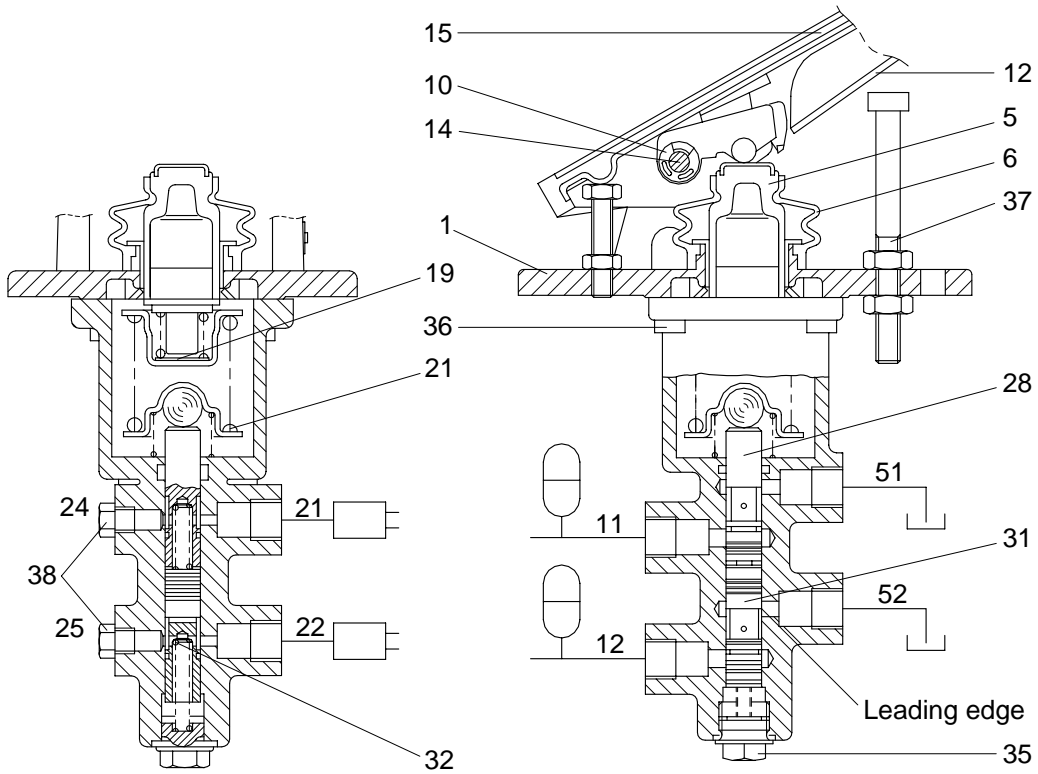


## GROUP 7 BRAKE PEDAL(VALVE)

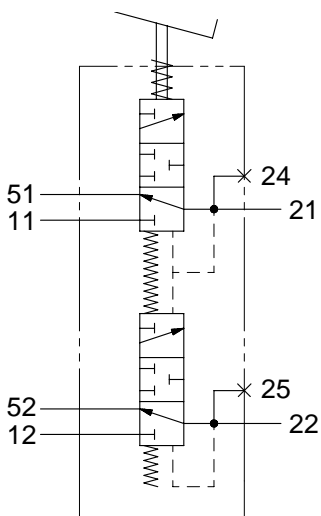
### 1. STRUCTURE

The casing(Spacer) has the oil inlet port A(Primary pressure), and the oil outlet port T(Tank). In addition the secondary pressure is taken out through ports 1, 2, 3 and 4 provided at the bottom face.



17032BV01(1)

- |    |               |    |                 |    |                   |
|----|---------------|----|-----------------|----|-------------------|
| 1  | Base plate    | 15 | Pedal cover     | 32 | Spring            |
| 5  | Piston        | 19 | Distance washer | 35 | Plug              |
| 6  | Bellows       | 21 | Spring set      | 36 | Screw             |
| 10 | Retainer ring | 28 | Upper spool     | 37 | Restriction screw |
| 12 | Pedal         | 31 | Lower spool     | 38 | Plug              |
| 14 | Pin           |    |                 |    |                   |



Hydraulic circuit

17032BV01(2)

Port	Port name	Port size
11	Port	M16 × 1.5
12	Port	M16 × 1.5
21	Brake cylinder port	M16 × 1.5
22	Brake cylinder port	M16 × 1.5
24	Plugging	M10 × 1.0
25	Plugging	M10 × 1.0
51	Drain port	M16 × 1.5
52	Drain port	M16 × 1.5

## **2. FUNCTION**

### **1) PURPOSE**

The purpose of the brake valve is to sensitively increase and decrease the braking pressure when the brake pedal is actuated.

### **2) READY POSITION**

When the braking system is ready for operation, its accumulator pressure acts directly on port 11/12 of the brake valve. A connection is established between ports 21/22 and port 51/52 so that the wheel brake ports 21/22 are pressureless via the returns ports 51/52.

