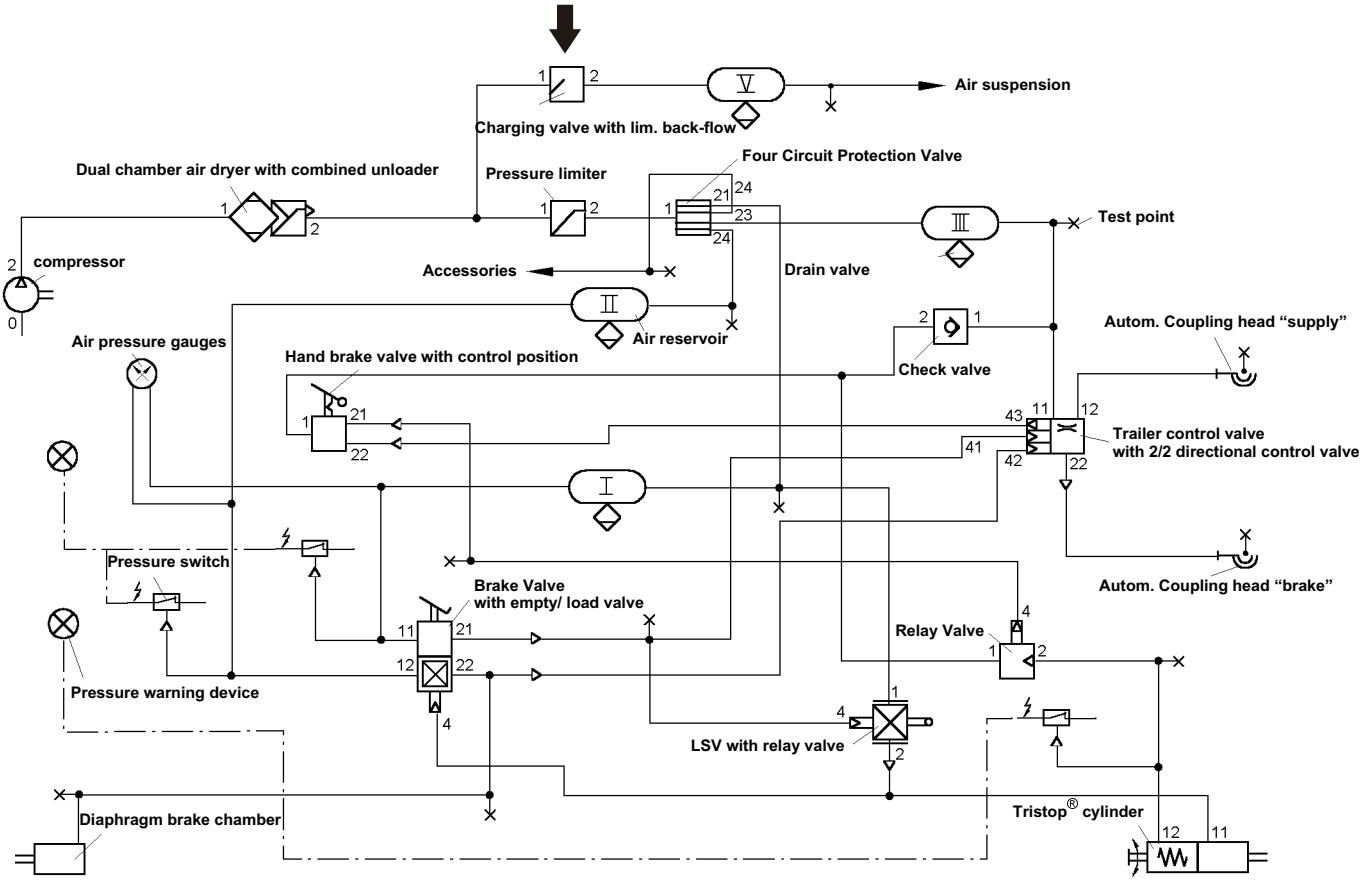
Maintenance

No maintenance is required beyond the checks required by law.

Testing

Up to the level of the preset overflow pressure, no compressed air may escape at port (2) when port (1) is pressurized. After the overflowing process, the pressures in the two ports must be identical. If the pressure in port (1) falls, return flow must commence initially. When the pressure falls below closing pressure, the return flow must be interrputed. No compressed air may then escape at port (1).

Schematic for Testing and Installation



Purpose

The purpose of these valves is to accelerate the venting process of the brake cylinders or the pilot lines when the brakes are released. Some variants (with thread at venting port 3) could be used as two-way valve.

