Key:

- a Quadruple system protection valve
- b Air reservoir
- c towing vehicle foot brake valve
- d operating current relay
- f operating cylinder for fuel injection pump
- g operating cylinder for the exhaust butterfly valve

3/2-Way Valve

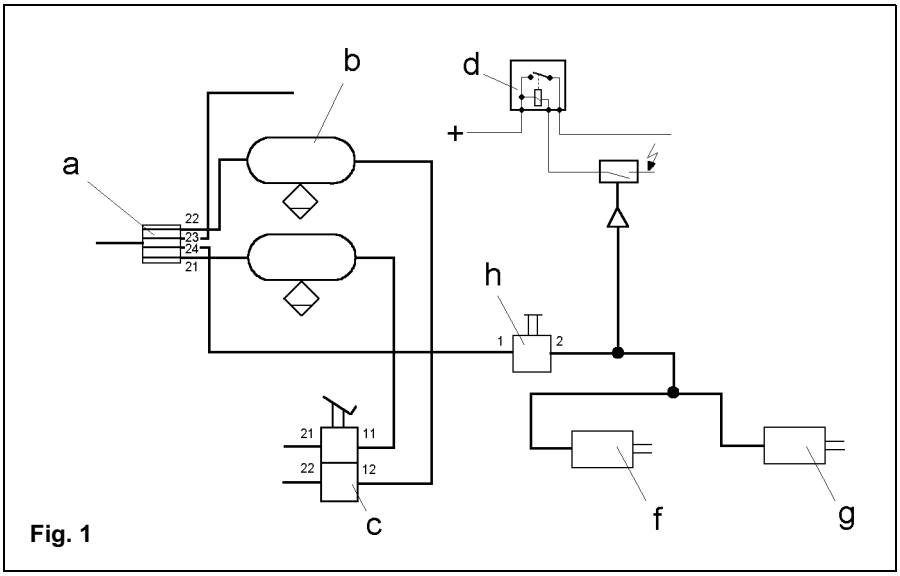


Fig. 1

According to Section 41 of the German Motor Vehicle Construction and Use Regulation, motor coaches with a permissible total weight in excess of 5.5 t and other motor vehicles with a permissible total weight in excess of 9 t have to have an additional sustained-action braking system fitted. Sustained-action brakes are engine brakes or systems which achieve a similar braking performance.The purpose of an engine brake is to brake the towing vehicle independently from the service braking system, thereby reducing the wear on the mechanical foundation brake to the greatest possible extent.

Fig. 1:
The engine brake is switched on by means of a foot-operated three-way valve (h) which supplies air pressure for the operating cylinders for the butterfly valve and the fuel-injection pump.

Key:

- a Quadruple system protection valve
- b Air reservoir
- d operating current relay
- e 3/2 Solenoid valve
- f operating cylinder for fuel injection pump
- g operating cylinder for the exhaust butterfly valve
- i towing vehicle foot brake valve with an electrical switch

