OPERATION AND MAINTENANCE MANUAL

AIR ACTUATED CLUTCH – BRAKE UNITS

SERIES HT

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(18 pages)

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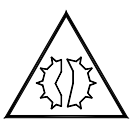
1 – Symbols

This symbol placed beside a box indicates the description of an operation or an operating condition involving the risk of an accident hazards.



This symbol placed besides a box indicates the description of an operation or an operating condition involving the risk of damaging the clutch-brake unit.

2 – Assembly drawings

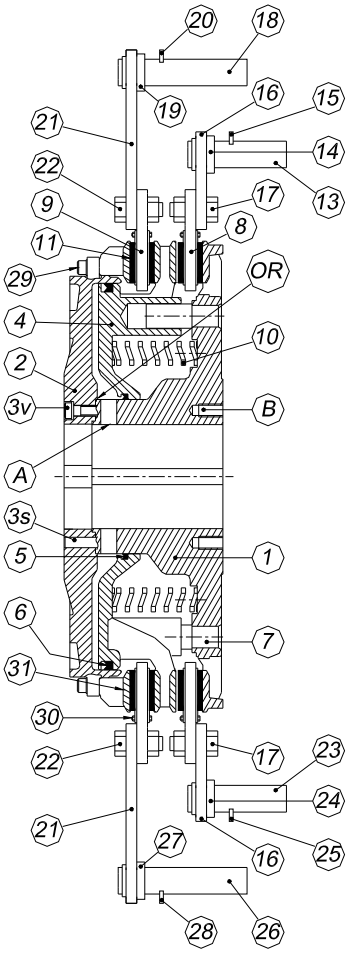


Fig.1a - C/B unit with pins Lining stuck on screwed pads

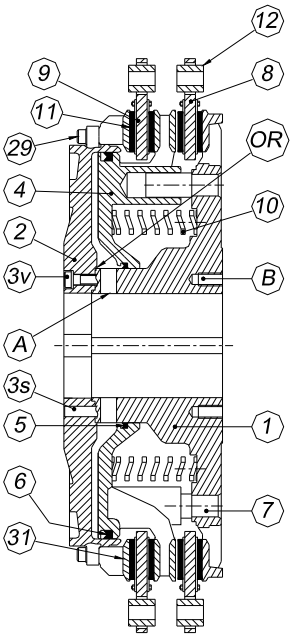


Fig. 1b - C/B unit with bushings. Lining stuck on screwed pads

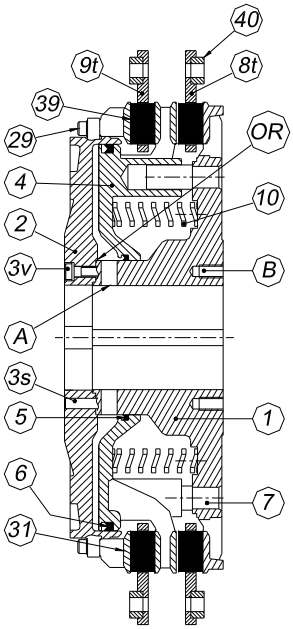


Fig. 1c – C/B unit with bushings. Floating friction blocks.

A) air inlet holes
B) extraction holes
1) hub
2) cylinder disc
3v) hub – cylinder disc pins
3s) hub – cylinder disc pins
4) central piston
5) internal seal
6) external seal
7) pins
8L)clutch disc for friction pads
8t)clutch disc for friction blocks
9) brake disc for friction pads
9t) brake disc for friction blocks
10) springs, spring-holders, -guides
11) friction pads
12) bushings
13) clutch square pin
14) clutch square clamp
15) clutch pin keep plate
16) clutch ears
17) clutch ear screws and nuts
18) brake square pin
19) brake square clamp
20) brake pin keep plate
21) brake ear
22) brake ear screws and nuts
23) clutch round pin
24) clutch round clamp
25) clutch pin keep plate
26) brake round pin
27) brake round clamp
28) brake pin keep plate
29) brake track screws
30) screws and nuts for frict. pads
31) brake track
39) friction blocks
40) bushings for block rings
OR) O-RING SEAL