The use of quick-release valves is recommended wherever the brake cylinder or pilot lines to be vented exceed a length of 7 metres.

Design types

973 500

a. Quick-Release Valve

This valve is available in two variants, depending on the type of diaphragm used (with or without fabric ply).

473 501

b. Quick-Release Valve

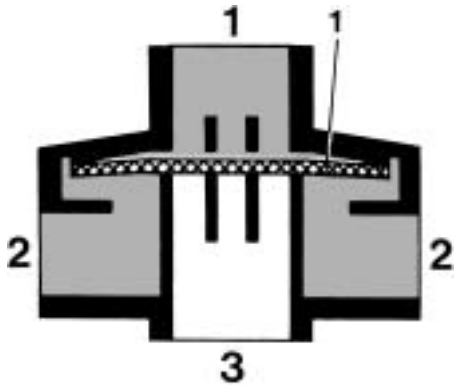
The **000 0** variant of this valve has a diaphragm bypass, whilst the other variants are supplied without a bypass.

The bypass (hole) in the diaphragm ensures that rapid venting takes place only if the pressure falls abruptly.

Quick-release valve **473 501 001 0** (with thread at venting port 3) is frequently used as a two-way valve.

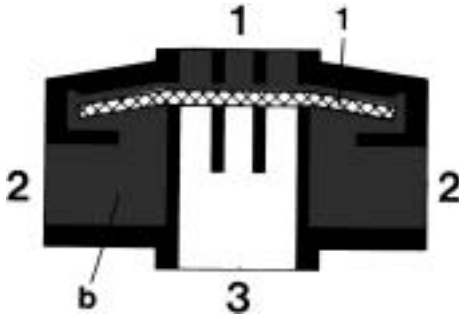
Operation of a Quick Release Valve

a. Driving Position



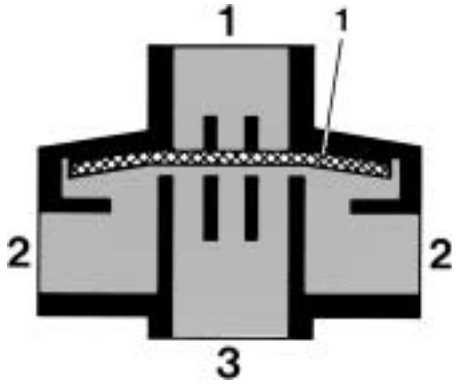
Since the diaphragm (1) is slightly prestressed when the housing is assembled, the vent **(3)** is closed in the driving position.

b. Braking Position



When port **(1)** is pressurized by the brake valve or the relay emergency valve, the compressed air passes the diaphragm (1), flows into chamber (b) and from there via ports **(2)** to the brake cylinders. Vent **(3)** is closed by the compressed air acting on the effective surface of the diaphragm (1).

c. Full Braking Position



When port **(1)** is vented, the pressure on the corresponding diaphragm surface is reduced. The compressed air in port **(2)** returning from the brake cylinders opens vent **(3)** by reversing the diaphragm (1). This causes the brake cylinders to be vented through a fairly short length of pipe.

