Spring-applied single-plate brakes for pneumatically

Series 0-450
Size 23 to 85
Edition 10.1988

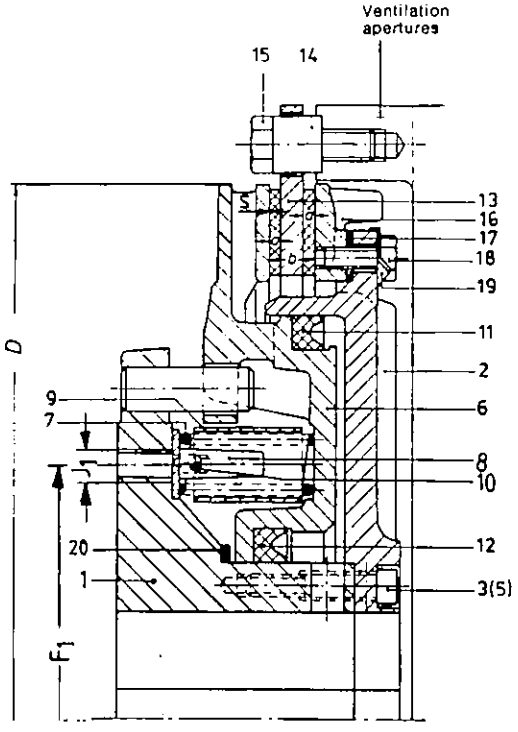

Fig. 1: Twelve point plate suspension

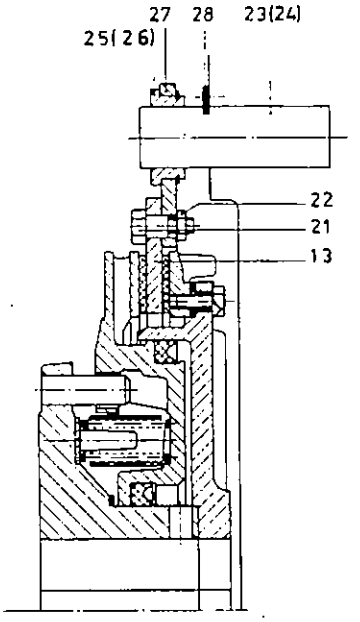

Fig. 2: Two point plate suspension

1. Function

This model can also be used as a single-plate spring-applied clutch. The plate (13) must be attatched to the m/c casing (or if used as a clutch to the flywheel). The piston (6) complete with centre plate moves axially on the hub (1), which is keyed to the shaft. The spring force, acting on the piston (6), gives rise to a frictional force between the plate (13) and the support plate (16). When compressed air is fed into the cylinder (working pressure 5,5 bar, max. pressure 6 bar), the piston moves, disengaging the brake. When the air is discharged to atmosphere via a valve, the brake engages once more.

2. Fitting

In order to avoid damage to the seals (11/12) the hub (1), cylinder (2), piston and centre plate (6) and support plate (16) are to be assembled to the shaft as a unit. The plate is split for easy fitting. When compressed air is fed into the cylinder, the centre plate moves axially enabling the friction plate halves (13) to be pushed into position. **Take care to keep the friction linings free from any lubricant.** The friction plate must be free to move axially in the released state. The tolerances for the plate suspension bolt holes given in the catalogue must be adhered to.
It is advisable to balance the unit dynamically at a speed in the region of the maximum speed. This should be carried out with the unit completely assembled on the shaft. All screws, bolts etc. must be tightened to the given torque (table 5). The hub and cylinder assembly is either to be keyed to the shaft (with two keys) or attatched by means of a proprietry locking assembly.

2.1 12-point plate suspension (fig. 1)

Apply compressed air to the brake a push the friction-plate halves (13) into position. Place the bushes (14) in the centring counterbore of the machine frame, and tighten the self-locking hex-headed screws (15) to the given torque MA (table 5). The plate halves are joined by straps to compensate for the centrifugal force when the unit is used as a clutch. The strap bolts are to be secured with Loctite 242.

2.2 2-point plate suspension (fig. 2)

The friction plate (13) is fitted with two trapezoidal lugs (27) (short or long type). Up to a size 50 unit, these are secured to the plate halves by hex-headed screws (21) and nuts (22), and positioned relative to the plate halves by expanding dowels. From size 61 upwards the lugs are secured by fitted bolts and hex-headed nuts (22). The plate is suspended on shoulder bolts (23/24), which are attatched to the machine frame. The bolts, one with a square end section (23) and the other with a cylindrical one (24) fit into corresponding bushes (25/26) in the lugs (27), and are secured axially by small retaining lugs (28). The two friction plate halves (13) are joined by straps, which compensate for the centrifugal force when the unit is used as a clutch. The strap bolts are to be secured with Loctite 242.

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Size	23	29	40	50	61	71	74	76	79	82	85
D	166	188	236	304	380	465	497	543	593	675	755
F1	67	91	113	142	178	220	235	255	280	315	345
J1	M6	M8	M8	M8	M8	M10	M12	M12	M12	M16	M16

3. Replacement of friction linings

The friction plate (13) is replaced by following the instructions given in 2.1 and 2.2 (above) in reverse order. From size 40 upwards, the friction segments are riveted to the plate halves, and can be replaced. In sizes 23 and 29 the segments are bonded to the plate halves, and the complete plate should be replaced.

