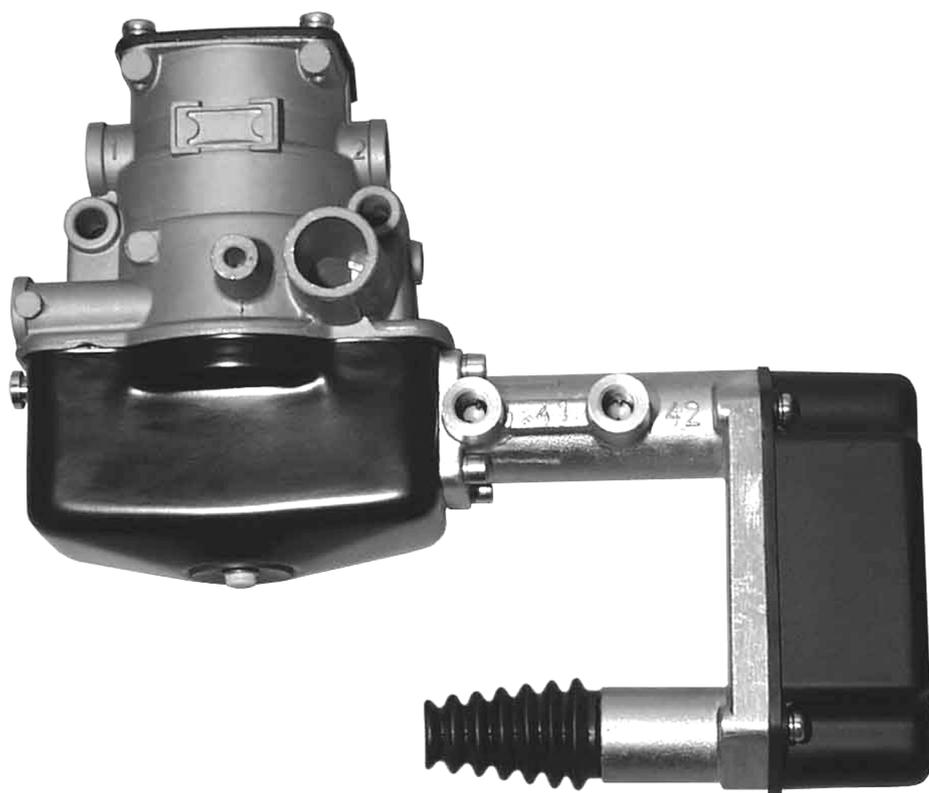


Innovation

Safety

Quality

Performance



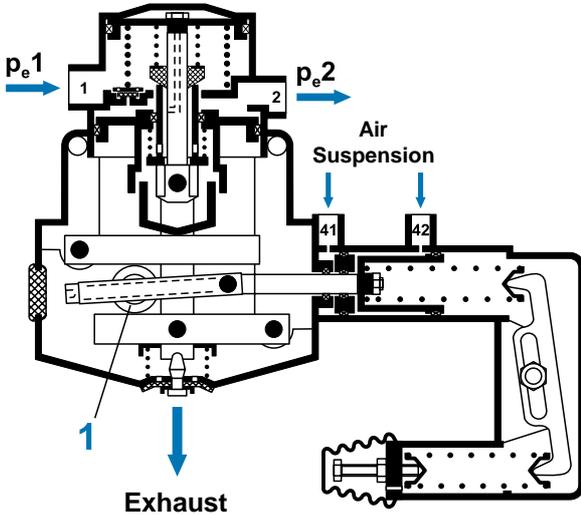
INSTALLATION INSTRUCTIONS Load Sensing Valve

602 005 001



602 005 001

1



Use

The automatic load sensing valve (LSV) – pneumatically controlled, is installed in vehicles (motor vehicles, trailers and articulated trailers) with pneumatic braking systems and pneumatic suspensions. The braking pressure in the pneumatic braking system, and with that the braking force, is controlled to correspond to the static load condition of the particular vehicle.