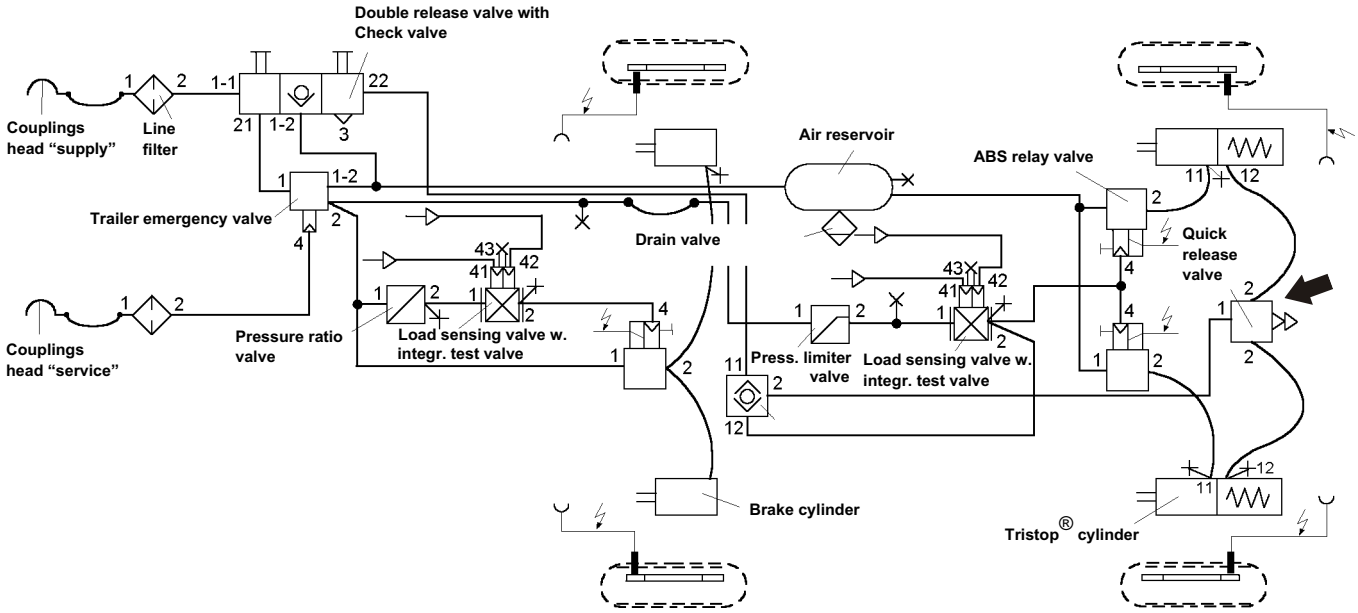
Maintenance

No maintenance is required beyond the checks required by law.

Testing

In the braking position, the quick-release valve must have closed the vent (3) by the time the input pressure reaches 0.2 bar **(port 1)**. When port (1) is vented, port **(2)** must be rapidly vented via **(3)**.

Schematic for Testing and Installation



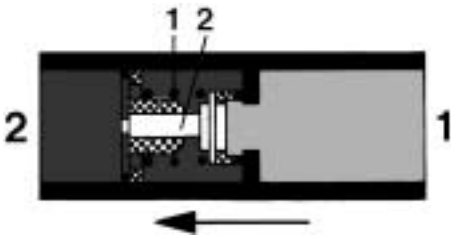
Purpose

The check valve is mainly used for additional compressed air systems which are not directly connected with the air braking system.

Its purpose is to let the pressure pass only in the direction indicated by the arrow.

Design types

Operation



The compressed air entering at port **(1)** opens valve **(2)** against the small force of the spring (1), allowing the incoming compressed air to be output at port **(2)**. If the pressure in port **(1)** falls, the higher pressure in port **(2)** closes the valve (2), thereby preventing any return flow. This protects the line connected to port **(2)**.