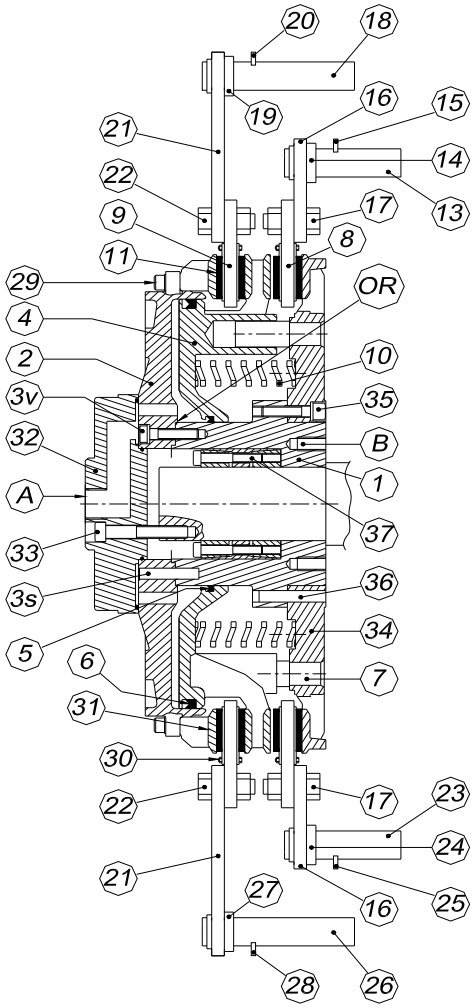


Fig. 1d - C/B unit with pins, Internal shrink disc and flange

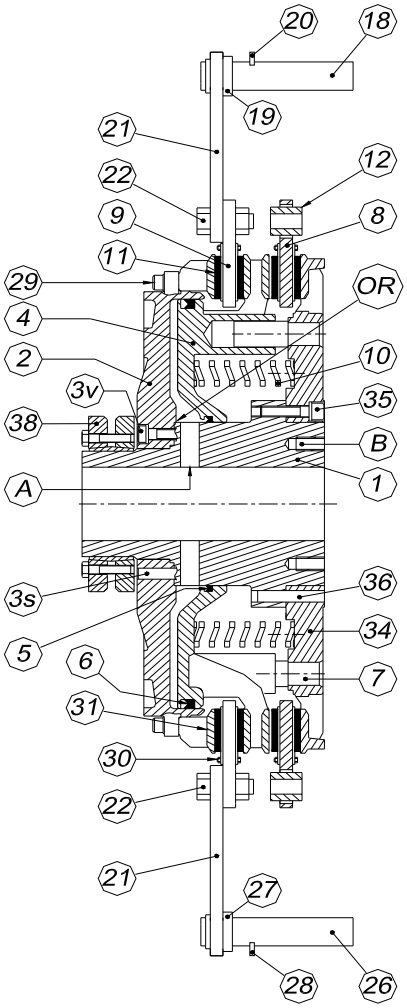


Fig. 1e - C/B unit with external shrink disc, bushings and pins

A) air inlet holes
B) extraction holes
1) hub
2) cylinder disc
3v) hub – cylinder disc pins
3s) hub – cylinder disc pins
4) central piston 1
5) internal seal
6) external seal
7) pins
8L) clutch disc for friction pads
9t) brake disc for friction pads
10) springs, spring-holders, -guides
11) friction pads
12) bushings
13) clutch square pin
14) clutch square clamp
15) clutch pin keep plate
16) clutch ears
17) clutch ear screws and nuts
18) brake square pin
19) brake square clamp
20) brake pin keep plate
21) brake ear
22) brake ear screws and nuts
23) clutch round pin
24) clutch round clamp
25) clutch pin keep plate
26) brake round pin
27) brake round clamp
28) brake pin keep plate
29) brake track screws
30) screws and nuts for frict.pads
31) brake track
32) air inlet flange
33) flange fixing screws
34) hub disc
35) hub – hub disc screws
36) hub – hub disc pins
37) internal shrink disc
38) external shrink disc
OR) o-ting seal

Note: the internal shrink disc (37) or the external disc (38) are not supplied.

3 – Operation

The function of air actuated brake-clutch unit series HT Is to start big inertial masses, transmitting high torques and to brake them, and standing the strong heat generated in the whole cycle.
They are therefore suitable to actuate mechanical presses, shears and punching machines.
As a rule the clutch disc turns integrally with the source of torque (for instance a flywheel), while the brake disc cannot turn since it is connected to the machine frame.
The unit is keyed on the driven shaft transmitting the motion to the machine members.