When the static load changes, the pressure in the suspension bellows changes continuously via the pneumatic suspension valve. This pressure is used to simultaneously control the connections 41, 42 of the LSV. The effective, easily reconstructed in the workshop, pressure ratio $iR = p_{e1} : p_{e2}$ is the practical reference point for the adjustments.

Mode of Operation 1

The connectors 41, 42 of the actuating cylinder are attached to the connecting lines of the pneumatic suspension valves / bellows on the right and left sides of the vehicle.

The pistons in the actuating cylinder are held in the end position when the vehicle is empty (suspension pressure empty connections 41, 42).

When the vehicle is loaded and the pressure rises at the connections 41, 42, the control pistons and the slider (1) attached to them by the connecting rod are shifted to the right which results in a change in the effective movement translation ratio.

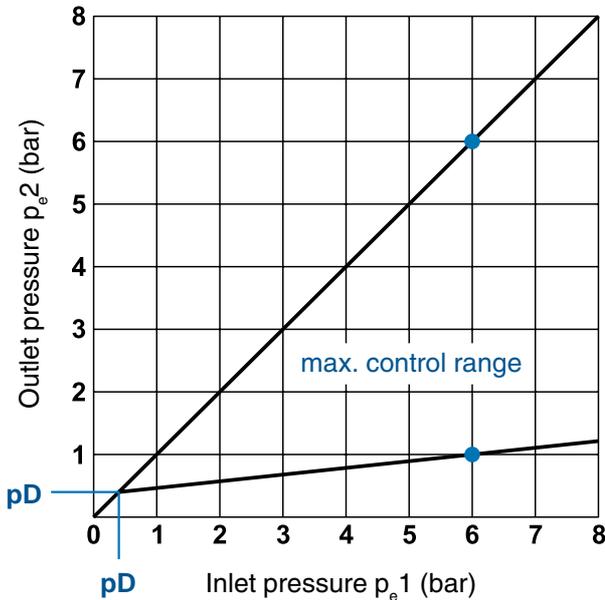
The translation movement between the pistons and balance arm is so adjusted that with suspension pressure empty the control inlet brake pressure p_{e1} at connection 1 is transferred to the outlet control pressure at connection 2 but reduced by the pressure ratio iR . The system is normally designed so that in the loaded position the controlled inlet pressure in connection 1 remains unchanged, i.e. the controlled outlet pressure at connection 2 is in the ratio 1:1 to it.

The LSV is fitted with a proportional control characteristic that has a start pressure control (pD) of approx. 0.4 bar **2** in the uncontrolled range to overcome the start force (valves, wheel brakes)

The LSV works “statically”, i.e. a change in the pressure ratio, e.g. from a change in suspension pressure following a change in axle loading, is suppressed during braking.