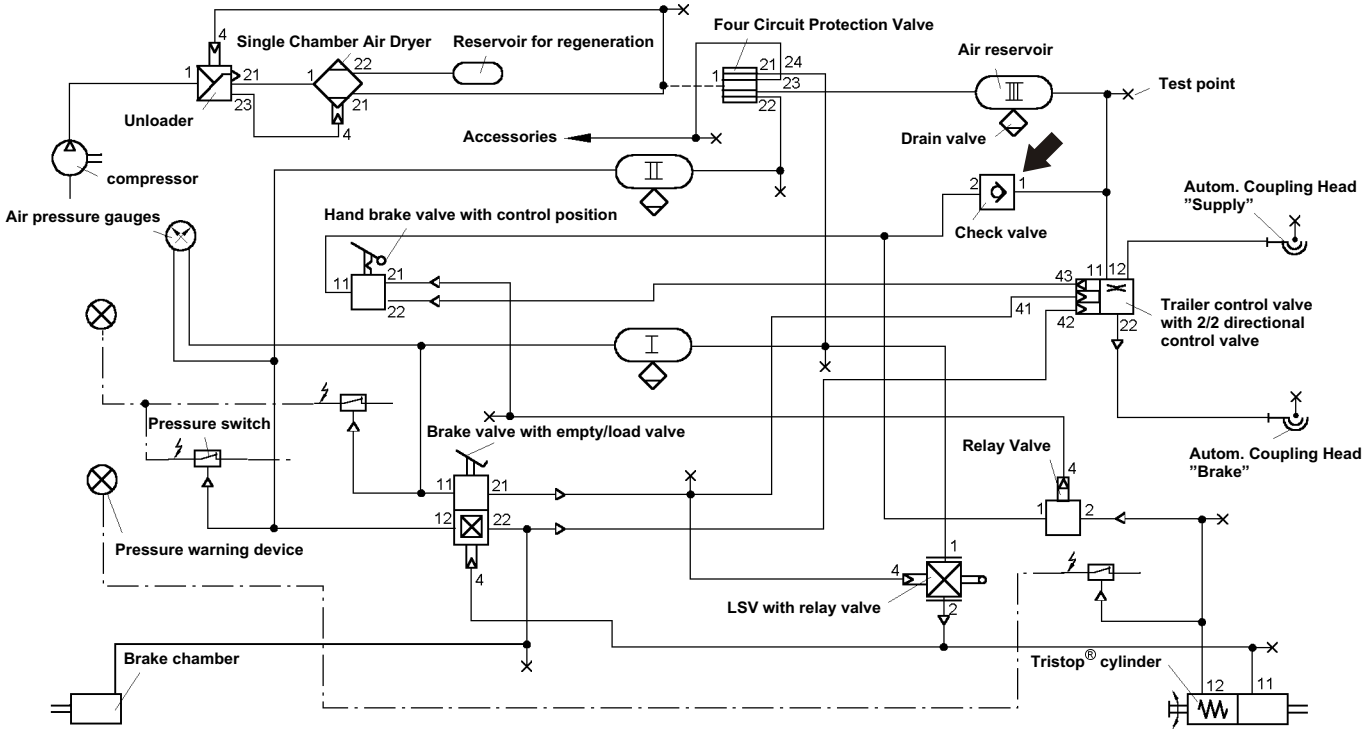
Maintenance

No maintenance is required beyond the checks required by law.

Testing

When the pressure in chamber (2) is increased, no compressed air may escape at the open port of chamber (1).

Schematic for Testing and Installation



Purpose

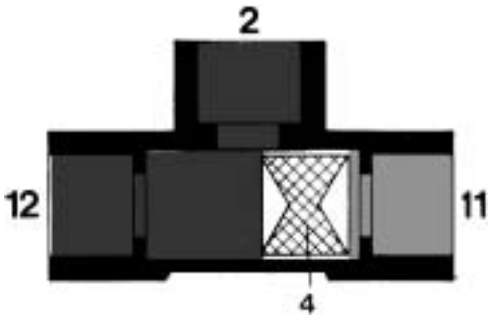
The two-way valve allows a downstream component to be actuated by means of two control valves. The higher of the two pressures will always be put through to port 2.

They are e.g. used at the rear axle in ABS/ASR systems or in emergency release functions for FBA. They also can be used for prevention of an addition of braking force (see Trailer-FBA).

Design types

Two-Way Valve with piston slide valve control.

Operation



When ports (11) or (12) are pressurized, the piston slide valve (4) slides across to the side which is not pressurized. This releases the control port (2), allowing the pressure to reach the controlling valve. The same process begins whenever a two-way valve is actuated on both sides with different pressures. The higher of the two pressures is then put through via port (2). If the pressures are identical on both sides, the piston slide valve (4) will be in a neutral position. In this case, port (2) is pressurized from both sides.