4. Dismantling

Note: The cylinder (2) is under spring pressure. The dismantling should be carried out by an experienced engineer. For extraction from the shaft the hub (1) is provided up to size 40 (size 50 upwards 3x120°) with two tapped holes (dimensions F1, J1) on the hub side. If the clutch must be withdrawn from the cylinder side extraction holes are provided by removing two screws (3) at 180°. To dismantle the cluth, two of screws (3) at 180° are replaced by auxiliary screws of 15 mm extra length. Remaining screws (3) are succesively unscrewed until the cylinder (2) is resting on the auxiliary screws and then removed. The spring pressure is then released by unscrewing the auxiliary screws and the cylinder (2) and the piston (5) can be removed. Before reassembly in reverse order, all parts should be cleaned and sealing compound applied to the joint between hub (1) and cylinder (2). Use new screws (3) and tighten to correct torque MA according to table 5.

5. Replacement parts

When ordering replacement parts, apart from the part number and description, it is necessary to give the factory number which is stamped on the outside of the brake, or to send a sample of the part to be replaced. To avoid delivery of incorrect parts, please place all orders in writing or by telex.

6.Compensation for wear using shims in clutches with reduced cylinder volume and wear indicator.

Because the cylinder volume and plate wear influence the brake response time, the larger brakes can be supplied with a reduced piston stroke , which reduces cylinder volume and hence response time. This also reduces the permissible amount of plate wear, although this can be overcome by the use of compensating shims (fig. 3). When the plate wear reaches the value x mm (see fig. 3 table 2), the brake is released by the application of full air pressure, the screws (18) are loosened, the shims are removed, and re-inserted behind the support plate (16). The screws (18) are then re-thightened to torque MA and wired. The need for adjustment is indicated by the wear indicator, which is located in the cylinder wall.

This consists of an indicator pin (32) which moves in the quide-piece. The latter is counter-locked by the nut (33). The pin is sealed by an O-ring (34). The wear indicator should be first set when the plates are new. The brake is engaged, and the indicator pin (32) pushed firmly against the piston (6). The guide piece is screwed out until its edge protrudes by a distance x (table 2) over the indicator pin. The quide piece is then locked by the locking screw. The wear can now be checked by pushing the pin (32) in firmly and measuring the depth. When the pin comes flush with the quide piece, the wear must be compensated as described above. This process ensures an almost constant braking time, independant of brake wear.

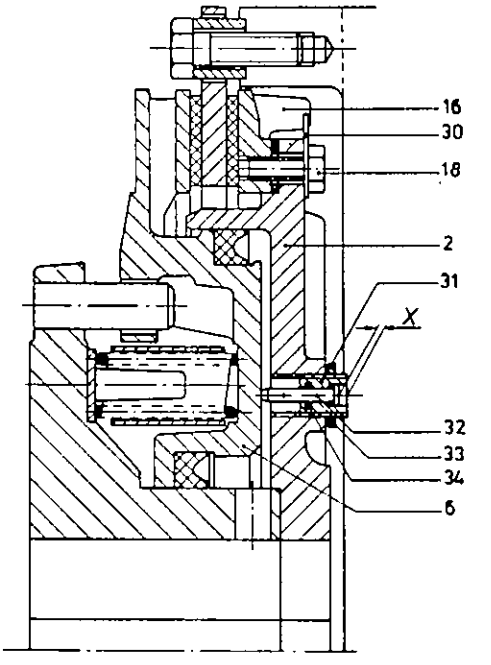


Fig. 3

Size	61	71	74	76	79	82	85
x mm	1,5	2	2	2,5	2,5	3	3

Table 2

7. Version with plate positioning springs

Positioning springs can be arranged on the friction plate of brakes used on high speed applications. The springs are guided by cups (35), and press the plate against the retaining washer (36) on the suspension screws (see figs. 4 and 5). Dimensions P and S must be kept within tolerances (see catalogue) to ensure correct plate positioning and even brake disengagement.

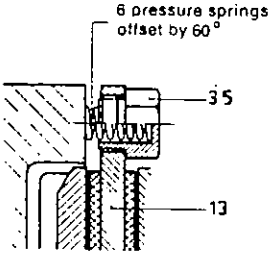
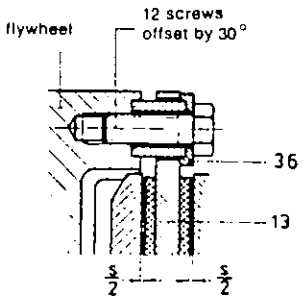


Fig. 4



Equal clearance!

Fig. 5

8. Accessories

8.1 Air supply

If no air supply is available, the required compressor size is determined by the air consumption of the brake. The cylinder volumes of the various brake sizes are given in table 3. To this, the volume of the supply line to the control valve must be added. The required volume flowrate of air can then be calculated from:

$Q = 1{,}5 \cdot V \cdot p \cdot z$ (litre/min)

V = volume of cylinder + supply line (litres)

p = max. working pressure (bar)

z = max. engagement frequency (min^{-1})

1,5 = assumed leakage factor, the actual leakage being a function of the working environment.

