Ortlinghaus-Werke GmbH D-5632 Wermelskirchen	**Installation and Maintenance Instructions** for pneumatically actuated single-plate clutch/brake combined units	Instruction No. 421 Series 0-400- Size 91/92/93

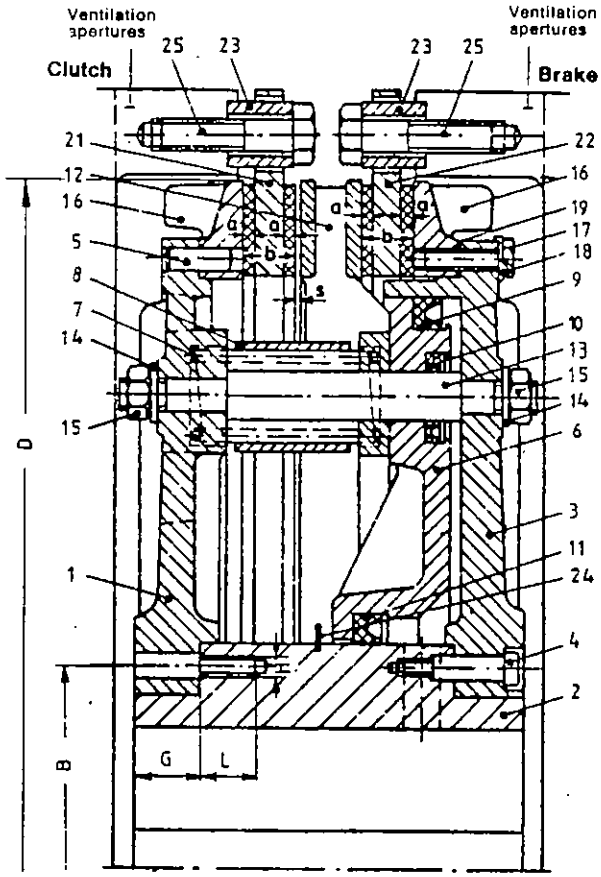


Fig. 1: Twelve point plate suspension

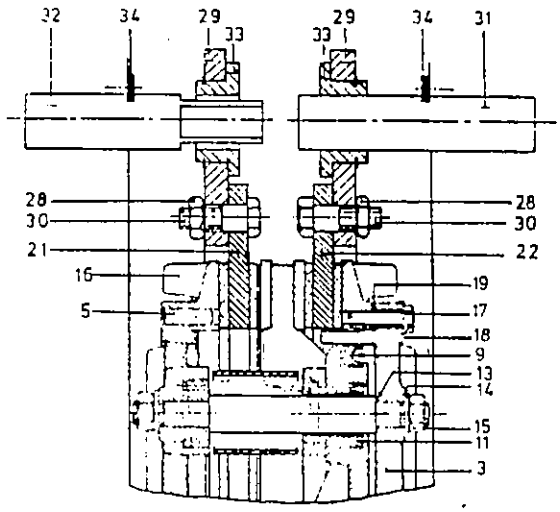


Fig. 2: Two point plate suspension

1. Operation

The clutch plate (21) is connected to the flywheel and the brake plate (22) is connected to the machine frame. The piston (6) and the centre plate (12) move axially on the hub (2) which is keyed to the shaft. The centre plate is subjected to spring pressure, engaging the brake plate (22) by friction against the support plate (16).
When compressed air (nominal operating pressure 5,5 bar, max. 6 bar) is fed into the cylinder (3), the piston (6) moves against the spring pressure, thereby releasing the brake and engaging the clutch. When the compressed air is discharged via a valve, the clutch disengages and the brake is engaged by the springs.

