Purpose

Trailer emergency valves are used inside trailer braking system. They are each controlled by a trailer control valve from the tractor vehicle.

The function of trailer emercency valves is to gradually brake the trailer, regardless of the pressure in the trailer brake line.

They initiate automatic braking of the trailer if the trailer breaks away or if the supply line is separated.

Design types

971 002 150 0

a. **Trailer emergency valve** with adjustable predominance. The predominance is maintained until full braking via the entire braking range. The device has a flange in one of its two outputs **(2)**, for connecting a hand brake-power regulator or pressure limiting valve directly.

971 002 152 0

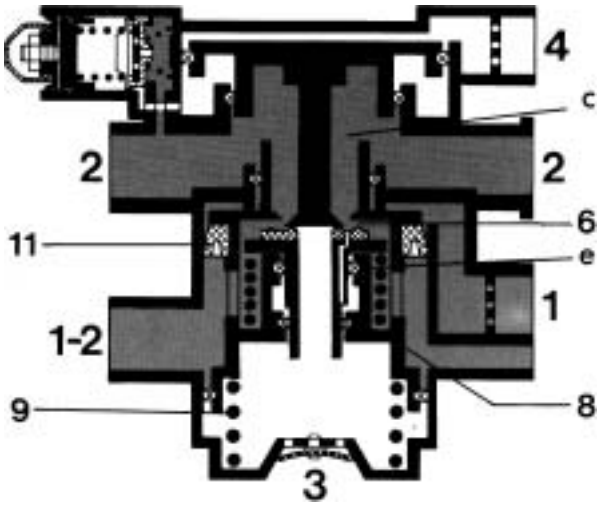
b. **Trailer emergency valve** as described under **"a"**. It is equipped with six brake cylinder ports **(2)** and can be switched in the semi-trailer as relay valve.

971 002 3.. 0

c. **Trailer emercency valve** as described under **"a"**, but without flange for manual braking brake-power regulator and with three outputs **(2)** for this It replaces device 971 002 150 0.

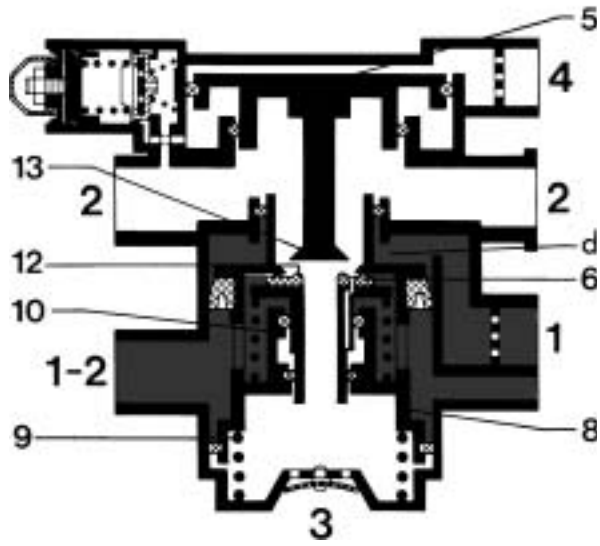
Operation of Relay Emergency Valve 971 002 150 0 (with adjustable advance)

a. Filling Position (up to 2.8 bar)



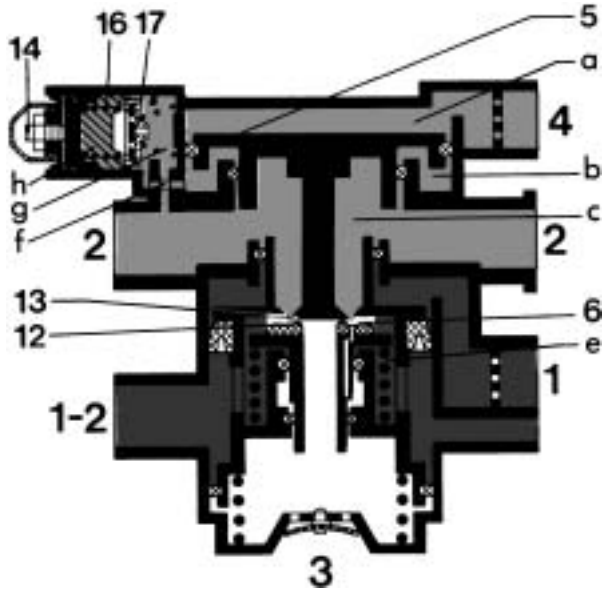
Provided port **(1 – 2)** is pressureless, the force of spring (9) will hold piston (8) in its upper position. The compressed air entering from the trailer supply line at port **(1)** flows via the opening grooved ring (11) into chamber (e). This allows the compressed air to reach port **(1 – 2)** and from there to the trailer's air reservoir. The same pressure also flows across the opened inlet valve (6) into chamber (c). The brake cylinders connected to ports **(2)** are thus pressurized immediately. The trailer is braked automatically.