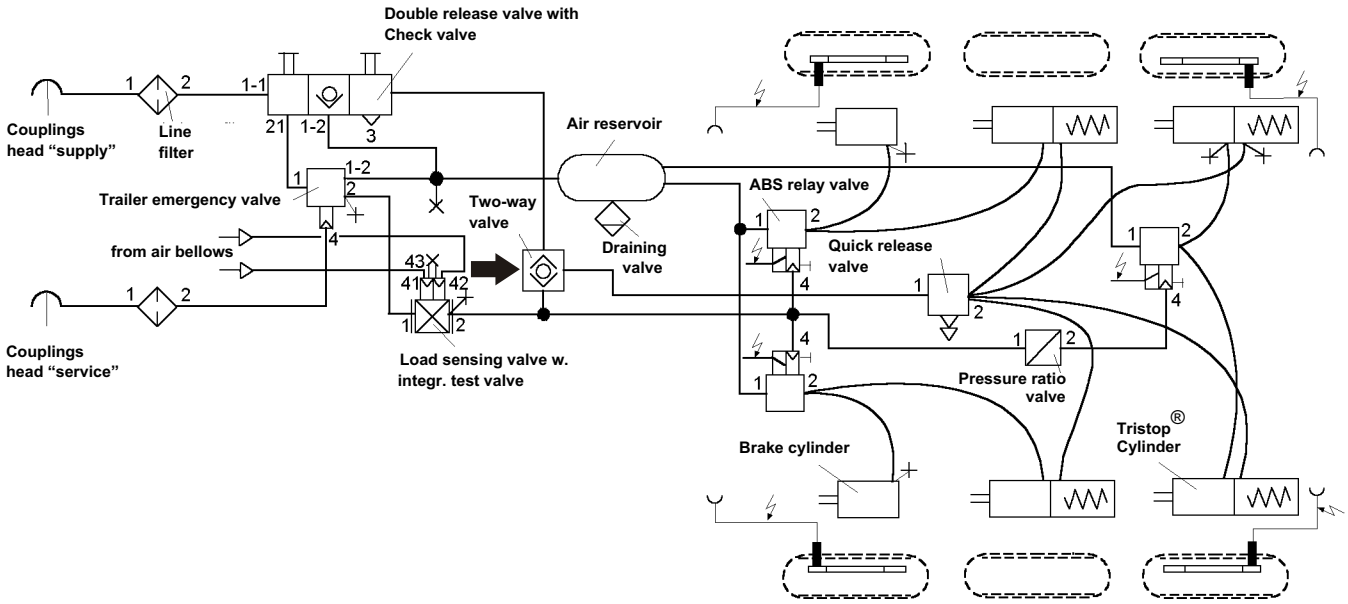
Maintenance

No maintenance is required beyond the checks required by law.

Testing

When checking the two-way valve, both sides are pressurized in turn. The side not being pressurized must be closed at a pressure of 0.2 bar.

Schematic for Testing and Installation

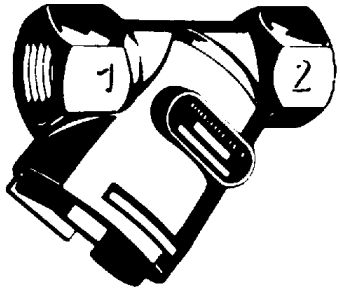


Purpose

Line filters are used as needed in the braking systems of the motor vehicle and the trailer.

Their purpose is to clean the compressed air, mainly from mechanical impurities, e. g. rust film.

Design types



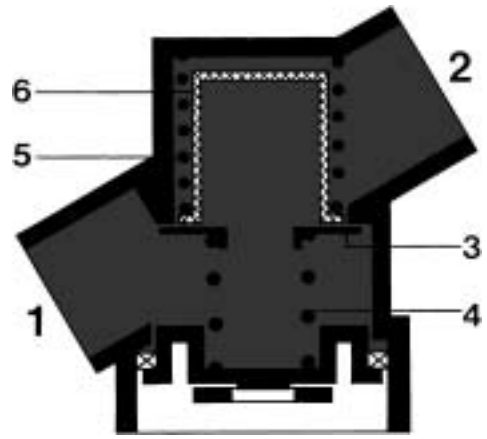
a. Line Filters 432 500 000 0 to 003 0 have been discontinued.

The filter must be connected in such a way that the pressure can be properly increased and decreased even if the filter cartridge is blocked. This means that as the pressure is increased, reversal takes place from **"2"** to **"1"**, and when the pressure is decreased, from **"1"** to **"2"** (see Installation Schematic).

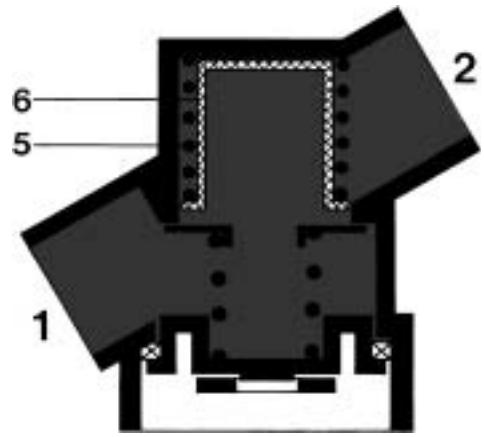
b. Line Filters 432 500 020 0 and 021 0 have replaced all variants described under "a" above.

Irrespective of whether the braking process is achieved by increasing or decreasing the pressure, the filter is connected in the passage of compressed air from **"1"** to **"2"**.