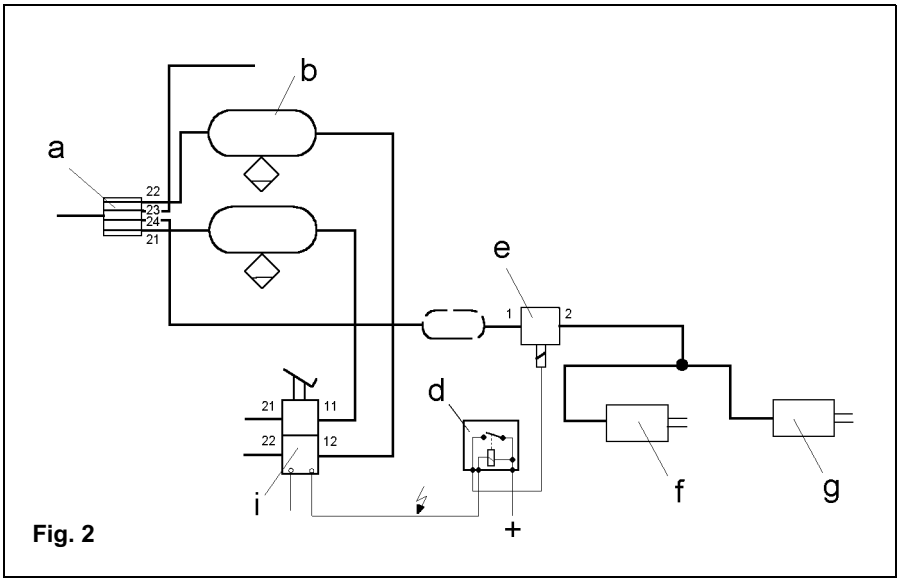
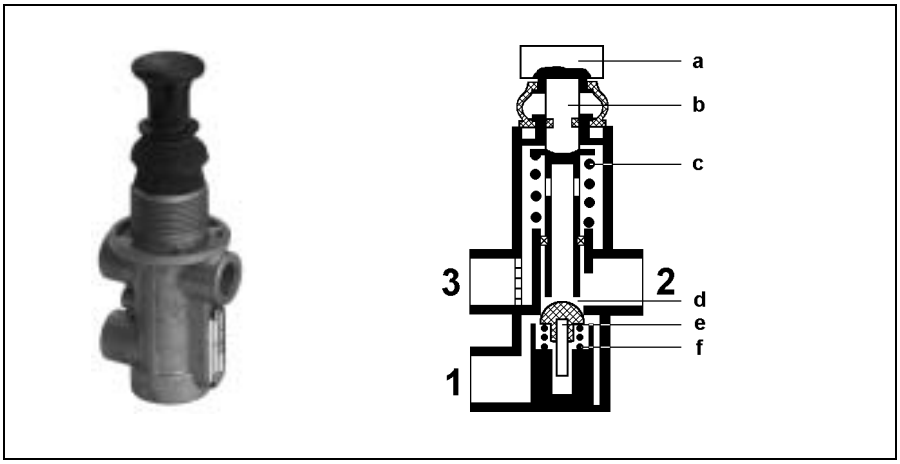


Fig. 2

Fig. 2:
Circuit for the electro-pneumatic engine brake in combination with the service braking system operated by compressed air.
Upon application of the dual-circuit brake valve (i), the electrical switch of the brake valve activates the engine brake via the operating contact relay (d) and the 3/2-way solenoid valve (e). This means that it is activated every time the service braking system is being used, thus supporting the air brake and reducing the wear on the mechanical foundation brake to the greatest possible extent.