2. Installation

To avoid damaging the U-seals (9, 10 and 11), the unit consisting of counterplate (1), hub (2), cylinder (3), piston (6), centre plate (12) and support plate (16), should be fitted to the shaft in assembled state. Clutch and brake plates are split for easy fitting. By feeding compressed air into the cylinder the centre plate moves and creates clearance for the fitting of the brake plate. When the air is discharged, sufficient clearance is produced for fitting of the clutch plate.
Take care to keep the friction linings free of 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 5.
The hub (2) is connected to the shaft with two keys or by means of a proprietary locking assembly.
If the unit is used at or near its maximum speed, we recommend that it is balanced.
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)
Series 0-400-.49
a) Brake plate (22):
Apply compressed air to the cylinder and place the plate halves (22) in position. Position the bushes (23) in the centring counterbore of the machine frame and tighten the self-locking hexagon screws (25) to the correct torque M_A according to table 5. In order to allow access to and removal of the hex. screws (25) in the clutch plate, two cut-outs are provided in the brake plate (22) at 180° to each other.

b) Clutch plate (21):
Discharge the compressed air and turn the flywheel until a counterbore is opposite the chamfer on the brake plate. Place the plate halves (21) in position and insert all 12 bushes (23) and screws (25) opposite the chamfer by turning the flywheel 30° for each. Tighten the screws to the correct torque M_A according to table 5. The clutch plate halves (21) 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)
Series 0-400-.47 with non-coaxial pins
Series 0-400-.48 with coaxial pins
The plates (21/22) are connected by two trapezoidal lugs (29), secured to the plates with fitted bolts (30) and hexagon nuts (28). Each plate is suspended by the lugs on shoulder bushes (33), guided by a square (32) and a round (31) pin, which are fixed to flywheel and frame respectively and secured by keys (34).

2.3 Combined suspension
Series 0-400-.43
Twelve point suspension of clutch plate and two point suspension of brake plate (short lugs).

Series 0-400-.44
Twelve point suspension of clutch plate and two point suspension of brake plate (long lugs).

Installation according to relevant parts of 2.1 and 2.2.

3. Replacement of friction linings

The plates (21/22) are removed in reverse order of installation as described in 2.1 and 2.2. Worn friction linings are removed and new linings attached by tubular copper rivets.

4. Dismantling Note: The cylinder (3) is under spring pressure.

The dismantling should be carried out by an experienced engineer. If this is not possible to arrange, proceed as follows.For removal of the unit from the shaft, two tapped holes (Dimensions B, H, L and G) are provided on either side of the clutch hub (2).
The unit is dismantled from the clutch or brake side by means of two studs of approx. 300 mm length, firmly tightened in the extraction holes. A steel cross-bar with holes diameter H at centre distance B is placed over the studs and clamped lightly with the stud nuts. Remove the fitted bolts (4) and the hexagon nuts (15) and release the springs (7) by unscrewing the stud nuts. After removing the studs the unit can be dismantled.
Before re-assembly in reverse order, all parts should be cleaned and sealing compound applied to the joint between the hub (2) and cylinder (3). Use a new set of fitted bolts (4) and tighten to correct torque according to table 5.

Size	91	92	93
D	905	1015	1140
B	265	290	325
H	M20	M24	M24
L	40	50	50
G	46	52	58

Table 1

5. Spare parts

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

6. Special versions

6.1 with reduced cylinder volume and wear indicator.
The response of the clutch/brake unit is heavily influenced by the cylinder volume and by friction lining wear lengthening the stroke. To overcome this we can supply clutch-brake combined units with a reduced cylinder volume. This, however, also reduces the maximum wear obtainable from the linings.
To overcome this problem, wear compensating shims are fitted in conjunction with a wear indicator (see fig. 3). The wear indicator is set at zero wear before the unit leaves the factory. As the linings reach max. wear condition the indicator pin (37) will lie flush with the outside edge of the threaded ring (36). The brake must then be released, and the screws (17) unscrewed. The shims (35) can then be removed and re-inserted between support plate (16) and cylinder (3).
Screws (17) are then tightened to correct torque M_A (table 5) and secured by wiring them in pairs. Each time wear compensation or lining renewal is carried out the wear indicator must be re-set as follows.
Engage the brake. Press the indicator pin (37) firmly against the piston (6). Screw in the threaded ring (36) until the gap between the top of the pin (37) and the outside edge of the ring (37) is Xmm (see table 2). Tighten the locknut (38).