Function Diagram

2



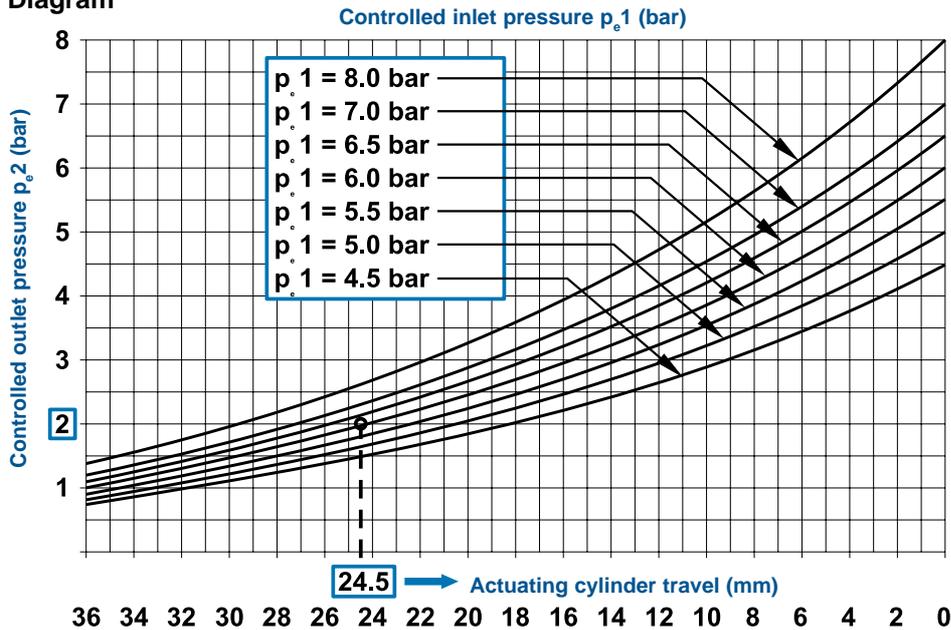
Attention - Danger



The removal of the device should only be made when in the depressurised condition.

3

Diagram



Formula for intermediate value

$$= \frac{(\text{bell. } p_e \text{ loaded} - \text{bell. } p_e \text{ empty}) \times 36}{\text{Actuating cylinder travel}}$$

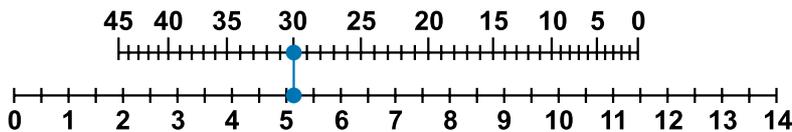
Example

$$\frac{(5 - 1.5) \times 36}{24.5}$$

Intermediate value = 5.14

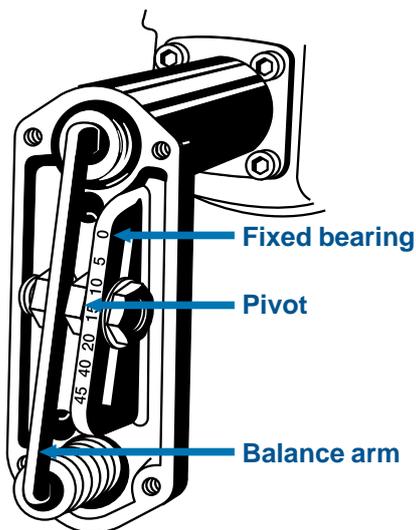
4

Adjustment Scale of the Balance Lever



Pivot point = 30

5



Setting Instructions

The LSV is **not** set up in the factory with any particular suspension or brake pressures so these must be set by the vehicle manufacturer to the necessary values (LSV instruction plate). The setting (diagram or LSV setting program) is made in a mechanical part and a pneumatic part.

Mechanical Part

Setting the pivot point (X)

1. Determine the actuating cylinder travel with the help of the diagram **3**
2. Calculate the intermediate value with the formula **3**
3. Determine pivot position (X) **6** for the balance arm from the pivot scale **4** :

Example: 3 4 5

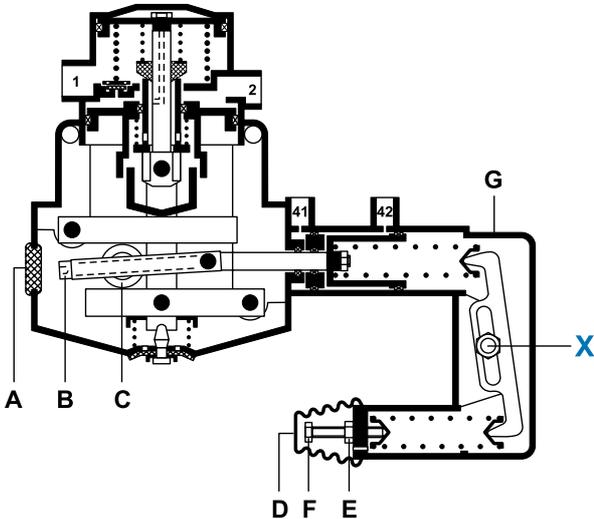
1. $p_{e1} = 6.0 \text{ bar}$ $p_{e2} \text{ empty} = 2.0 \text{ bar}$. With curve $p_{e1} = 6.0 \text{ bar}$, the intersection point with $p_{e2} = 2.0 \text{ bar}$ is formed, connect the intersection point with the actuating cylinder scale, giving **24.5 mm actuating cylinder travel**
2. Suspension pressure loaded $p_{e1, 42} = 5.0 \text{ bar}$, suspension pressure empty $p_{e1, 42} = 1.5 \text{ bar}$, gives **5.14 intermediate value**
3. Vertically above the value of the calculated intermediate point, the pivot position (X) can be read off the pivot scale for the balance arm, giving **30 mm pivot point**.