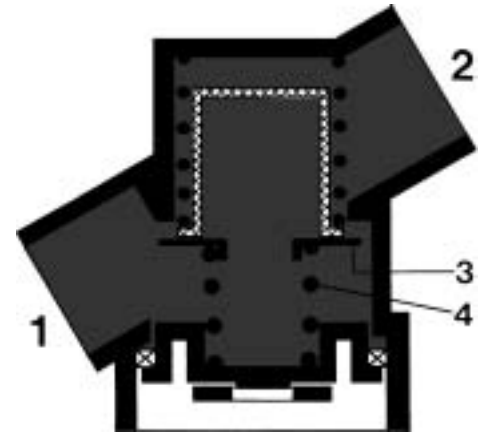
Operation of Line Filter 432 500 02. 0



The spring (5) holds the filter element (6) in its upper position. The air entering at port (1) flows through the filter element (6), where it is cleaned, and via port (2) to the downstream component.



If the filter element (6) is blocked during the pressurizing phase, the pressure in port (1) can raise the filter element after overcoming the force of the spring (5), thereby releasing the passage for the unfiltered air to port (2).



If the pressure in port (1) is decreased while the filter element (6) is blocked, the pressure in port (2) can push the filter element (6) downwards against the force of spring (4), together with the spring guide (3). This ensures a backward reduction in pressure from “2” to “1”.

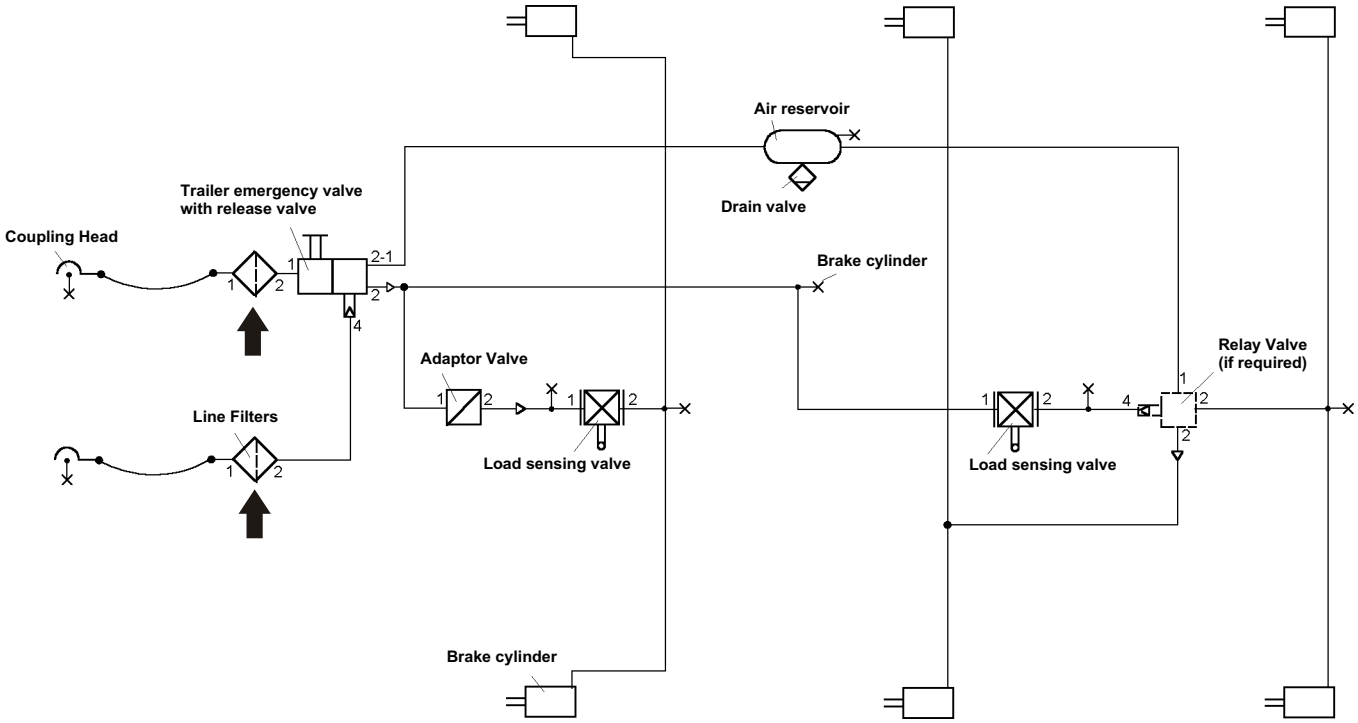
Maintenance

The filter element should be cleaned at regular intervals (or every time the brakes are inspected). To do this, it is blown out with compressed air. If this is not possible, the filter element needs to be replaced.

Testing

The line filters must allow the input compressed air to pass without any loss.

Schematic for Testing and Installation (older Line Filters)



Schematic for Testing and Installation (newer Line Filters)