

Pneumatically actuated single-plate clutch

Series 0-440
 Sizes 23 to 85
 Edition 09.1988

1. Operation

The clutch plate (11) is connected to the fly-wheel. The piston (5) moves axially on the internal hub (1) which is keyed to the shaft. The springs (6) are pressing the piston against the support bolts (15).

When compressed air (nominal operating pressure 5.5 bar; max. 6 bar) is fed into the cylinder (2), the piston moves against the spring pressure, thereby engaging the clutch. When the compressed air is discharged via a valve, the clutch disengages.

2. Installation

To avoid damaging the seals (9/10) the unit consisting of hub (1), cylinder (2), piston (5) and support bolts (15) should be fitted to the shaft in assembled state. The hub (1) with the cylinder is connected to the shaft with two keys or by means of a proprietary locking assembly.

The clutch plate (11) is split for easy fitting. Take care to keep the friction linings free from lubricants. Note: It is important that -when disengaged- the plates are free to move axially to avoid idling drag. The tolerances for the plate suspension bolt holes as stated in the catalogue must be adhered to.

All screws must be tightened to correct torque M_A according to table 4. We recommend that the unit is dynamically balanced at or near its maximum speed.

The air supply line should be kept short and the valve fitted as close to the clutch as possible in order to achieve short response times. If possible it is recommended to fit the valve directly to the rotating air inlet.

2.1 Twelve point plate suspension (Fig. 1)

Discharge the compressed air. Place the plate (11) in position and insert all 12 bushes (12) in the centring counterbore of the flywheel. Place the screws (14) and tighten them to correct torque M_A according to table 4. The clutch plate halves (11) are connected by straps to compensate for the centrifugal force. The strapping screws must be secured with Loctite 242 or equivalent.

2.2 Two point plate suspension (Fig. 2)

The plate (11) is connected by two lugs (20) -short or long type- up to size 50 the lugs are secured to the plate by hexagon screws (24) and hexagon nuts (25) as well as expanding dowels. From size 61 upwards the lugs are secured by fitted bolts (24) and hexagon nuts (25).

The plate with the lugs (20) is suspended on shoulder bushes (22/23), guided by a square (18) and a round (17) pin, which are fixed to flywheel respectively and secured by keys (30).