Attention - Danger

Don't forget setting



6



- Set the pivot point (X) corresponding to the value determined: Remove cover G, hold both of the nuts between the balance lever and the frame with the hexagonal spanner 14 mm, loosen the locknuts on the balance lever and fixed bearing with the hexagonal spanner 17 mm and set the pivot position to the calculated value X 6. First tighten the nuts on the fixed bearing, set up the balance arm 7 (centrally between the return springs for the 90° - position to the long axis of the LSV; if necessary, remove any pre-tensioning in the return springs by turning the adjustment screw F to the left), tighten the nuts 17 mm on the balance lever with about 12-13 Nm torque.

Pneumatic Part

Setting the outlet pressure p_{e2} empty: **6**

- Vent connections 1, 41, 42 to $p_e = 0$ bar.
- Remove the rubber cap A.
- Place the hexagonal key 5 mm into screw B, shift the slider C against the force of the spring and see whether the automatic return takes place. If it does not return: remove bellows D, loosen locknut E, pre-tension the springs using screw F till the slider C returns to the starting position.
- Turn the screw B so that when controlling the inlet brake pressure p_{e1} at connection 1, the desired outlet pressure p_{e2} empty is controlled at energy outlet 2. Connection 1 has to be vented to $p_{e1} = 0$ bar before the screw B is adjusted.

TURN TO THE LEFT at B raises p_{e2}

TURN TO THE RIGHT at B lowers p_{e2}

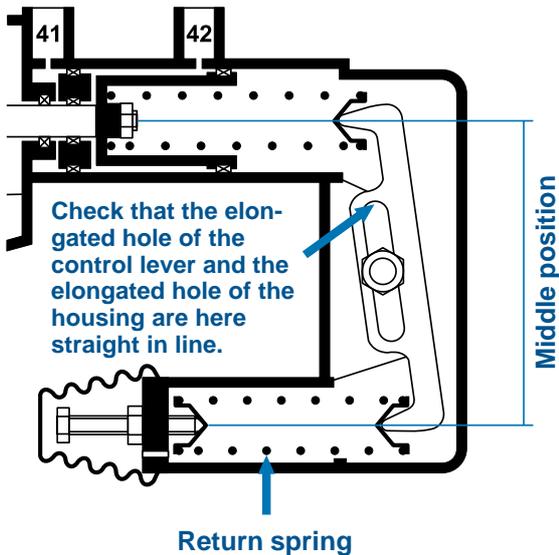
- Vent connection 1 to $p_{e1} = 0$ bar. Control suspension pressure to $p_{e41, 42}$ empty in actuating cylinder.
- Control brake pressure p_{e1} at connection 1, the outlet pressure p_{e2} empty must correspond to the previously set value. If the outlet pressure p_{e2} empty is greater; again tension the return spring in the actuating cylinder using screw F till, when controlling p_{e1} , the desired outlet pressure p_{e2} empty is achieved (do not tension too much).
- Vent connection 1 to $p_{e1} = 0$ bar, raise suspension pressure $p_{e41, 42}$ empty by approx. 0.7 bar, control brake pressure p_{e1} at connection 1, the pressure controlled at connection 2 must now be very slightly greater than p_{e2} empty. If a higher pressure is not achieved then the pre-tension of the return spring is too great. To correct this, loosen the adjustment screw F till the desired change in outlet pressure is obtained (do not lower the spring tension too much, examine p_{e2} empty again as a check), tighten locknut E.
- Replace rubber cap A and bellows D as well as protective cover G.