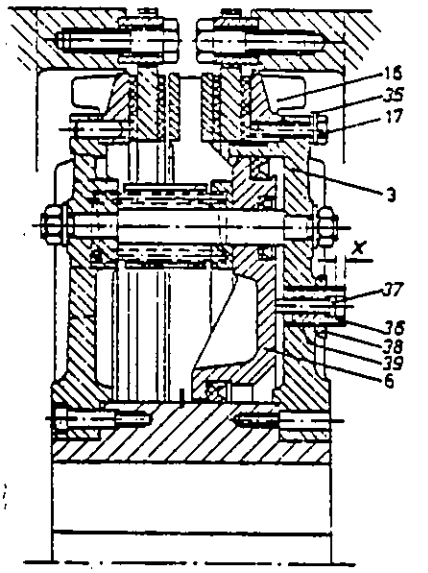


Fig. 3

Size	91	92	93
X mm	3,5	4	4

Table 2

6.2 with separating springs
On clutches with 12-point suspension, to eliminate unnecessary drag a series of six compression springs may be fitted to the clutch and brake unit. The springs are guided in cups (40) and press the plate (21) against the retaining washer (41). To ensure drag-free idling, check that the plate moves evenly. Dimensions O, P and S in the catalogue must be kept within close tolerance.

6.3 with cooling fins
In cases where the unit is subject to extreme thermal loading, cooling fins are attached to the clutch plate to give a forced convection cooling effect.

6.4 with damping bolts
When the brake is engaged and the clutch idling, an irritating rattle is sometimes apparent from the clutch plate. This is caused by externally sourced vibrations or running at critical speeds and the play in the clutch plate suspension. To eliminate the play, two suspension screws offset by 120° are replaced by damping bolts with a sprung steel ball (42). Existing units can be converted to this system.

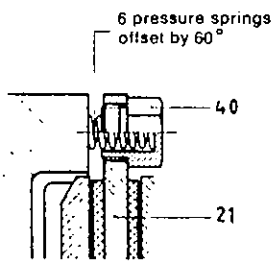
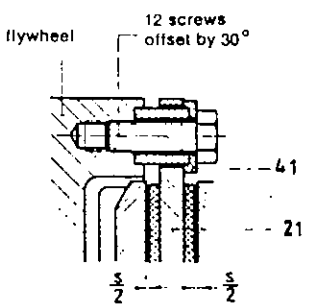


Fig. 4



Equal clearance!

Fig. 5

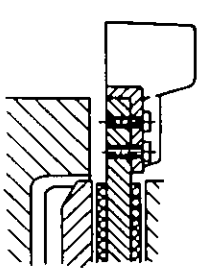


Fig. 6

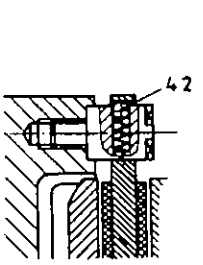


Fig. 7

7. Accessories

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 3 gives the cylinder volume of the different sizes. The volume of the supply line between the clutch and the control valve must be added. The required amount of free air can be calculated as follows:

Size	Cylinder capacity in litres	
	Minimum (with new linings)	Maximum (with worn linings)
91	4,94	7,55
92	6,60	10,35
93	8,35	13,04

Table 3

$Q = 1,5 \cdot V \cdot p \cdot z$ = compressor capacity at atmospheric pressure in l/min.
V = volume of cylinder and connection pipe in l.
p = working pressure in bar.
z = max. number of engagements per minute.
1,5 = leakage factor, depending on operating conditions.
If more than one unit is incorporated this mut be taken into account.
Important! Air must be filtered.