### **3) PARTIAL BRAKING**

When the brake valve is actuated, an amount of hydraulic pressure is output as a ratio of the foot force applied.

The spring assembly(21) beneath base plate(1) is designed in such a way that the braking pressure changes depending on the angle. In the lower braking pressure range, the machine can be slowed sensitively.

When the braking process is commenced, the upper spool(28) is mechanically actuated via spring assembly(21), and the lower spool(31) is actuated hydraulically by spool(28). As spools(28 and 31) move downward, they will first close returns 51/52 via the control edges, thus establishing a connection between accumulator port 11/12 and ports 21/22 for the wheel brake cylinders. The foot force applied now determines the output braking pressure. The control spools(28 and 31) are held in the control position by the force applied(Spring assembly) above the spools and the hydraulic pressure below the spool(Balance of forces).

After output of the braking pressure, spools(28 and 31) are in a partial braking position, causing ports 11/12 and 51/52 to close and holding the pressure in ports 21/22.

### **4) FULL BRAKING POSITION**

When pedal(12) is fully actuated, an end position of the brakes is reached and a connection established between accumulator ports 11/12 and brake cylinder ports 21/22. Returns 51/52 are closed at this point.

When the braking process ended, a connection is once again established between brake cylinder ports 21/22 and return ports 51/52, closing accumulator ports 11/12.

The arrangement of spools in the valve ensures that even if one braking circuit fails the other remains fully operational. This is achieved by means of the mechanical actuation of both spools and requires slightly more pedal travel.

### **5) LIMITING THE BRAKING PRESSURE**

Pedal restriction screw(37) on base plate(1) below pedal(12) is used to limit the braking pressure.

### **6) FAILURE OF A CIRCUIT**

In the event of the lower circuit failing, the upper circuit will remain operational. Spring assembly (21) will mechanically actuate spool(28). In the event of the upper circuit failing, the lower circuit will remain operational since the lower spool(31) is mechanically actuated by spring assembly(21) and spool(28).

### **7) INSTALLATION REQUIREMENTS**

Return lines 51/52 must be connected directly to the tank.

The connecting lines must be installed in such a way as to permit proper bleeding.

## **8) MAINTENANCE OF THE BRAKE VALVE**

No special maintenance beyond the legal requirements is necessary.

When using high pressure cleaners on the machined, please make sure that the water jet is not aimed directly at the brake valve(to prevent damaging the bellows).

**For safety reasons the whole of the brake valve must be replaced if parts other than those listed above are damaged.**

## **9) REPAIR WORK**

**When working on the braking system, always make sure that there is absolutely no pressure in the system. Even when the engine is switched off there will be some residual pressure in the system.**

**When doing repair work, make sure your environment is very clean.**

**immediately close all open ports on the components and on pipes using plugs.**

## **10) REPLACING THE PEDAL COVER**

Pedal cover(15) is simply pulled off by hand. The new pedal covers is pushed over pedal(12) and tightened manually. Fasten the bellows with the strap retainers.

## **11) REPLACING THE COMPLETE ACTUATING MECHANISM**

Carefully clamp the unit vertically in a fixture. The actuating mechanism can be removed by taking out the four screws(36) below base plate(1). Make sure that spring assembly(21) does not fall out. When installing the new actuating mechanism, make sure that spring assembly(21) is fitted in the right order. Tighten the four screws(36).

## **12) REPLACING THE BELLOWS**

To change bellows(6) it is advisable to remove pedal(12). For this purpose, loosen retaining ring(10) and knock out pin(14) using a mandrill. When knocking out the pin, make sure that the mandrill is applied to the side of the pin without a knurl. Remove pedal(12) and bellows(6).

Now fit the new bellows(6) and proceed in reverse order as described above. The upper portion of bellows(6) is fastened to piston(5), its lower portion to base plate(1) secure the bellows using clamps.

## **13) REPLACING THE GROOVED RING**

Carefully clamp the unit vertically in a fixture. Unscrew screw plug(35) and pull spools(28 and 31) out downwards. Check the spools for damage. If they are found to be damaged, the whole brake valve needs to be replaced(Pairs of spools and housings are matched in manufacturing).

If the spools are not damaged in any way, remove the whole actuating mechanism as described above. Remove spring assembly(21) and grooved ring(27) and put in a new greased grooved ring with its lips pointing downwards. Install both the spring assembly as shown in the drawing, and the pedal. Put in spring(30), followed by spool(31), using a slight turning motion if possible.

Insert spring(32) and close the unit with screw plug(35).

Check return port 51/52 to see if there is a gap of approx. 2mm between the lower edge of the hole and the control edge of spool(28). If this is not the case, take out screw plug(35) once more and change the setting by removing or adding distance washers(19) in the upper spring plate. Replace the screw plug and once again check the distance between the lower edge of the hole at port 51/52 and the control edge of spool(28).