b. Driving Position



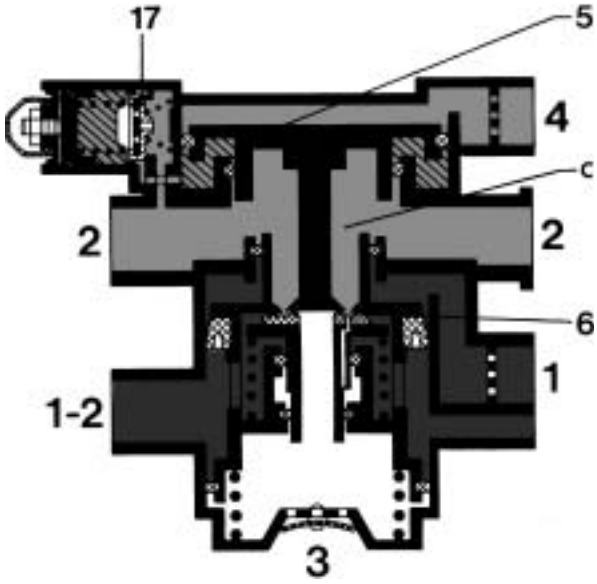
This braking action is discontinued when a maximum pressure of 2.8 bar has built up in chamber (d). The piston (8) overcomes the force of spring (9), thereby moving downwards. This causes the piston (8), taking with it valve body (10), to close the inlet valve (6). At the same time, the valve seat (13) will lift off the outlet valve (12), opening vent **(3)**. The pressure in the connected brake cylinders is thus reduced.

c. Partial Braking Position



When port **(4)** is pressurized, the pressure rises in chamber (a). This forces the piston valve (5) downwards, its valve seat (13) closing outlet valve (12). The inlet valve (6) opens. From chamber (e), supply pressure now flows into chamber (c) and via ports (2) to the brake cylinders. Due to the different surfaces of piston (5) between chambers (a) and (c), the output pressure at port (2) is higher than the input pressure at port (4).

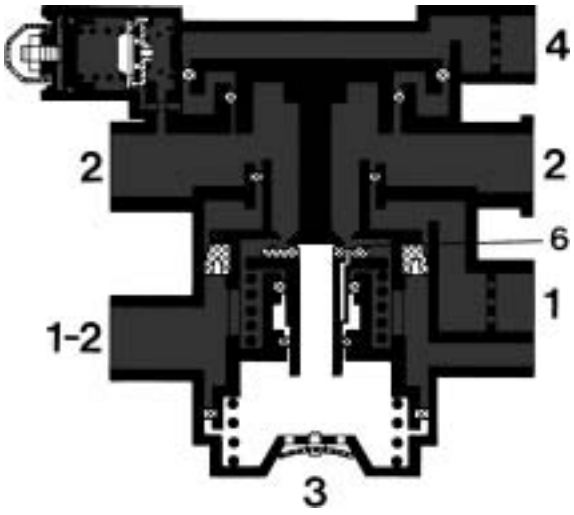
Predominance



The difference in pressures is dependent upon the advance set by means of the screw (14). This is achieved by the pressure in chamber (c) also reaching chamber (g) immediately. Valve (17) opens when the force of spring (16) has been overcome. The pressure now flowing into chamber (h) also reaches annular chamber (b) through duct (f).

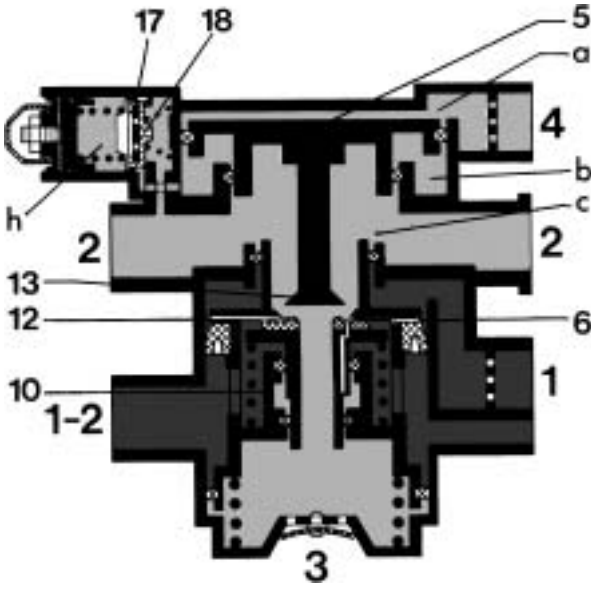
Valve (17) is closed again when the pressure advance set in chamber (c) has been reached. At the same time the piston valve (5) is raised again until the inlet valve (6) closes. A final braking position has thus been reached.