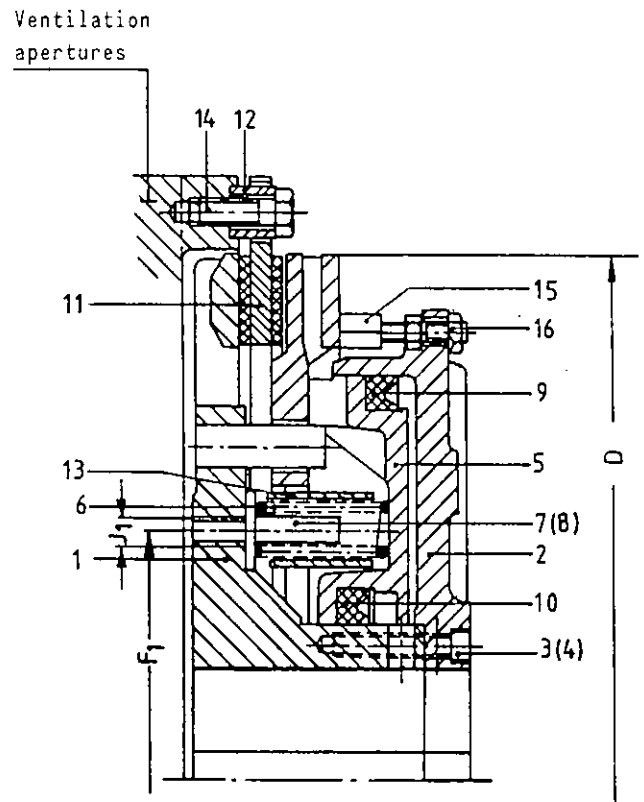


Fig. 1: Twelve point plate suspension

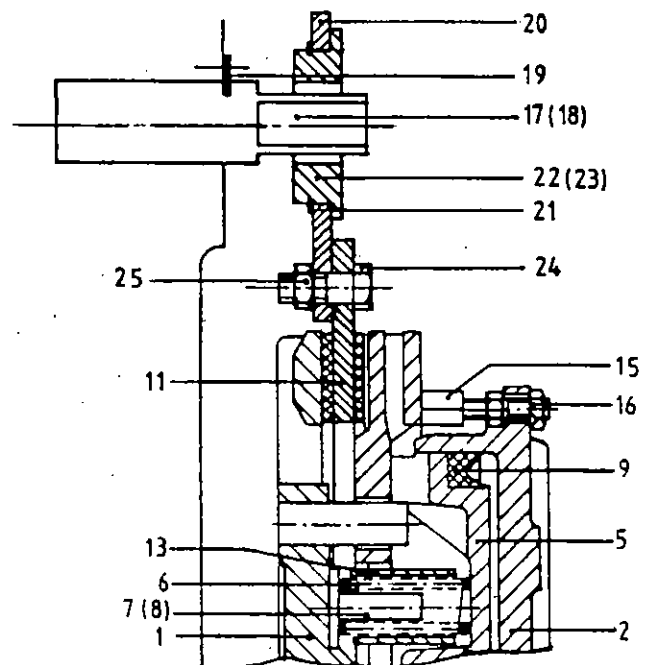


Fig. 2: Two point plate suspension

3. Replacement of friction linings

Remove the plate (11) in reverse order of installation as described in 2.1 and 2.2. On clutch size 23 to 79, the friction segments are bonded to the plate (11). These plate must be renewed complete and the complete plate must be renewed. On clutch size 82 upwards, the segments are replaced by rivetting new segments to the plate.

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 $3 \times 120^\circ$) with two tapped holes (dimensions F1 and 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 clutch, two of screws (3) at 180° are replaced by auxiliary screws of 15 mm extra length. Remaining screws (3) are successively 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 re-assembly 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 M_A according to table 4.

5. Spare parts

When ordering spare parts it is necessary, in addition to description and part number, to state the factory number which is stamped on the clutch. To avoid delivery of wrong parts, always place orders writing or by telex.

6. Special features

6.1 Plate positioning springs (Fig. 3 and 4)

Special positioning springs can be fitted to the clutch plate of units with twelve point suspension, used on high speed shafts. By centring the plate between the two adjacent friction surfaces the springs eliminate drag and unnecessary heat generation. Dimensions O, P and S (see catalogue) must be accurately maintained.

6.2 Cooling fins (size 71 and above)

In case of extreme thermal loading on the clutch cooling fins (fig. 5), which cause additional force cooling of the clutch and achieve an approx. 30% higher hourly thermal loadability than normal, can be fitted to the clutch plate.

6.3 Damping bolts

Resonance at certain critical speeds can sometimes cause noisy running of a disengaged clutch. This can be eliminated by fitting two spring loaded damping bolts in place of two of the standard fixing bolts (see fig. 6). These should be displaced at 120° and can be fitted to new or existing installations.

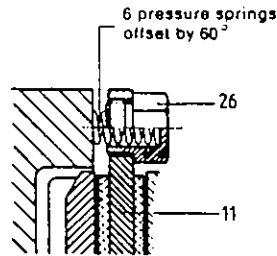


Fig. 3

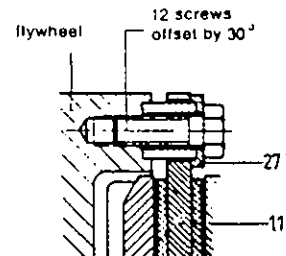


Fig. 4

Equal clearance!

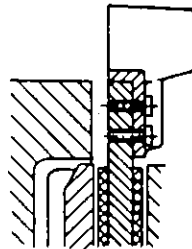


Fig. 5

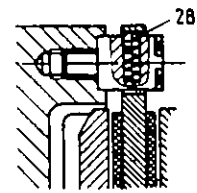


Fig. 6

7. Accessoires -

7.1 Air supply

In mobile applications or if no central air supply is available the size of the compressor is decided by the air consumption of the clutch. Table 2 gives the cylinder volume of the different size. The volume of the supply line between the clutch and the control valve must be added. The required amount of free air can be cal-

Table 1

Size	23	29	40	50	61	71	74	76	79	82	85
D	166	188	236	304	380	465	497	543	593	675	755
F ₁	67	91	113	142	178	220	235	255	280	315	345
J ₁	M6	M8	M8	M8	M8	M10	M12	M12	M12	M16	M16

culated as follows:

$Q = 1.5 \cdot V \cdot p \cdot z$ = compressor capacity at atmospheric pressure in l/min.

V = volume of cylinder and connection pipe in l.

p = operating pressure in bar.

z = max. number of engagements per minute.

1.5 = leakage factor, depending on operating conditions.

If more than one clutch is incorporated into the supply line, this must be taken into account in the above calculations.

Note: use filtered air only.

Size	Cylinder capacity in litres	
	Minimum (with new linings)	Maximum (with worn linings)
- 23	0.03	0.05
- 29	0.07	0.10
- 40	0.13	0.17
- 50	0.23	0.29
- 61	0.46	0.61
- 71	0.82	1.15
- 74	1.00	1.37
- 76	1.18	1.71
- 79	1.62	2.31
- 82	2.22	3.21
- 85	2.65	3.85

Table 2

7.2 Rotating air inlets

Air inlets for direct connection to solenoid valves and safety valves can be supplied. The connection of the air inlet to the shaft should be adequately sealed and well aligned. Accurate performance and long life can only be warranted if the inner part is running true with the shaft. Air supply pipes must be connected to the air inlet by a flexible hose of at least 300 mm length to prevent excessive load on the bearing.