3/2 Directional Control Valve 463 013 . . . 0

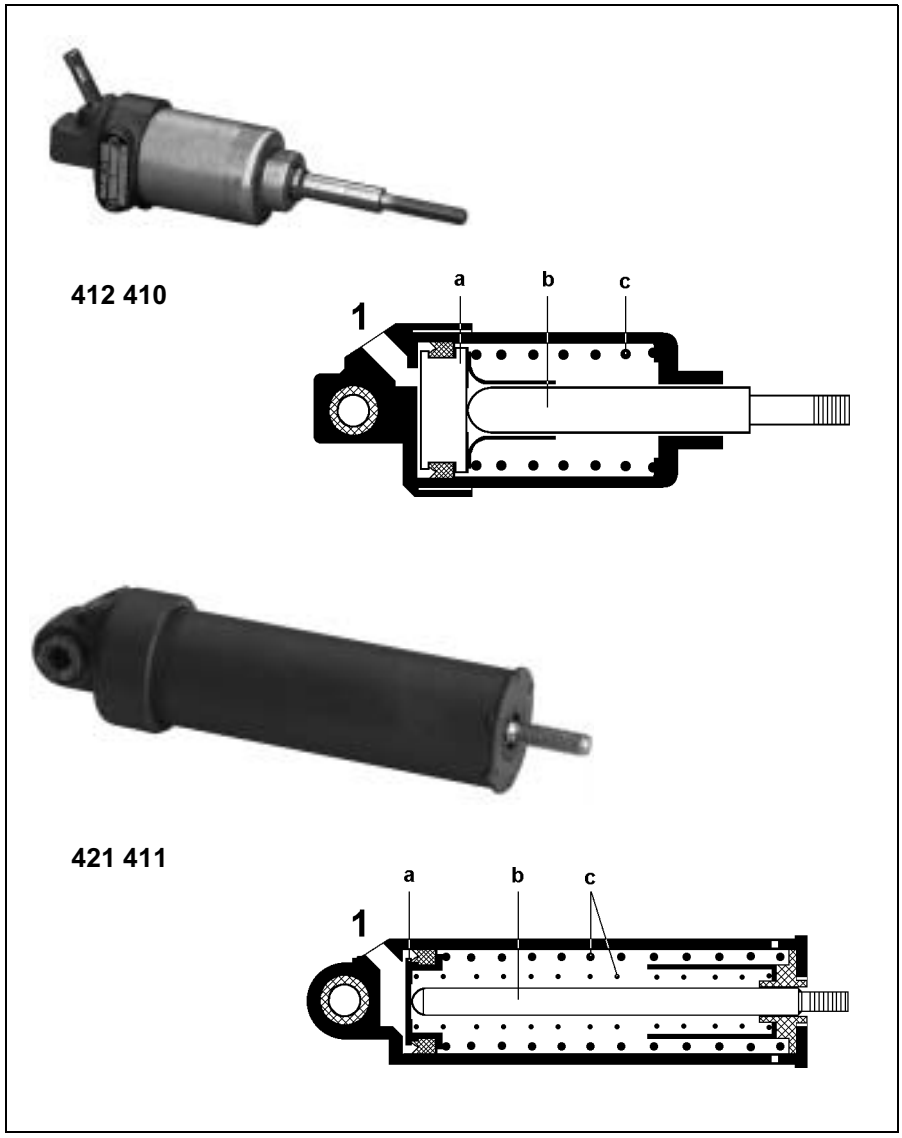


Purpose:
To pressurise and exhaust operating cylinder e. g. exhaust braking system.

Operation:
IThe compressed air arriving from the air reservoir flows through port 1 and reaches the 3/2-way valve, until it reaches the underside of the closed inlet valve (e). When the actuating button (a) is pushed down, the plunger (b) is forced downwards against the force of the pressure spring (c) until it makes contact with the inlet valve (e), closing the outlet (d) and, as it continues to move downwards, opening the inlet valve (e). The compressed now flows through Port 2 to the downstream operating cylinders.

When the actuating button (a) is released, the pressure spring (c) forces the plunger (b) back into its upper end position. Pushed by the supply pressure and the pressure spring (f), the inlet valve (e) follows the upward motion of the plunger (b) and closes the passage to Port 1. Through the opening outlet (d) the compressed air from Port 2 now flows to Port 3 and the operating cylinders are evacuated once again.

Operating Cylinder 4210410 . . . 0 and 0



Purpose:

Shutting off the fuel injection pump and operating the butterfly in the exhaust brake system.

Operation:

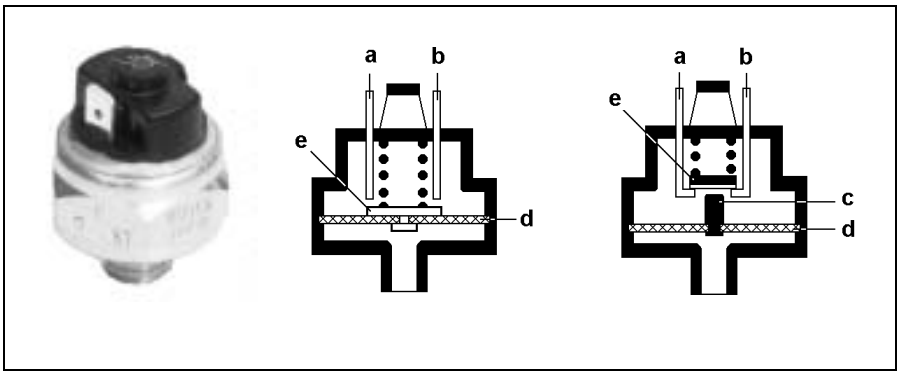
Air enters the cylinders from either the 3 way valve or the 3 way magnet valve through port 1. As pressure builds up behind piston (a) the push rod (b) moves outwards against the load of springs (c).