d. Full Braking Position



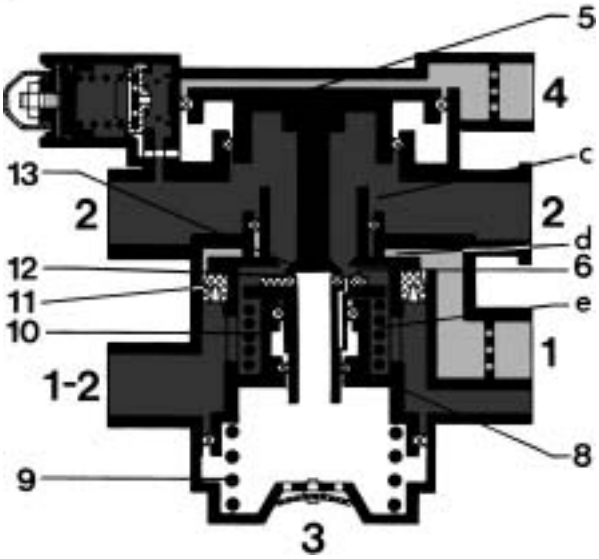
As the pressure is increased further in port **(4)**, the relay emergency reverses as described under **"c"** and increases, graded sensitively up until full brake application, the pressure in ports **(2)**. The inlet valve (6) is fully open during this process. The pre-set predominance is maintained across the whole of the braking range.

e. Release Position



When the pressure at port **(4)** is decreased, the pressure falls in chamber (a). The compressed air in chambers (b) and (c) can thus raise the piston valve (5). Since the force of the spring (7) and the pressure in chamber (c) causes the valve body (10) to follow that upward motion, the inlet valve (6) closes. As the piston valve (5) continues to rise, it raises its valve seat (13) off the outlet valve (12) which opens. The pressure in chamber (h) escapes via the opening check valve (18) into chamber (c). The pressure in the brake cylinders connected to ports **(2)** is reduced via vent (3).

f. Automatic Braking Position



If the trailer parts from its towing vehilce or the pressure at port **(1)** falls, the pressure in chamber (d) will be reduced. Since the supply pressure in chamber (e) cannot flow back via the grooved ring (11), piston (8) is forced upwards by the force of spring (9). This causes the valve body (10) to rest on the valve seat (13) of piston (5), closing the outlet valve (12). As piston (8) continues its upward motion, inlet valve (6) now opens. The reservoir pressure in port **(1 – 2)** and from chamber (4) now flows to the brake cylinders via chamber (c) and ports (2). This causes the trailer to be braked automatically.

The trailer's brakes are released when port **(1)** is pressurized, as described under **"a"** and **"b"** above.

Maintenance

No maintenance is required beyond the checks required by law.

Testing

When filling the trailer's supply line, the air reservoirs and the brake cylinders are pressurized up to a maximum pressure of 2.8 bar. As the pressure in the supply line is increased further, the pressure in the brake cylinders must fall once again.

Response pressure:	max. 0,4 bar
Grading:	max. 0.3 bar
Full braking:	full reservoir pressure
Advance:	max 1.2 bar

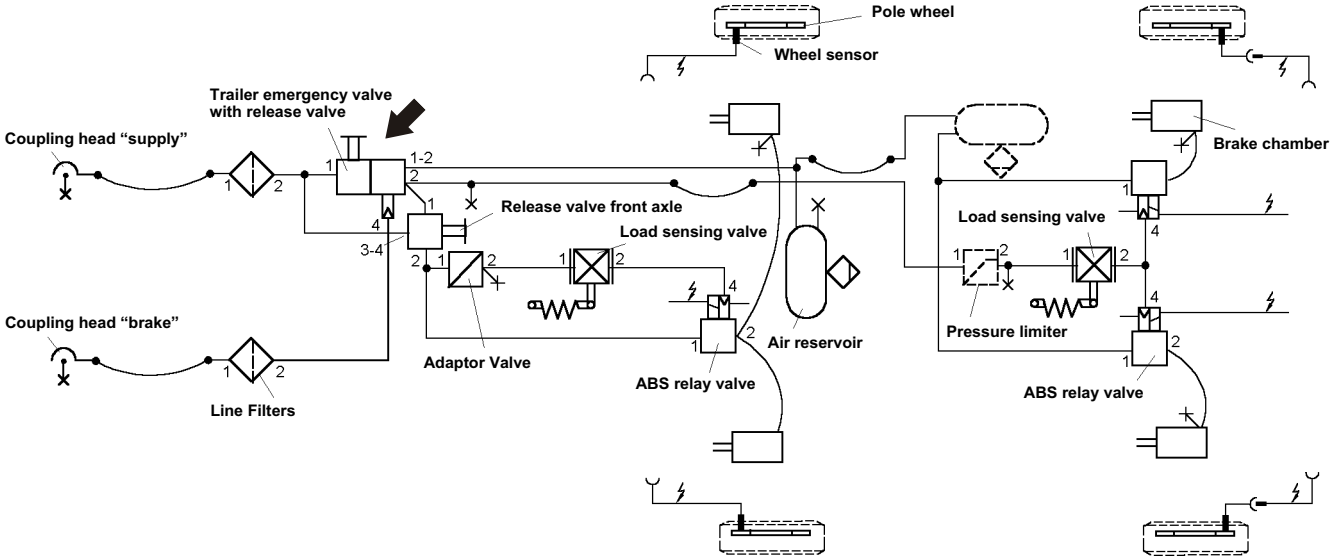
When the pressure in the trailer's supply line is reduced to ≥ 2.0 bar, the automatic braking position of the relay emergency valve must commence.