7.2 Rotating air inlets

Air inlets can be supplied for direct connection to solenoid valves and safety valves. The connection of the air inlet to the shaft should be adequately sealed and well aligned. Accurate performance and long life can only be guaranteed 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.

Size	I/D of pipes and valves used in press manufacture.
91	2"
92	2"
93	2"

Table 4

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

7.3 Air accumulator

When the engagement frequency is high,it is recommended that an accumulator is provided just before the valve to ensure that there is sufficiente air available for each engagement process. Accumulator volume:

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

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

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

In order to be able to check the opereting pressure, it is of advantage to fit a pressure gauge. If the pressure is too low, the cluth can slip and fail as the result of overheating or wear. When the cluth is being engaged, the air pressure meesured directly before the unit should not fall below 90% of the operating pressure. Operating pressure 5.5 bar. Max. permissible operating pressure 6 bar.

7.4 Air supply system

To achieve precise performance in rapidly working presses, it is necessary to use pipes of at least the dimensions listed in table 4. The oiler (3, fig.8) must be set in such a way that the oil feed rate lies between 1 and max. 3 drops per m^3 air.

Diagram of a compressed air system:

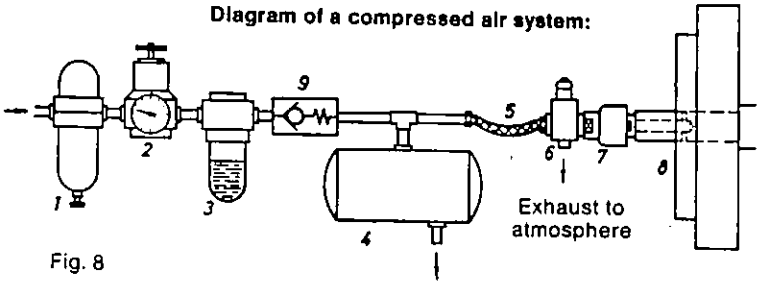


Fig. 8

1 = Compressed air filter
2 = Pressure reducing valve
3 = Lubricator
4 = Air accumulator
5 = Flexible metal hose
6 = Three way solenoid valve or press safety valve
7 = Air inlet adaptor
8 = Clutch-brake combined unit
9 = Check valve

Table 5 Part No. according to Fig.1 and Fig. 2		Size of unit			Screw grade	Secured by
		91	92	93		
1 Counterplate 2 Hub 3 Cylinder						
4 Fitted bolt	M_A in Nm	90	225	225	12.9	Pre - tension
5 Dowel 6 Piston 7 Pressure spring 8 Tubular spring cover 9 U-seal 10 U-seal 11 U-seal 12 Centre plate 13 Bolt 14 Washer						
15 Hexagon nut	M_A in Nm	440	530	700	8	Selflocking steel nut
16 Support plate						
17 Hexagon screw	M_A in Nm	210	210	410	10.9	Lockwasher
18 Locking washer 19 Insulating washer 20 21 Clutch plate 22 Brake plate 23 Cylindrical bush 24 Circlip						Hex. screws pos. 25 are selflocking when properly tightened but should be secured with Loctite after repeated removal. Use Loctite 242 or equivalent up to M 16 and grade 270 for larger screws.
25 Hexagon screw	M_A in Nm	1000	1500	2000	10.9	
26 27 Rapid discharge valve						
28 Hexagon nut	M_A in Nm	710	710	1450	8	Secure with Loctite 270 or equivalent on assembly
29 Lug 30 Fitted bolt 31 Suspension pin 32 Suspension pin 33 Shoulder bush 34 Key						
Air gap s	new max mm	1,7	1,8	2		Check every 3 months
	fully worn mm	15,7	17,8	18		
Plate thickness b	new mm	35	40	45		
	fully worn mm	28	32	37		
Lining thickness a	new mm	8	10	11		
	fully worn mm	4,5	6	7		
Wear per plate max.	mm	7	8	8		

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