Braking – (figures 1a, 1b, 1c, 1d and 1e): the springs (10) push the piston (4) thus closing the brake disc (9) against the brake track (31). The dynamic friction produced on the brake disc lining brings about the torque braking the driven shaft.

Engagement – (figure 1a, 1b, 1c, 1d and 1e): the compressed air inserted through hole (A) overcomes the strength of springs and moves the piston (4) thus freeing the brake disc (9) and pushing then the clutch disc (8) against the hub disc (1) or (34).

The regular operating pressure is 5.5 bar.
The maximum allowed pressure is 6 bar.
Using higher pressures may cause the breaking of the cylinder disc.

Do not use pressures below 5 bar unless specific agreements are made with our engineering department

Use air dried, filtered and oiled by means of a filter-lubricator unit introducing 1 to 3 drops of oil every one cubic meter (35 cubic feet) of air.

4 – Supply

4.1 - Mounting styles

The connection of discs to the machine can be done in three ways:

1) by suspending them on screwed bushings (the ring is free to slide – fig. 1b)
2) by suspending them on two points by means of pins (the ring is still free to slide – fig.1a)
3) by clamping them on bushings by means of screws (ring locked in place – fig. 1c)

These ways can be combined with each other between the brake and the clutch side.

The clutch-brake unit comes already fully assembled and equipped with the bushings and/or pins required for mounting the unit.
Several centre-to-centre dimensions are available for mounting with pins.
The unit in its standard version is keyed on the shaft by means of keys, which are not supplied, complying with UNI specifications; while for versions with steel-insert hub, this is done by means of an internal (fig. 1d) or external (fig. 1e) shrink disc, which is not supplied.
The actuating air can be admitted through two transversal holes in the keying hole or by me\ans of a special air inlet flange on the brake side.
The friction material may be stuck on the pads to be screwed to the discs or have the shape of blocks to be inserted in through special slots on the discs.
Upon request, we can supply special clutch-brake units and the mounting fittings.

The friction lining on brake disc and clutch disc must be protected against lubricants and excessive moisture

4.2 - OMPI coding system

for instance: HT0770-BXLF1

- The first six characters define the series and the nominal transmissible friction torque in Kgm and therefore define unit model and size.
- The seventh position define a normal group, the steel hub or the shrink disc
- The five characters after the hyphen define the following features:

Ref.: for the centre-to-centre distances see the Clutch-Brake Series HT Catalogue

Position - Feature	Example	Possible alternatives
1st character Type and centre-to-centre distance of clutch disc connections	B bushings	B - bushings with 'Q' centre-to-centre distance X - pins with 'X' centre-to-centre distance 1 - pins with 'XX' centre-to-centre distance 0 - "brake-only" version
2nd character Type and centre-to-centre distance of brake disc connections	X Pins with 'X' centre-to-centre distance	B - bushings with 'Q' centre-to-centre distance X - pins with 'X' centre-to-centre distance 1 - pins with 'XX' centre-to-centre distance 0 - "clutch-only" version
3rd character Mounting style of friction material	L Mounted on friction pads	L - on friction pads T - friction blocks (see note)
4th character Air inlet flange	F With standard flange	0 - not fitted F - standard flange
5th character number of springs	1 max. number	1 - max. number 3 - minus three spring 6 - minus six springs 9 - minus nine springs 2 - minus twelve springs

Note: In versions with block friction material, the first and the second character can only be B or 0

4.3 – Transport

Lift the unit by supporting the body casting.
Do not hook to the discs

4.4. Spare parts

The warranty on our products will apply only if original OMPI spare parts are used.
The body casting carries the serial number.
Kindly quote in all your orders this number made up of 12 characters.

5 – Installation and operation

5.1 - Notes and warnings for mounting the unit on the machine.

- Apply strong thread-locking Loctite on all the screws for the assembly to the machine that are not self-locking type.
- All the screws for mounting on the machine must be tightened with a dynamometric spanner with the torque value as prescribed by the rules of the strength class the screws belong to.
- The connecting pins, if any, of discs must be housed in the relevant holes and fixed with their own plates.
- The pin with square end must be so positioned that it does not hinder possible thermal expansions in radial direction.
- Key the brake-clutch unit to the shaft by means of keys or shrink disc.
- If required, support the half-rings of the brake disc to prevent it from dropping during brake disengagement.

5.2 – Feed and lubrication

The clutch-brake unit must be fed through a pneumatic supply system similar to the one shown in fig.2.