Setting the Predominance

After removing the protective cap (15) and unscrewing the counternut (15a), the predominance is set using a hexagon socket screw key size 5. By turning the adjusting screw (14) clockwise or anti-clockwise, the predominance can be continuously adjusted up to the maximum value. This must always be done with the relay emergency valve in its release position. After setting the predominance, the counternut (15a) is tightened and the protective cap (15) fastened. New valves produced after the middle of 1994 use a self-securing screw, and the counternut has become dispensible.

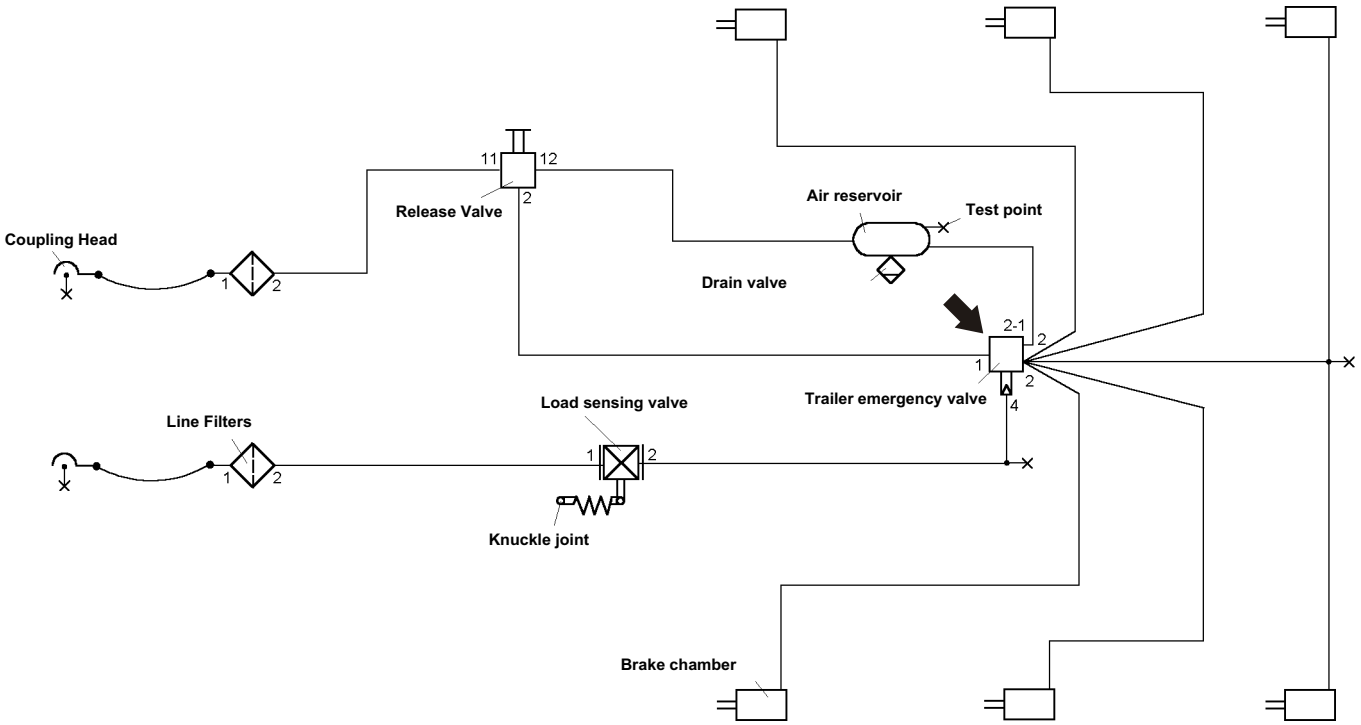
Schematic for Testing and Installation

(from 971 002 150 0 / 971 002 300 0)



Schematic for Testing and Installation

(from 971 002 152 0)



Purpose

Release valves are used within the braking system of drawbar trailers and semitrailers.

Release valves allow manual release of the trailer's braking system, or the front axle brake cylinders only, when the trailer is not attached to its tractor, allowing the vehicle or the drawbar to be moved. They are also used in spring and parking braking systems to release and actuate the parking braking system.

Design types

963 001 ..

a. Release valve (BBA) with mounting flange
The release valve is flanged directly on the trailer brake valve.

963 006 ...

b. Release valve (BBA) for line installation
The device is used, if the installation point of the trailer brake valve is not easily accessible and installation in pipes becomes necessary.

463 034 ...

