IMPORTANT

Please read these instructions carefully before installing and operating the product.Your particular attention is drawn to the notes on safety.

These installation and operating instructions are valid on condition that the product meets the selection criteria for its proper use. Selection and design of the product is not the subject of these installation and operating instructions. Disregarding or misinterpreting these installation and operating instructions invalidates any product liability or guarantee by RINGSPANN; the same applies if the product is taken apart or changed.

These installation and operating instructions should be kept in a safe place and should accompany the product if it is passed on to others -either on its own or as part of a machine- to make it accessible to the user.

SAFETY NOTICE

- Installation and operation of this product should only be carried out by skilled personnel.
- Repairs may only be carried out by the manufacturer or accredited RINGSPANN agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either RINGSPANN or an accredited RINGSPANN agent should be informed.
- Switch off the power supply before commencing work on electrical components.
- Rotating machine elements must be protected by the purchaser to prevent accidental contact.
- Supplies abroad are subject to the safety laws prevailing in those countries.

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Contents

1. General information

These installation and operating instructions apply to:

- the DU/DV 060 FPM, brake chamber mounted on the right (see Fig. 1 in Section 3).
- the DU/DV 060 FPM with left -mounted brake chamber.
- the DU/DV 060 FPM with inductive proximity switch in the brake chamber.
- for installation on a brake disc with a thickness of 25,0 or 40 mm.
- various types of brake-pad materials.

An identification plate with a 16-digit part number is affixed to the calliper. The precise design of the brake calliper is defined by this part number only.

Please consult the drawings in each section when using this instructions.

1.1 Brake chamber design and distinguishing feature

There are two versions of the brake chamber, which are distinguished as follows:

- Version I with a coil spring set as shown in Fig. 3, section 8.1. The outside wall at the end of the cylinder casing is smooth in this version.
- Version II with 8 equally strong compression springs as shown in Fig. 5, section 8.3. In this version, 8 hex nuts attached to the ends of the spring guide bolts are located on the outside wall at the end of the cylinder casing.

2. Configuration and function

The brake calliper is used as a stopping brake or parking brake.

The brake power is produced by springs; the brake is opened by compressed air. If the linings become worn, the brake torque is reduced. It is then necessary to check for wear or adjust the brake force as described in chapter 6.3

Over an inductive proximity switch inserted at the brake chamber the operating condition “brake chamber opened” (optionally).

Rotating parts must be secured by the user against inadvertent contact (e.g. brake disc).

2.1 Installation – safety precautions

Warning – danger of injury:
In version II with 8 equally strong compression springs, spring tension may not be completely released when the cylinder flange screws (15) are loosened or removed if the full spring tolerance of l_o is used. Version II of the brake chamber may be disassembled only as described in section 8.4!