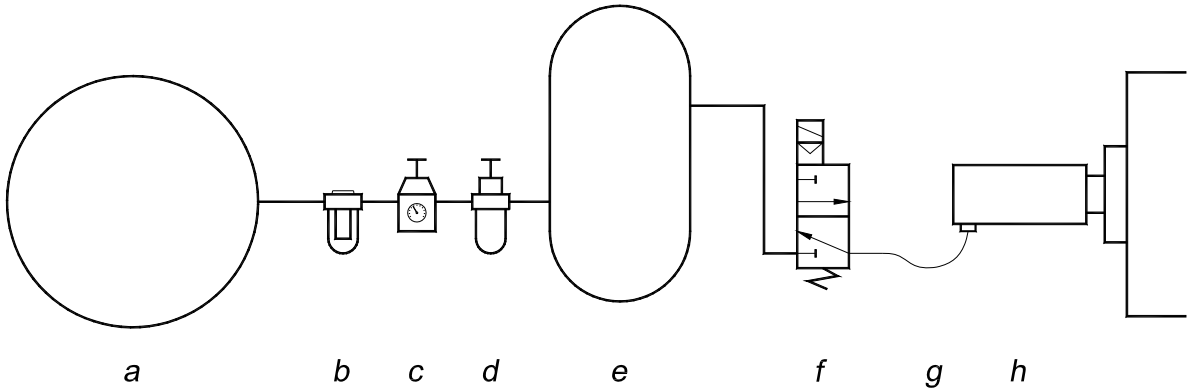


Fig.2

a) compressor b) air filter
c) pressure reducer c) lubricator
e) accumulator f) solenoid valve
g) flexible hose h) rotating joint

The compressor and the accumulator should be an adequate size as to enable the delivery of the proper quantity of air at the required pressure and for the number of required engagements.
The operating pressure should range from 5.5 to 6 bar.
In order to reduce the reaction time during the engagement and braking phases, it is recommended that the solenoid valve be installed as close to the unit as possible.
A lubricator is mandatory.
Use lubricants with a kinematic viscosity ranging from 20 to 40 mm^2/s (1 mm^2/s = 1 cSt), for instance Shell Tellus Oil 123, 127 or 133.
Adjust the lubricator to supply 1 to 3 drops every one cubic meter (35 cubic feet) of air.

5.3 – Warnings and precautions in operation

In case of high rotation speeds of the unit, carry out the balancing of the unit. From time to time check for wear of the friction material.
Protect the friction material from moisture or lubricants.
Ensure adequate ventilation to prevent overheating.
The heating of brake-clutch unit depends on rotation speed, masses to be moved, number of engagements and unit ventilation; do not exceed the values prescribed by the manufacturer as indicated in the technical sheet concerning the application of the unit to the machine.
Do not request from the machine a ton performance higher than the expected value to prevent overheating and rapid wear of friction material.

5.4 – Trouble shooting: causes and remedies

Trouble	Possible cause	Remedy
Clutch slips	Insufficient air pressure	Increase the clutch up to 6 bar
	Problem with air supply system	Check compressed air system
	Friction linings are worn	Compensate wear
	Friction linings are oiled or wet	Replace the friction pads and remove the cause of pollution
	Seals are worn	Replace seals
Stopping angle increases	Friction linings are worn	Compensate wear
	Friction linings are oiled or wet	Replace the friction pads and remove the cause of pollution
Air leaks	Seals are worn	Replace seals

In case the troubles cannot be solved with the suggested remedies, consult the manufacturer.

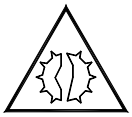
6 – Maintenance

6.1 – Warnings

Before starting any check, adjustment or maintenance operation make sure that:

1) the flywheel is completely stopped
2) the power supply is cut off
3) the temperature of unit cannot cause burns

Before disengaging the brake by letting air into the unit, prop the slide or even better move it to a safe position at the bottom dead centre.



All disassembled screws should be screwed again by means of a dynamometric spanner with the value indicated in table 6.3, after applying strong Loctite for thread locking (do not apply Loctite on nuts equipped with anti-unscrewing nylon insert)

6.2 – Checking the ear/ring connection screws and nuts for tightness (fig. 1a at page 3)

Due to vibrations and impacts that may occur during machine operation, the screws (17) connecting the clutch ring (8) with its driving ears (16) may **loosen**. This may cause breaking of the screws and the subsequent **breakaway of the two half-rings**, which are thus centrifuged off.
It is recommended to carry out a regular check, **every three or four months**, of the tightening torque of the above screws as indicated in the following 6.3 table.