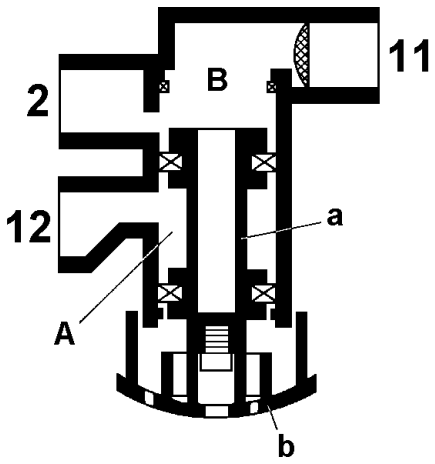
c. Release valve for front axle (BBA)
The device can be fastened with the flange directly on the trailer brake valve output and used to separately release the brake cylinders on the front axle of drawbar trailers.

963 001 051 0

d. Dual release valve for BBA and FBA (parking braking system)
The device is used in trailers with spring brake actuators/parking braking systems. The black knob is used to release or actuate the BBA, whereas the red knob actuates or releases the FAB.

Operation of Release Valves

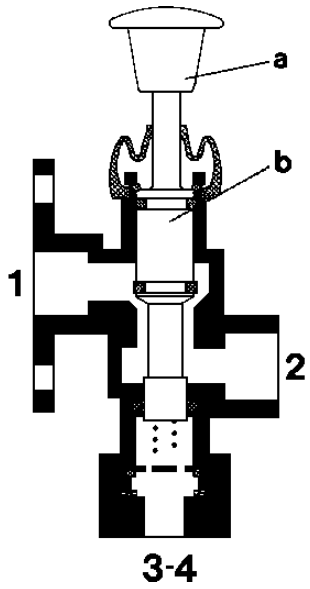
a. 963 00.



When using the relay emergency valve in combination with load-sensing valves or manually adjustable load-apportioning valves that have no release position, Trailer Release Valve 963 00. … 0 allows the trailer to be moved even when it is not attached to a motor vehicle. To do this, the piston (a) is manually pushed fully home using actuator button (b). This closes the passage from port **11** (supply line) of the release valve to port 1 of the relay emergency valve, and a connection between port 1 of the relay emergency valve and port **12** of the release valve is established. The trailer's reservoir pressure at port **12** flows into port **1** of the relay emergency valve, causing it to reverse into the driving or release position, and the pressure in the brake cylinders is reduced.

If, when the trailer is once again attached to a motor vehicle, the piston (a) has not been fully pulled out manually, the supply pressure from the motor vehicle entering via port **11** will push it out. The release valve is then once more in its normal position where a connection is established between port **11** of the release valve and port 1 of the relay emergency valve.

b. 463 034



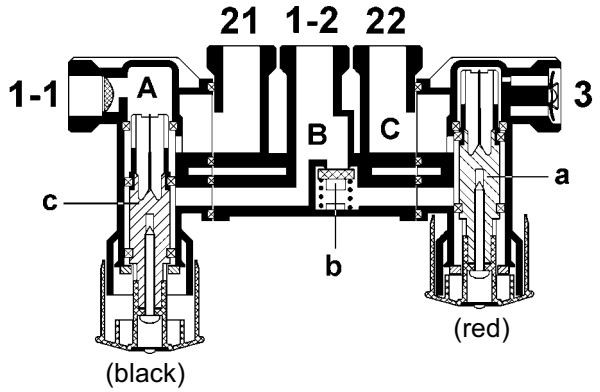
To release the front axle brake cylinders, the piston (b) is manually pushed fully home using actuator button (a). This closes the passage from port **1** to port **2**. The front axle's control pressure at port **2** escapes to atmosphere via port **3 – 4** and the open "supply" hose coupling. The drawbar can now be turned.

If, when the trailer is once again attached to a motor vehicle, the piston (b) has not been fully pulled out manually, the supply pressure from the motor vehicle entering via the "supply" hose coupling and port **3–4** will push it out. The release valve is then once more in its driving position where a connection is established between ports **1** and **2**.

Testing

The release valve must be checked for any leakages, and to make sure that the actuating button (automatic reversal when re-connecting the trailer and filling the supply line) moves freely. When the trailer is not attached to a motor vehicle, no pressure may escape at the "supply" hose coupling.

c. 963 001 051 0



In the **travelling position**, the black actuating knob (BBA) is in the lower final position. Air is supplied from the coupling head “Supply” via port **(1)** to port **(21)** and from there to trailer emergency valve port **(1)**. The BBA is released.

The red actuating knob (FBA) is in the lower position and supplies air to port **(22)** via air reservoir ports **(1-2)**. The spring brake actuator parts of the Tristop spring brakes are also in release position.

The red knob is pulled to the lower position **to brake the FBA**, and port **(22)** is depressurised via exhaust **(3)**. The spring brake actuator/FBA becomes active. The FBA can be released again if sufficient air reservoir pressure is available, by pushing in the red knob.

The BBA can be released in unhitched trailers by pushing the black actuating knob to the upper position. This causes air to be supplied to port **(21)** and the automatic braking of trailer emergency valve is neutralised again. Renewed braking takes place when the black actuating knob is pulled out and port **(21)** is depressurised via port **(1)**.

Please note

When the supply line is coupled or filled, the black actuating knob (BBA) must automatically return to the travelling position (lower position), if it is not already there.