Cylinder 421 410 . ..is connected to the lever on the fuel injection pump, so that when operated, the lever moves from the ”idle“ position to the ”stop“ position. The cylinder is also connected into the throttle linkage, so that as long as the exhaust brake is in operation, it is impossible to depress the accelerator pedal.

Cylinder 421 411 . . . 0 is connected to the butterfly in the exhaust pipe, so that when operated, the butterfly closes. The back pressure created in the engine gives a braking effect to the vehicle. The back pressure created in the engine gives a braking effect to the vehicle.

When the cylinders are exhausted, the springs (c) push the piston (a) back to its original position.

Pressure switch 441 014 . . . 0



Purpose:

To switch on or off electrical units and lamps according to the application.

Operation:

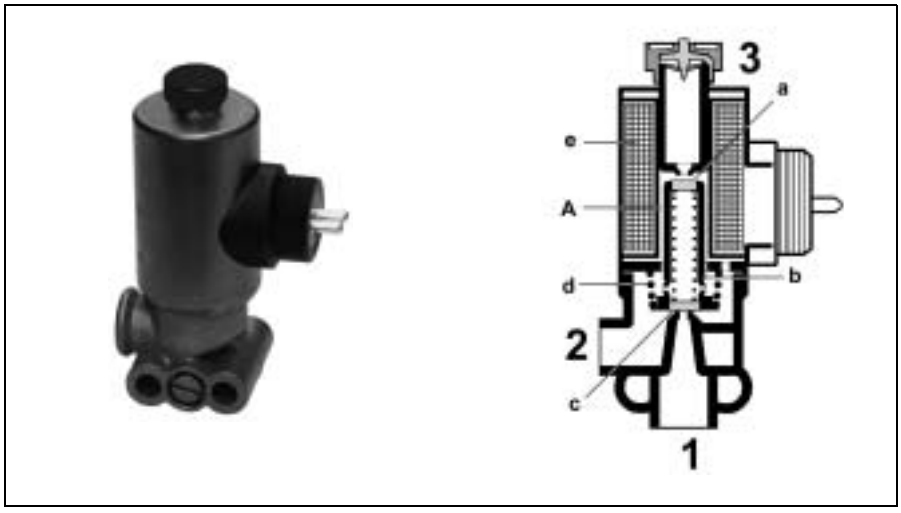
Application ”E“ (normally open)
On reaching the switch pressure the diaphragm (d) together with the contact plate (e) is raised and a connection at the poles (a and b) is made.

With a pressure fall this connection is again interrupted.

Application ”A“ (normally closed)
On reaching the switch pressure the diaphragm (d) is raised together with the tappet. The tappet (c) lifts the contact plate (e) and the connection at the poles (a and b) is interrupted.

With a pressure fall this connection is remade.

3/2 Solenoid valve vented 472 170 . . . 0



Purpose:

To pressurize an air line when current is supplied to the solenoid.

Operation:

The supply line, coming from reservoir is connected to port 1. The armature (b) which forms the valve core keeps inlet (c) closed by the load in pressure spring (d).

When a current reaches solenoid coil (e), armature (b) is lifted, outlet (a) is closed and inlet (c) is opened. The compressed air from the supply line will now flow from port 1 to port 2, pressurizing the working line.

When the current to solenoid coil (e) is interrupted, pressure spring (d) will return armature (b) to its original position. Inlet (c) is closed, outlet (a) is opened and the working line is exhausted via chamber (A) and exhaust 3.