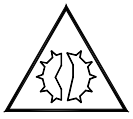
6.3 – Table of screw tightening torques (Nm)

refer to figures 1a, 1b, 1c, 1d e 1e

	Ears (17-22)		Cylinder disc (3v)		Hub disc (35)		Brake track (29)		Bushing (12)	
	screws	torque	screws	torque	screws	torque	screws	torque	screws	torque
Model	(12.9)	(Nm)	(12.9)	(Nm)	(12.9)	(Nm)	(12.9)	(Nm)	(8.8)	(Nm)
HT 0125	M8	34	M8	34	M8	40	M6	14	M8	23
HT 0260	M10	67	M8	34	M10	79	M6	14	M10	46
HT 0350	M12	116	M10	67	M10	79	M8	34	M12	79
HT 0490	M12	116	M10	67	M12	136	M8	34	M14	127
HT 0770	M12	116	M12	116	M12	136	M10	67	M14	127
HT 1000	M16	291	M14	187	M16	341	M10	67	M16	198
HT 1500	M16	291	M16	291	M18	471	M10	67	M20	402
HT 2150	M20	570	M16	291	M18	471	M10	67	M24	691
HT 2900	M24	981	M18	402	M20	667	M12	116	M24	691
HT 3900	M24	981	M20	570	M24	1148	M12	116	M24	691
HT 5800	M24	981	M27	1452	M27	1700	M20	570	M27	1022
HT 8000	M30	1969	M27	1452	M27	1700	M20	570	M30	1387

6.4 – Checking for wear the friction linings

The wear of friction linings results in a decay of clutch performances, in particular the transmissible torque by the clutch and the braking torque decrease, while the reaction times increase.
Therefore check from time to time with a thickness gauge the gap B (piston stroke) between the friction lining of the clutch disc and the piston or between the pads and the piston (refer to figure 4 and 5) with the flywheel stopped and the brake engaged.



When the gap reaches the maximum allowed value, which can be noted from table 6.6, it is mandatory to replace the friction pads or the friction blocks.
It is possible to compensate the wear, gradually, as it occurs by means of special shims.
In addition check the friction track of hub disc and cylinder disc, and piston to be undamaged.

6.5 - Table of thickness of friction linings

refer to figure 4

Model	A min	A new
HT 0125	2.3 mm	4.3 mm
HT 0260	3.3 mm	5.8 mm
HT 0350	3.5 mm	6.0 mm
HT 0490	3.0 mm	6.0 mm
HT 0770	3.5 mm	7.0 mm
HT 1000	4.0 mm	8.0 mm
HT 1500	4.5 mm	8.5 mm
HT 2150	5.0 mm	9.0 mm
HT 2900	4.5 mm	8.5 mm
HT 3900	4.5 mm	8.5 mm
HT 5800	3.5 mm	8.5 mm
HT 8000	3.0 mm	8.5 mm

A new thickness of new friction lining

A min minimum thickness allowed for friction lining

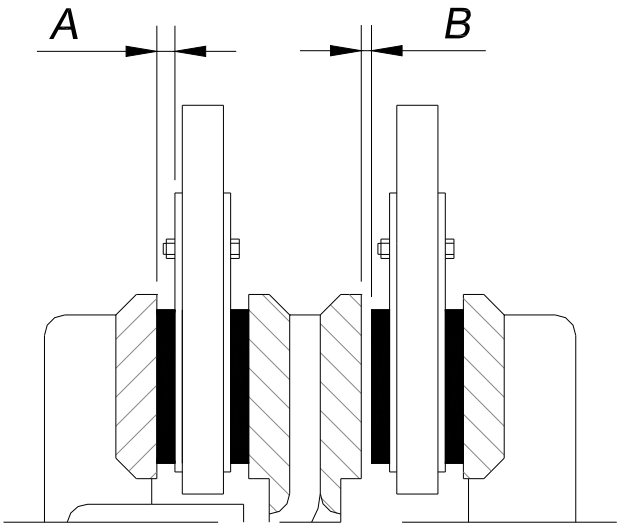


Fig. 4 – Lining on friction pads

6.6. – Table of gaps of clutch discs (piston strokes)