Check outlet pressure p_{e2} loaded:

- Control the suspension pressure in the actuator cylinder to $p_{e41, 42}$ loaded, control the brake pressure p_{e1} at connection 1, the outlet pressure p_{e2} must correspond to the value on the LSV instruction plate, the brake calculation or the value given by the vehicle or axle manufacturer, usually $p_{e1} = p_{e2}$.

Balance level correct in the Fix the middle position

7



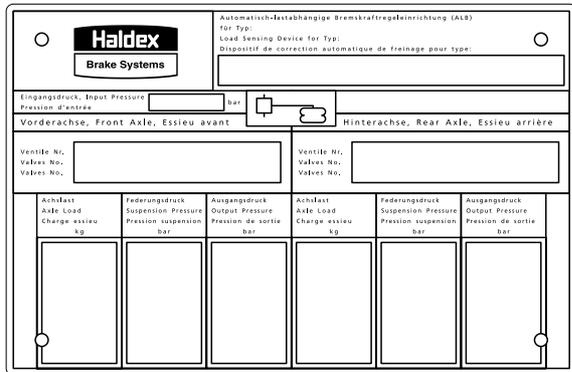
Attention - Danger



It is mandatory that the LSV is so mounted that during examination and adjustment the vent points downwards.

028 0280 09 LSV Instruction Plate

8



Installation Guidelines

The LSV is fixed to the vehicle chassis with two M 8 bolts. The vent **must** point downwards. The pneumatic lines have to be connected according to the connection markings 1, 2, 41, 42.

The values of the settings have to be stamped on the accompanying LSV information plate **Order. No. 028 0280 09 8**. The information plate must not be capable of getting lost and must be attached to the vehicle where it is easily visible (German road traffic licensing regulation: StVZO - SP - Rili. - 2.5).

Maintenance

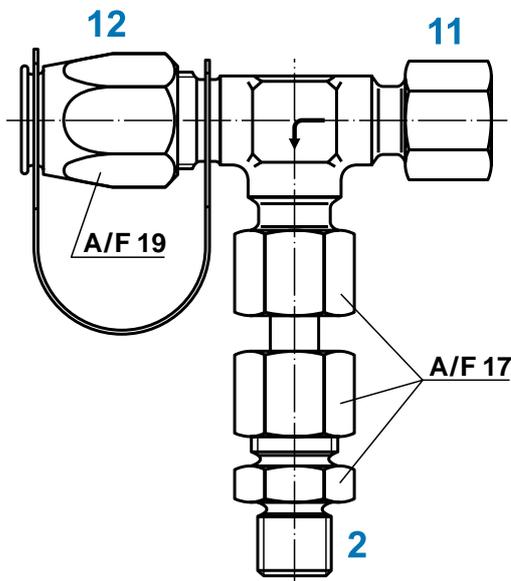
According to the legal requirements or the European guideline. If there are braking problems or defects are observed while underway, then the LSV should be examined internally or replaced.

Testing

- Function and leak test
- Check that p_{e2} empty and p_{e1} loaded correspond to the data on the LSV instruction plate.
- It is mandatory that the LSV be so mounted that it is in a vertical position and the vent point downwards during examination and adjustment

318 072 001 Simulation Connection

9



Simulation connection 9

- Variable installation (good access)
- Makes it possible to test to EG/ECE as well as the German § 29 StVZO
 - 11 = Energy inflow (bellows)
 - 12 = Energy inflow (filling connection)
 - 2 = Energy outflow (LSV 41/42)

Technical Datas

Operating pressure: $p_{e\max}$ 10 bar
 Operating temperature range: - 40°C to + 80°C
 Connections: 1, 2: M 16 x 1.5
 41, 42: M 12 x 1.5

Connection markings:

- 1 = Energy inflow
- 2 = Energy outflow
- 41 = Control connection 1
- 42 = Control connection 2