3. Drawing and parts list

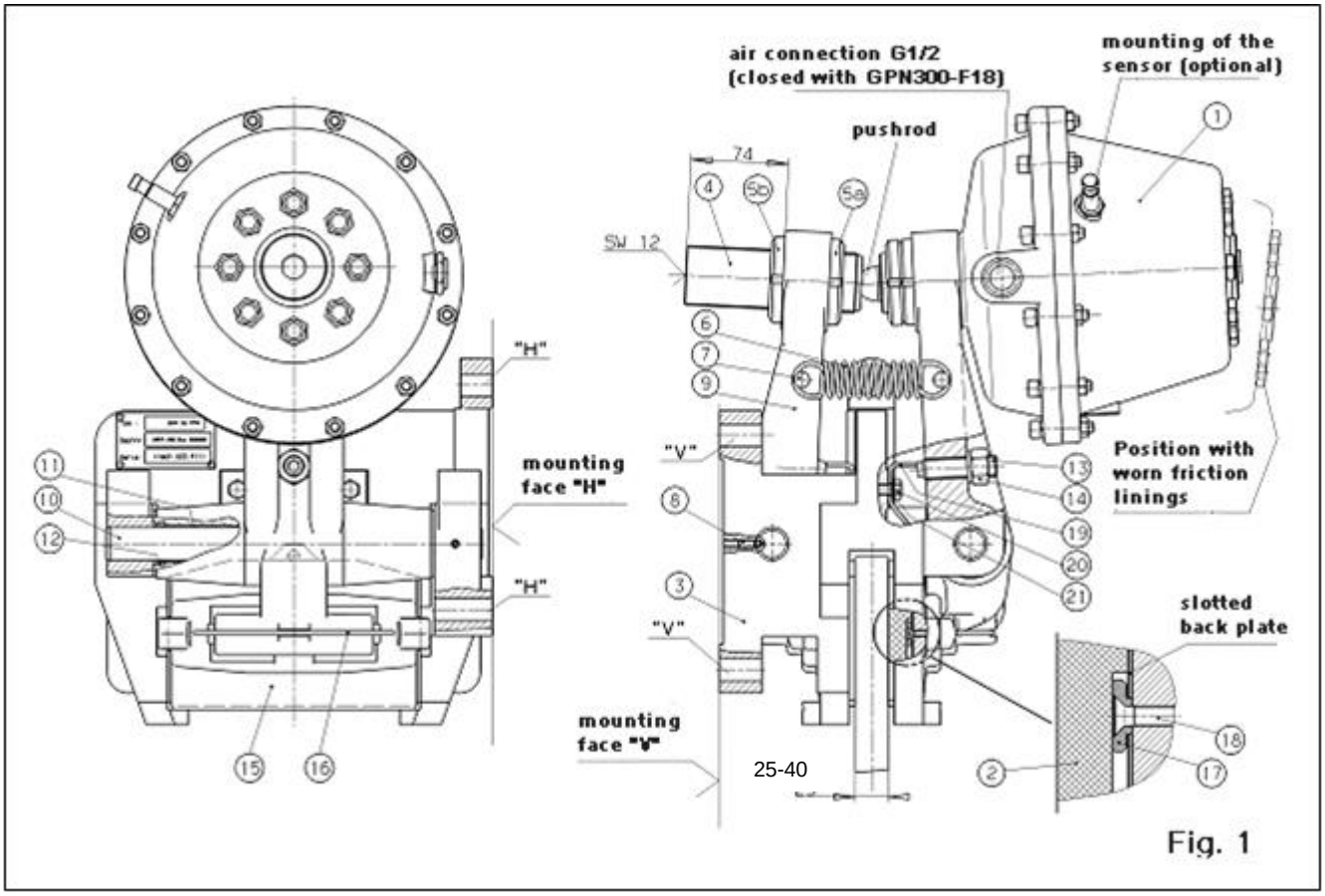


Fig. 1

Spare parts

Part	Nomenclature	Quantity
1	Brake chamber	1
2	Brake pad	2
3	Frame	1
4	Support bolt	1
5	grooved nut KM9	2
6	return spring	2
7	shoulder pin	4
8	threaded pin M 6x16	4
9	lever	2
10	shaft	2
11	sliding bearing	4
12	wiper	4
13	threaded pin M 16x60	2
14	hex. nut, self locking	2
15	swivel mount	2
16	Spring bracket for swivel mount	2
17	holding disc for friction pad	2
18	countersunk screw M 5x16 DIN 7991	2
19	sheet metal bracket	2
20	hex. screw	4
21	disc 8,4 DIN 125-St	4
Option sensor		
27 in fig. 3	Inductive proximity switch PNP (closer)	1

4. Condition on delivery

The brake calliper is delivered with a clamping gap of approx. 25 mm or 40 between brake pads. Under air pressure (bar at the Datasheet), the brake calliper opens to the pre-defined clamping gap of 26 mm 41mm (brake disc thickness plus 0.5 mm gap on each side between the brake disc and the brake pads).

The inductive proximity switch lies in the case of supply loosely with (optional).

5. Installing the RINGSPANN brake calliper

Before installing the brake, the brake disc must be cleaned with alcohol, e.g. ethyl or isopropyl alcohol, or a water-based surfactant solution (soapy water, etc.) and then rubbed dry with a clean cloth.