If more than one brake is in circuit, this must be taken into account.

Size	Cylinder capacity in litres (with new linings)
– 23	0,03
– 29	0,07
– 40	0,13
– 50	0,23
– 61	0,46
– 71	0,82
– 74	1,00
– 76	1,18
– 79	1,62
– 82	2,22
– 85	2,65

Table 3

8.2 Air inlets

Air inlets can be supplied for direct connection to 3-way solenoid valves (and press safety valves). The connection of the air inlet should be adequately sealed and well aligned, to ensure accurate performance and maximum life. Air supply lines must be connected to the rotating air inlet by at least 300 mm of flexible metal hose, to prevent excessive loads on the inlet bearing. Maximum operating pressure 6 bar. Maintenance: lubricate with 6-8 gram of grease approximately every 7000 hrs.

8.3 Air accumulator

In order to ensure a sufficiently constant supply pressure, particularly at high engagement frequencies, it is recommended that a pressure compensating tank (accumulator) is fitted just before the control valve.

Accumulator volume (V_{Dr}):

$$V_{Dr} = 15 \text{ to } 20 \cdot (V_{cyl} + V_L)$$

V_{cyl} = max. cylinder volume (table 3)

V_L = volume of supply line between valve and cluth/brake combined unit.

During engagement, the pressure in the supply line just before the brake should not fall below 90% of the working pressure. Min. operating pressure 5,5 bar. Max. operating pressure 6 bar.

Size	I/D of pipes and valves used in press manufacture
	1/4" *) — 1/2"
– 29	1/4" *) — 1/2"
– 40	1/2"
– 50	1/2"
– 61	3/4"
– 71	1"
– 74	1"
– 76	1"
– 79	1"
– 82	1 1/2"
– 85	1 1/2"

Table 4

*) Only at speeds exceeding 1500 min^{-1}

8.4 Air supply lines

For high frequency applications (eg. in presses), it is necessary to take the pipe dimensions given in table 4 as the minimum practical values.

Diagram of a compressed air system:

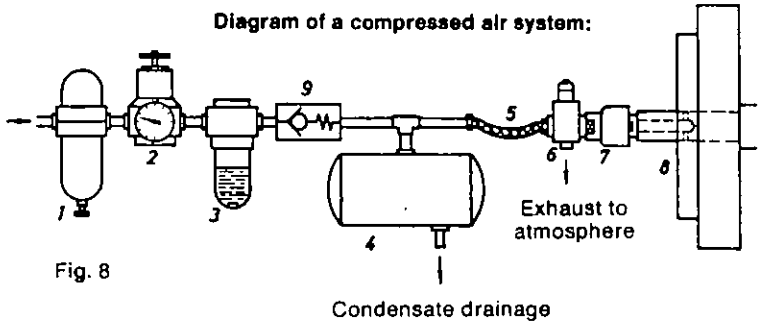


Fig. 8

1 = Compressed air filter
2 = Pressure reducing valve
3 = Lubricator
4 = Air accumulator
5 = Flexible metal hose
6 = Solenoid three-way valve
7 = Air inlet adaptor
8 = Clutch
9 = Non-return valve

Table 5 Part in drgs. 1 and 2	Size 23	29	40	50	61	71	74	76	79	82	85	Screw grade	secured by
1 Hub 2 Cylinder													
3 Screw M_A in Nm	8.5	8.5	14	35	35	69	69	120	120	190	295	12.9	Renew screw on re-assembly
5 Dowel 6 Piston 7 Spring 8 Spring retension plate 9 Spring cup 10 Expanding dowel 11 Seal 12 Seal 13 Plate 14 Cylindrical bush													
15 Hex. screw M_A in Nm	8.5	8.5	15	35	69	190	190	190	295	580	1000	10.9	Torque plus Loctite 262 or equivalent
16 Support plate 17 Insulating disc													
18 Hex. screw													Locking washer
19 Lockwasher 20 Spacer													
21 Hex. screw					Fitted bolt (10.9)							8.8	Torque plus Loctite
22 Hex. nut M_A in Nm	15	15	15	35	49	86	86	86	210	210	410	8	262 or equivalent
23 Bolt 24 Bolt 25 Shoulder bush 26 Shoulder bush 27 Lug 28 Retaining lug													
Air gap s new max. mm	1	1	1	1	1	1	1	1	1	1	1		Check every 3 months
Air gap s fully worn mm	3	3	3	3	4	5	5	6	6	7	7		
Plate thickness b new mm	7	9	11	12	15	20	22	23	25	29	32		
Plate thickness b fully worn mm	5	7	9	10	12	16	18	18	20	23	26		
Lining thickness a new mm	1.75	2.5	3	3.25	3.5	5	5.5	5.5	6	7	7.5		
Lining thickness a fully worn mm	0.75	1.5	2	2.25	2	3	3.5	3	3.5	4	4.5		
Plate wear max. mm	2	2	2	2	3	4	4	5	5	6	6		

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