The red actuating knob (FBA) must always be switched manually. In this case, it does not matter whether the supply line is coupled or unhitched.

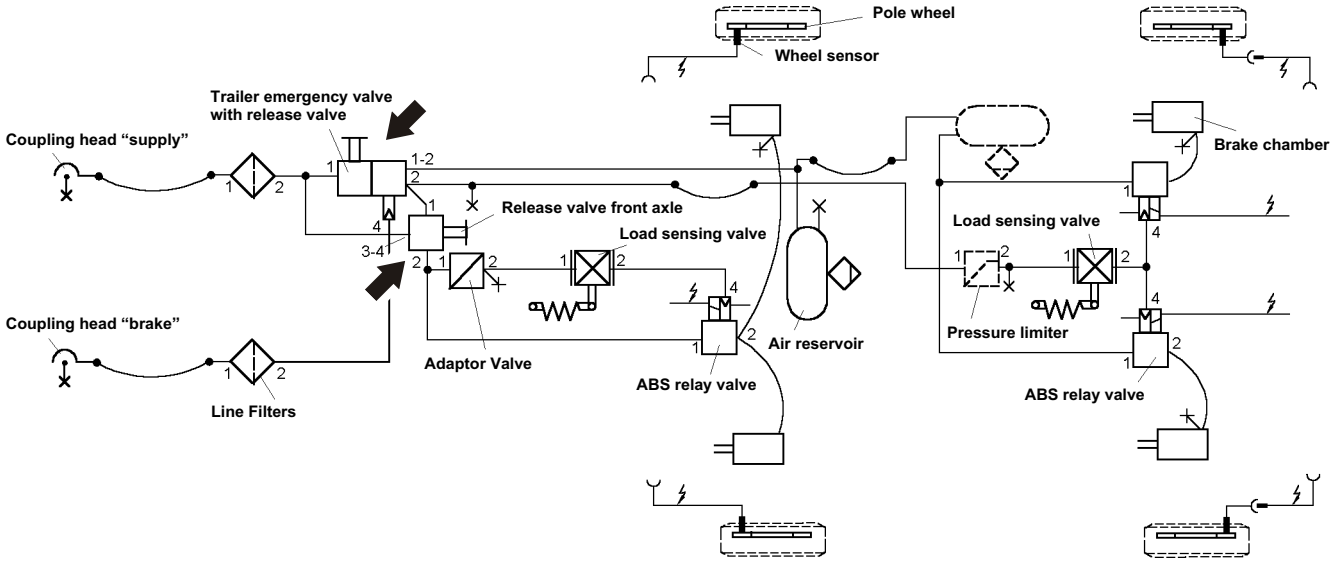
Testing

The release valves must be tested for permeability and easy accessibility of the actuating knob.

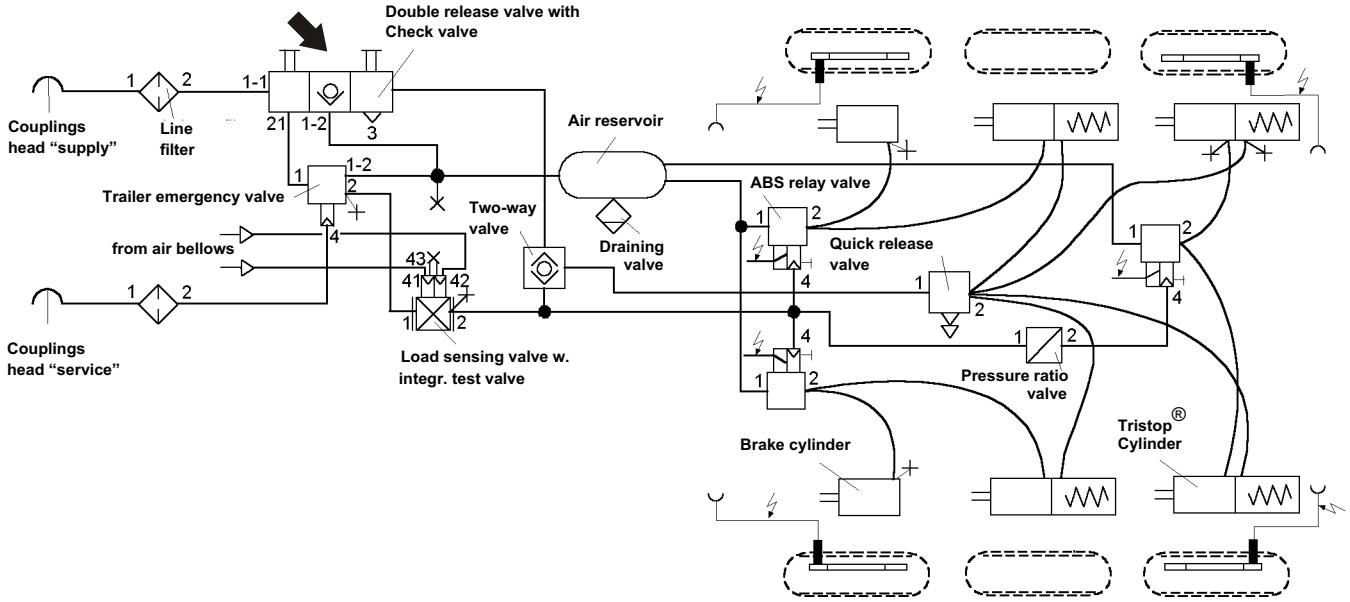
When the trailer is not attached to a motor vehicle, no pressure may escape at the “supply” hose coupling.