refer to figures 4 and 5

Model	B new	Bmax
HT 0125	1.00 ±0.25 mm	9.0 mm
HT 0260	1.00 ±0.25 mm	11.0 mm
HT 0350	1.00 ±0.25 mm	11.0 mm
HT 0490	1.50 ±0.30 mm	13.5 mm
HT 0770	1.50 ±0.35 mm	15.5 mm
HT 1000	1.50 ±0.40 mm	17.5 mm
HT 1500	2.00 ±0.40 mm	18.0 mm
HT 2150	2.00 ±0.40 mm	18.0 mm
HT 2900	2.00 ±0.40 mm	18.0 mm
HT 3900	2.00 ±0.40 mm	18.0 mm
HT 5800	2.00 ±0.50 mm	22.0 mm
HT 8000	2.00 ±0.50 mm	24.0 mm

B new
on-assembly factory-set gap between friction lining surface of clutch disc and the piston or between friction block and piston

B max
maximum allowed gap between friction lining surface of clutch disc and the piston or between friction block and piston (maximum wear)

6.7 - Table of thickness of friction blocks

refer to figure 5

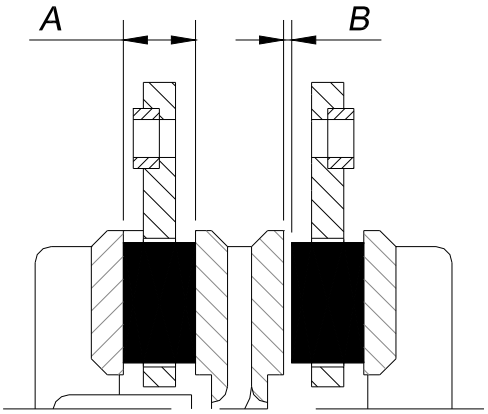


***fig. 5** – Friction blocks*

Model	Thickness A (mm)
HT 0125	13 -0.1
HT 0260	17 -0.1
HT 0350	17 -0.1
HT 0490	19 -0.1
HT 0770	23 -0.2
HT 1000	26 -0.2
HT 1500	29 -0.2
HT 2150	32 -0.2
HT 2900	33 -0.2
HT 3900	36 -0.2
HT 5800	38 -0.2
HT 8000	41 -0.2

6.8 – Wear compensation of friction lining

If the minimum thickness as indicated in table 6.5 has not yet been reached, it is possible to compensate the wear by inserting special spacers, supplied upon request, between the disc surface and the lined friction pad.
The spacers should be located, in regular wear condition, under all the lined friction pads on one face of the clutch disc and under all the lined friction pads on one face of the brake disc, according to the sequence indicated in figures 6a, 6b, 6c and 6d.
In case of irregular wear, it may be necessary to put spacers under the brake side only or under the clutch side only.

Fig. 6a – New C/B unit

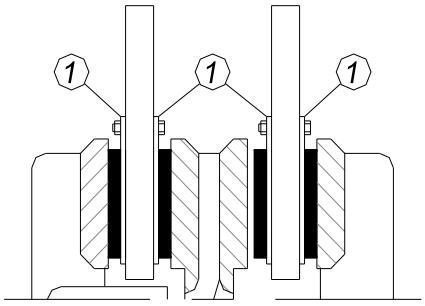


Fig. 6b – Normal wear
First gap adjustment

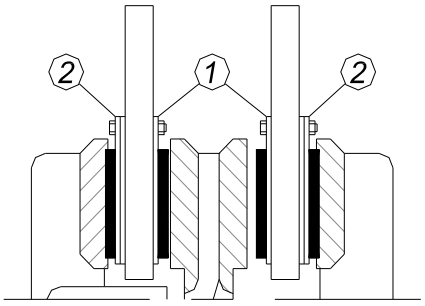


Fig. 6c – Normal wear
Second gap adjustment

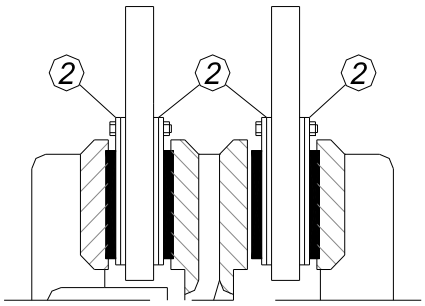
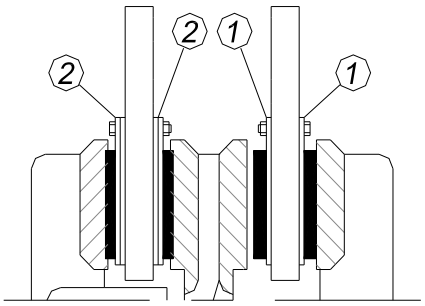


Fig. 6d – Irregular wear
First gap adjustment



Adjustment of clutch side:

- Comply with the instructions in para. 6.1
- Disassemble the lined friction pads and the spacers, if any.
- Reassemble the dismantled friction pads by inserting the spacers, making sure that no foreign matter nor dirt goes into the unit.