Type

602 005 001 Load Sensing Valve

Accessories

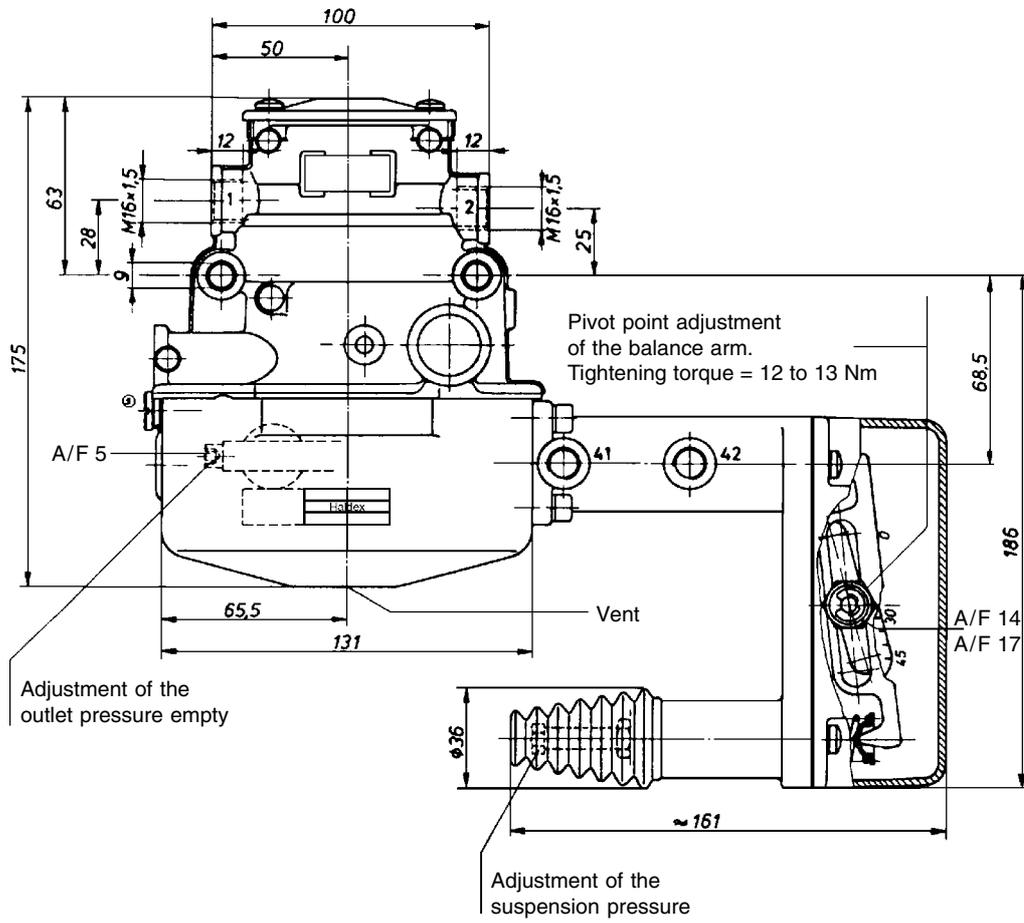
- 028 0280 09 Instruction plate **8**
- 318 072 001 Simulation connection **9**
- 000 Diskette, LSV adjustment program