The black knob should be tested for automatic return when the supply line is coupled or filled.

Schematic for Testing and Installation for Release Valves 963 001 ... and 463 034 ...



Schematic for Testing and Installation for Dual Release Valve 963 001 051 0



Purpose

Load apportioning valves are used within the trailer's braking system. They are usually connected to the relay emergency valve by means of a mounting flange. Their task is to adapt the trailer's braking performance to the load carried. In this process, the load apportioning valve limits the control pressure output by the relay emergency valve to a preset value.

Design types

475 604

Order number	purpose
475 604 010 0	at braking systems with
475 604 012 0	calculated pressure 4.5 bar
475 604 011 0	at calculated
475 604 013 0	pressure ≥ 6.0 bar

Variants 012 0 and 013 0 have no release position.

The load apportioning valves shown can be used for trailer with single-line or dual-line braking systems. Because of the difference in calculated pressures (4.5 and 6.0 bar respectively), the adjusting ranges of the load apportioning valves vary.

Please note

If the trailer overruns the motor vehicle during the braking process in spite of the predominance having been calculated correctly, it is possible that the compressed air output at the "unladen" setting is insufficient for properly braking the trailer. In this case the required unladen pressure needs to be re-calculated using to the formula below, and the load apportioning valve readjusted.

Formula

$$pB_l = \frac{pB_e}{i}$$

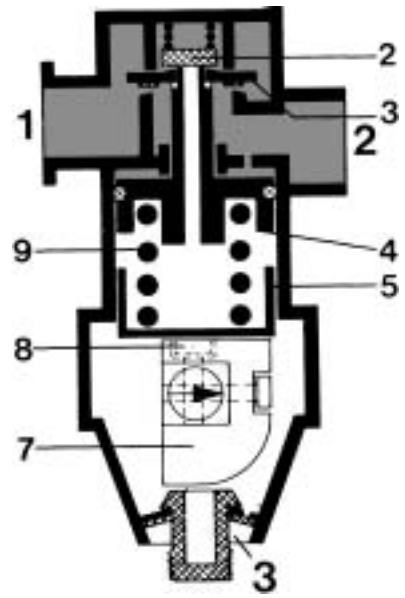
$$i = \frac{G_z}{G_L}$$

Index

pB_u = braking pressure "unladen"
pB_e = calculated pressure (p_n)
i = laden/unladen ratio
T_Z = permissible total weight
T_U = unladen weight

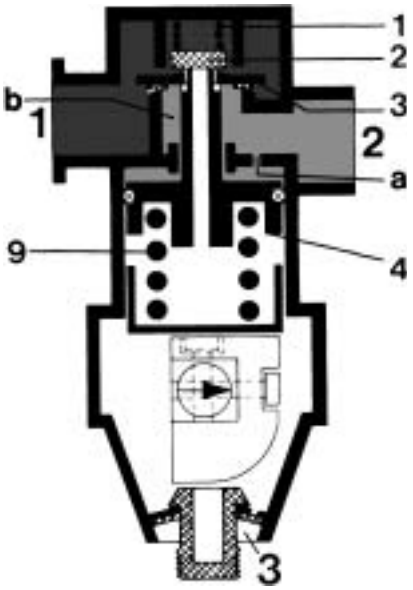
Operation of Load Apportioning Valve 475 604

a. “Unladen” Position



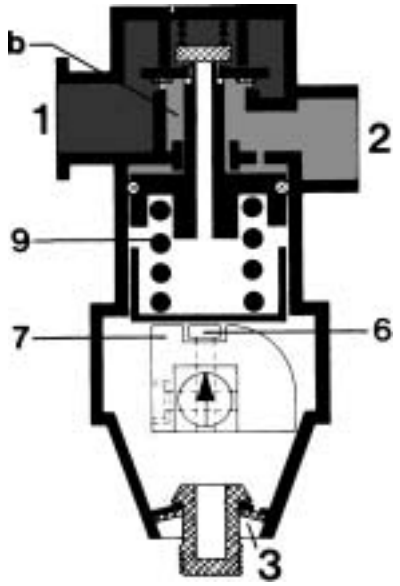
In the “unladen” position the compression spring (9) is preloaded by the cam (7) via the spring barrel (5). This causes the pressure limiting piston (4) to move to its upper position. The outlet valve (2), relieved from pressure, is closed, and the inlet valve (3), raised via piston (4), is open.