Maintenance: Lubricate with 6-8 grams of grease at intervals of approx. 7000 hours.

7.3 Air accumulator

Especially with high engagement figures, i.e. eccentric presses or similar, it is recommended to use a pressure compensating tank (accumulator) of suitable size in order to avoid a drop in pressure during engagement. The connecting pipeline should be kept as short as possible. A pressure switch can be incorporated to prevent engagement at too low a pressure which might cause the clutch to slip. Accumulator volume (V_{Dr}):

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

V_{cyl} = max. cylinder volume (table 2)

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

During engagement the pressure in the supply line just before the clutch should not fall below 90% or normal value.

Min. operating pressure 5.5 bar.

Max. operating pressure 6 bar.

7.4 Pipelines

To achieve accurate performance in rapidly working presses etc. it is necessary to use min. pipe dimension as listed in table 3. The lubricator (part 3, fig. 7) must be set to give an oil feed rate of 1 to 3 drops per m³ of air.

Size	I/D of pipes and valves used in press manufacture
- 23	G 1/4" - G 1/2"
- 29	G 1/4" - G 1/2"
- 40	G 1/2"
- 50	G 1/2"
- 61	G 3/4"
- 71	G 1"
- 74	G 1"
- 76	G 1"
- 79	G 1"
- 82	G 1 1/2"
- 85	G 1 1/2"

Table 3

*) Only at speeds exceeding 1500 min⁻¹

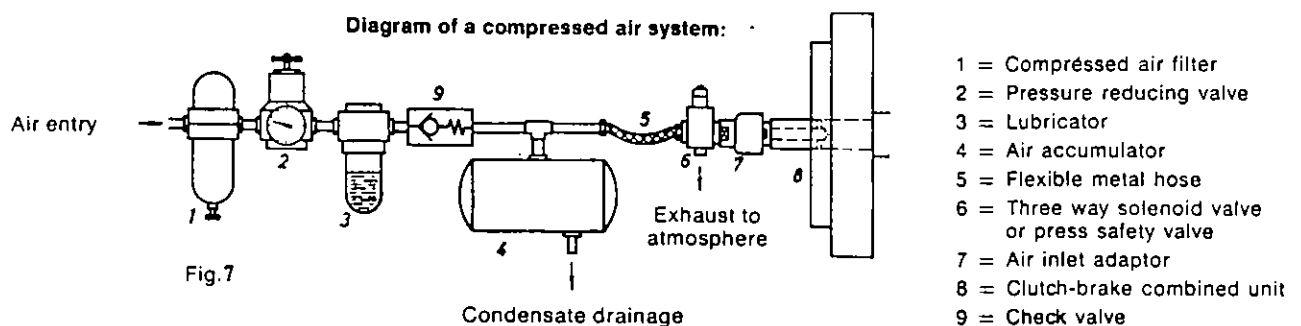


Table 4 Part no. according to fig. 1 and fig. 2	M _A in Nm	Clutch size												Screw grade	Secured by	
		23	29	40	50	61	71	74	76	79	82	85				
		Fitted bolt (10.9) from size 61 upwards														
1 Hub																
2 Cylinder																
3 Screw	8.5	8,5	14	35	35	69	69	120	120	190	190	295	580	1000	12.9	Replace screws on re-assembly
4 Dowel																
5 Piston																
6 Pressure spring																
7 Spring retension plate																
8 Expanding dowel																
9 U-seal																
10 U-seal																
11 Plate																
12 Cylindrical bush																
13 Tubular spring cover																
14 Hexagon screw	8.5	8,5	15	35	69	190	190	190	190	295	580	1000	10.9	Torque plus Loctite 262 or equivalent		
15 Support bolt																
16 Hexagon nut																Locking washer
17 Round section pin																
18 Square section pin																
19 Key																
20 Lug																
21 Circlip																
22 Shoulder bush																
23 Shoulder bush																
24 Hexagon screw															8.8	Torque plus Loctite 262 or equivalent
25 Hexagon nut	M _A in Nm	15	15	15	35	49	86	86	86	210	210	410	8			
Air gap s	new max mm	0.7	0.7	0.8	0.9	1	1.1	1.1	1.1	1.2	1.2	1.4	1.5			
	fully worn mm	4.7	4.7	4.8	4.9	7	9.1	9.1	9.1	11.2	11.2	13.4	13.5			
Plate	new mm	7	9	11	12	15	20	22	23	25	29	32				
thickness b	fully worn mm	5	7	9	10	12	16	18	18	20	23	26				
Lining	new mm	1.75	2.5	3	3.25	3.5	5	5.5	5.5	6	7	7.5				
thickness a	fully worn mm	0.75	1.5	2	2.25	2	3	3.5	3	3.5	4	4.5				
Wear per plate	mm	2	2	2	2	3	4	4	4	5	6	6		Check every 3 months		

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