Attention - Danger

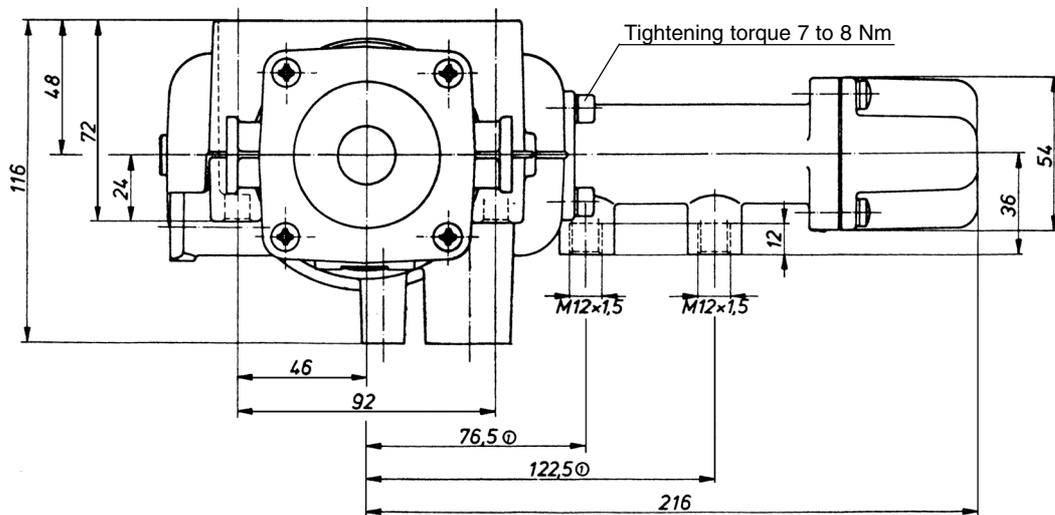


When working with a high pressure cleaning machine, keep to a safe distance of at least 50 cm.