Pressure Limiting Position



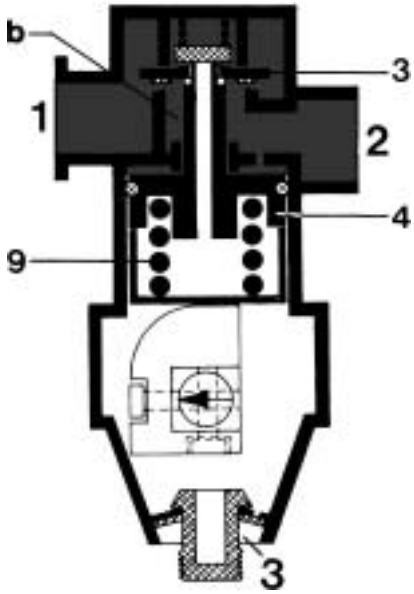
When the brakes are applied, the pressure output from the relay emergency valve flows through port (1) of the apportioning valve via the opened inlet valve (3) into chamber (b). When the force of the piston (4) is greater than that of spring (9), the pressure limiting piston (4) moves downwards, and the inlet valve (3) is closed by the force of spring (1). The compressed air in chamber (b) now flows via port (2) to the trailer’s brake cylinders.

b. “Half Laden” Position



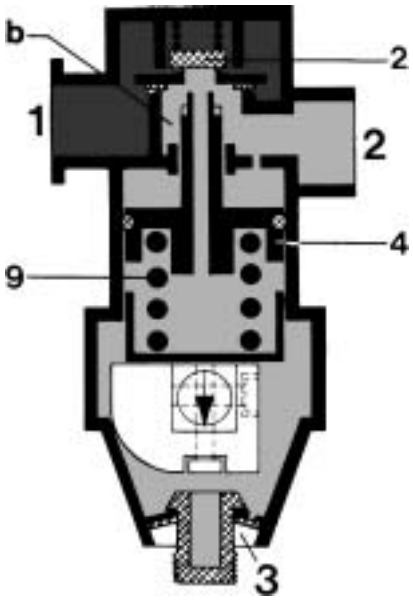
As the load on the trailer is increased, the lever’s position has to be changed from “unladen” to “half laden”. The position of the cam (7) now allows spring (9) to be preloaded further. During a braking process, a higher pressure is now required in chamber (b). Pressure limiting is then achieved as described under “a” above.

c. “Fully Laden” Position



If the apportioning valve is at the “fully laden” position, the spring has been preloaded even further. The pressure entering chamber (b) is now no longer great enough to force the piston (4) downwards. The inlet valve (3) remains open, allowing the full input pressure to reach the brake cylinders.

d. "Release" Position



When the trailer's pilot line is disconnected, the relay emergency valve outputs the full pressure. When the brake apportioning valve is moved from one of its three positions to the "release" position, the force of spring (9) is reduced. The pressure in chamber (b) forces the piston (4) downwards, and its tube lifts off the outlet valve (2), releasing the vent. Thus the pressure from chamber (b) and the brake cylinders escapes.

Maintenance

No maintenance is required beyond the checks required by law.

Testing

Depending on the trailer's laden/unladen ratio, the load apportioning valve must output the respective pressure in all positions available for selection. In the release position, the brake cylinders must be vented properly.

Table showing Variants and Design Pressures

Ordering number	Empty	"Partially Laden"	"Fully Laden"	Release
475 604 010 0	1.4 to 1.6	3.2 to 3.4	Air Reservoir Pressure	0.0
475 604 011 0	1.9 to 2.1	3.8 to 4.0	Air Reservoir Pressure	0.0
475 604 012 0	1.4 to 1.6	3.2 to 3.4	Air Reservoir Pressure	without Release Position
475 604 013 0	1.9 to 2.1	3.8 to 4.0	Air Reservoir Pressure	without Release Position

Settings for the Load Apportioning Valve

As described under "Types" above, Load Apportioning Valve 475 604 can not only be set to an "Unladen" position but also has a "half laden" position. In order to make independent adjustments for both settings, the following procedure must be followed:

1. Load Apportioning Valve with Release Position "Unladen"

Remove protective rubber plug from the vent. Set load apportioning valve to "fully laden". Using a hexagon socket screw key (4 mm), unscrew adjusting screw (8) when the pressure is increased, or screw it in when the pressure is reduced.

"Half Laden" Position

Set load apportioning valve to "release". In this case the pressure is merely adjusted via adjusting screw (6) as described under "1" above.

2. Load Apportioning Valve without Release Position "Unladen"

The "unladen" position is adjusted as described under "1" above, using adjusting screw (8).

"Half Laden" Position

Set load apportioning valve to "release". Remove the screw plug on the side of the lower part of the housing. Then change the pressure setting via adjusting screw (6).

Please note

The setting range of variants 010 0 and 012 0 is:

in the "unladen" position 0.8 to 1.7 bar
in the "half laden" position 2.8 to 3.7 bar

The setting range of variants 011 0 and 013 0 is:

in the "unladen" position 1.4 to 2.3 bar
in the "half laden" position 3.4 to 4.3 bar

Schematic for Testing and Installation