Adjustment of brake side:

- Comply with the instructions in para. 6.1
- Feed compressed air to the unit with machine stopped
- Operate as done with the clutch side.

Once the compensation is completed, it is advisable to check that the gap is within the tolerances of B_{new} and not above B_{max} in table 6.6.

If the gap as measured is less than the minimum value of B_{new} tolerance, you run the risk of uncontrolled clutch engagements or of dangerous overheating the clutch-brake unit.

6.9 – Replacing the friction pads, discs or friction blocks

To replace the friction pads operate in a similar way as described in the para. concerning compensation.
To replace the discs or pads, if the discs are made up of whole rings, it is necessary to disassemble completely the unit.
On the contrary if the discs consists of two demountable half-rings, you can replace the discs and the pads without disassembling the unit.

Replacing the clutch side

- Comply with the instructions in para. 6.1
- Disassemble the mechanic connection of the clutch disc to the flywheel (pins, bushings or ears) and the connection plates, if any, of the two half-rings
- Remove the two half-rings and replace them, or replace the friction blocks.

- Put back in place the two half-rings, fit the plates, if existing, and restore the mechanic connection between disc and flywheel.

- Make sure that no foreign matter nor dirt goes into the unit.

Replacing the brake side

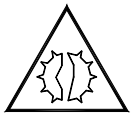
- Comply with the instructions in para. 6.1.
- Feed compressed air to the unit with machine stopped
- Operate as done with the clutch side

Once the replacement is completed, it is advisable to check that the gap is as indicated in table 6.6.

6.10 – Disassembly of the unit

Refer to the drawings of figures 1a, 1b, 1c, 1d, and 1e.

- Comply with the instructions in para. 6.1.
- Remove the unit from the shaft by means of the extraction holes (A) on the clutch side. Obtain extraction holes on the brake side by removing two opposed bolts on the cylinder disc.



Never force with levers of any kind

- Place the unit on a level surface (vertical axis), with the brake side on top.
- Unless it was already required in order to remove the unit from the shaft, unscrew two opposed bolts on the cylinder disc (3 and 2)
- Screw in the two threaded holes, now empty, two bolts longer than the standard ones.
- Gradually unscrew crosswise the other bolts and, by levering uniformly with a screwdriver on the brake disc(9) start to remove the cylinder disc (2).

CAUTION: the load of springs (10) might release the cylinder disc and cause injuries.

- Once the springs have been released, remove the cylinder disc, take off the brake disc, and then the piston (4). Remove the clutch disc (8) and springs (10)

6.11 – Reassembly of the unit

- Make sure to grease well the cylindrical section of the hub (1) where the seal (5) is located, the pins (7) and the cylindrical section of the cylinder disc (2) where it comes in contact with the seal (6).
- Accurately place in position the springs (10) in their proper seats or, if provided, in the spring-holder.
- Insert the clutch disc (8) in the correct position.
- Slide the seals (5) and (6) in the proper grooves of piston (4) and then slide the latter on the hub (1) paying attention not to pinch the seal (5) and to fit springs and hub pins into the proper piston cavities.
- Accurately insert and centre the brake disc.
- Place the o-ring seal in the proper groove on the hub.
- Place in position the cylinder disc (2) centring it on pins (3s) and gradually inserting the limb of seal (6) in the cylinder disc.
- Gradually screw two longer bolts, until the disc is brought down close to the hub, overcoming spring strength.

CAUTION: the load of springs (10) might release the cylinder disc and cause injuries

- When the distance is such as to enable to grasp the correct bolts, screw into the empty holes the standard bolts, unscrew the longer bolts and replace them with two correct ones.
- Screw the bolts until the cylinder disc is brought down to the hub and tighten them with the proper torque.
- Check the gap as indicated in paragraphs and tables 6.4, 6.5, 6.6 and 6.7