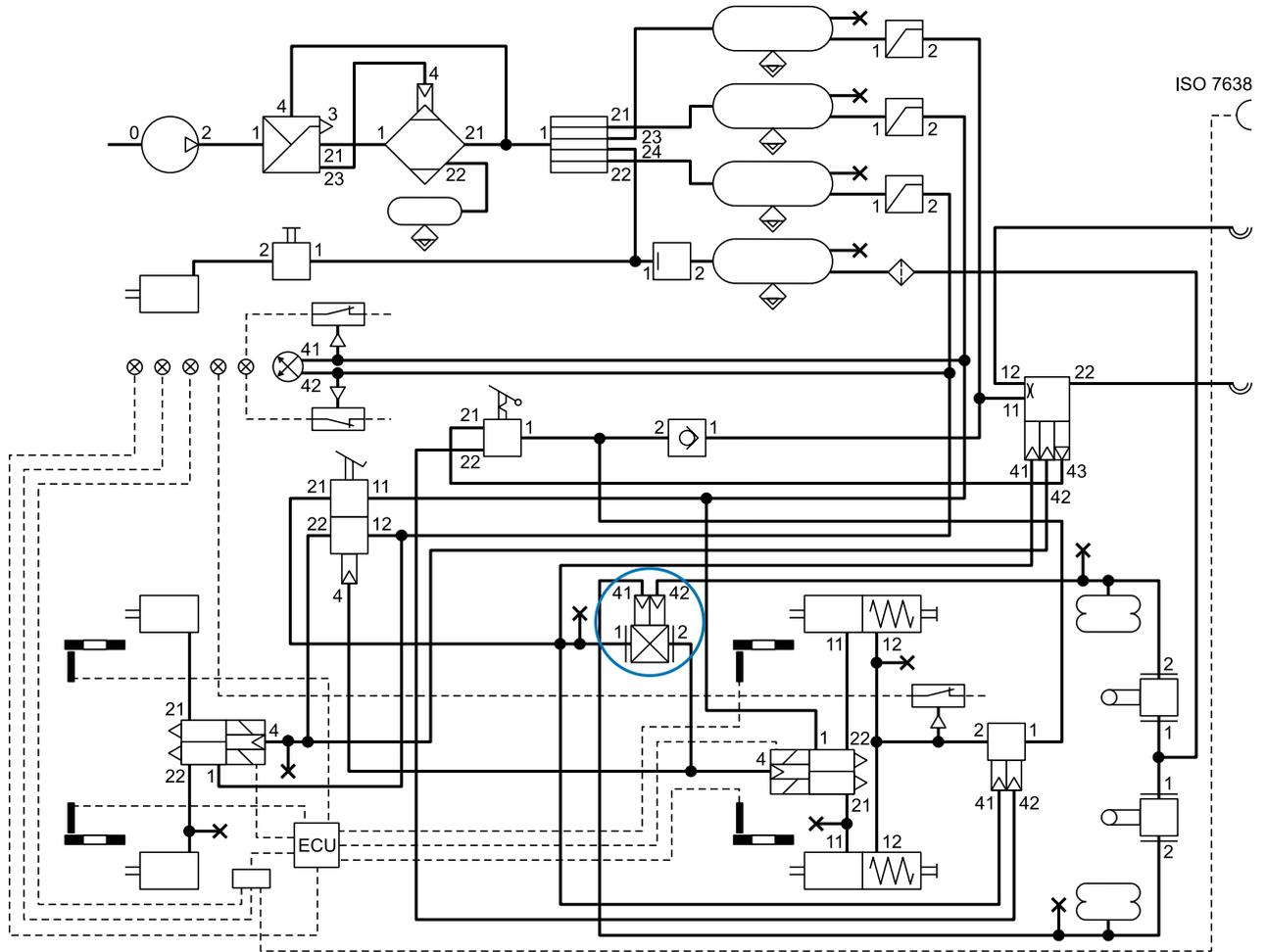
Installation Drawing 602 005 001



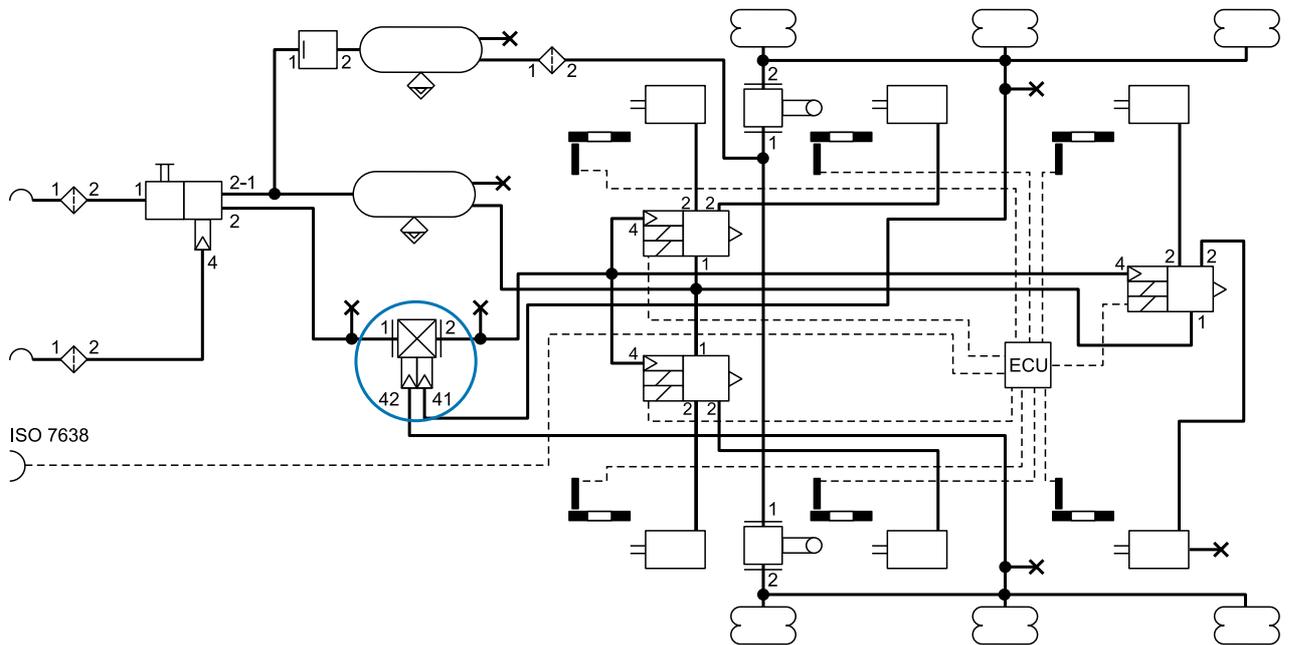
Installation Drawing 602 005 001



Installation Schematic: Heavy Vehicle with Air Suspension and ABS



Installation Schematic: Trailer with Air Suspension and ABS



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These installation instructions replaces the version 602 002 ... issue April 1982



Performance & Safety in Vehicles