When cleaning the brake disc with a thinner, acetone or a brake cleaning agent, it is important to ensure that neither these cleaners nor any cleaner residues come in contact with the brake pads. This is especially important in the case of brakes used only as parking brakes, as no dynamic braking operations take place during which thinner residues would be rubbed off the brake disc.

Please note:
Oil and rust-proofing-agent residues reduced friction coefficient and thus diminish transmissible braking torque substantially!
Prior to installation to the brake disc, the brake calliper must be released (opened).

This is possible:

- once the compressed air supply has been connected (see Section 5.2).
  You can install a mechanical safety feature to protect against possible pressure loss or pressure failure in the form of an M16 bolt (length 40 – 60 mm).
  Apply air pressure to the brake chamber.
  Remove the plastic protecting cap (Fig. 3, section 8.1, pos. 23).
  Screw the bolt into the spring plate threading (Fig. 3, pos. 5) until the bolt comes in contact with the shoulder ring (Fig. 3, pos. 6).

Warning:
Remove the safety bolt after installing the brake calliper! The brake calliper must never be operated when the safety bolt is in place, as this negates the braking effect and poses the danger of severe injury!

5.1 Installation

The brake calliper should be mounted to stabile, vibration-free machine components in order to ensure noise-free, non-screech.
During installation, it is essential to ensure that brake pads are centred and in full contact with the brake disc (the midlines of the brake arm must point to the midpoint of the brake disc). Maximum permissible lateral brake disc wobble is 0.2 mm. Greater wobble may cause rattling and shaking of the brake unit.

The brake calliper is mounted to the machine component with using 4 M12 bolts (with frame construction V) or additional 3 M 12 bolts (with frame construction U) the strength class 8.8. Tighten the screws with a torque wrench (Tighten torque 195 Nm).

5.2 Compressed air connection

Air hoses are connected to the brake chamber with a G 1/2 " fitting (Whitworth threaded pipe, DIN ISO 228-1). A flexible hose connection is required, so that the brake chamber in the enterprise can move freely.

The necessary operating air pressure amounts to Datasheet. Maximum pressure is 10 bar. The brake chamber has been lubricated prior to delivery and thus can be operated with compressed air with or without oil. Compressed air must be filtered, dried and drained (solid material class 5 – impurities larger than 40µm must be removed with suitable filters – pressure dew-point +2°C). With unlubricated compressed air it is to be made certain that compressed air does not contain an ozone, because then the diaphragm wears faster.

If the brake is operated with oiled air, the following oils are recommended for a maintenance unit:

Suitable types of oil	Viscosity at 20° C (mm²/s)
Avia Avilub RSL 3	34
BP Energol HLP 40	27
ESSO Spinesso 34	23
Shell Tellus oil C 10	22
Mobil VAC HLP 9	25.2

Maximum air consumption per braking operations is:

with full piston stroke. Brake calliper are not installed, at the brake disk:
approx. 1 300 cm³ /stroke brake calliper are installed at the brake disc: approx. 170 cm³/stroke

5.3 Setting the gap between brake pads and the brake disc

The gap must be set: - during initial installation

- when brake pads are worn
- after every brake pad replacement

The brake achieved nominal braking force with a gap of 0.5 on each side of the brake disc.

Please note:

- The minimum adjustable gap depends on the degree of brake disc wobble. The smaller the gap, the larger the wear reserve before the brake calliper must be readjusted.
- Actual operating pressure must be equal to or greater than the setting pressure, as otherwise the brake calliper will not open completely during normal operation, causing the brake pads to rub against the brake disc.

Observe the following procedure when setting the gap:

- The brake must be opened (air pressure is activated).
- Turn the two M16 threaded pins (Fig. 1, pos. 13) counter-clockwise, approximately 2 revolutions.
- Setting the total gap
  – Loosen the groove nut (Fig. 1, pos. 5b) and turn it back in the direction of the end of the support bolt.

  Please note:
  An SW 12 socket screw is located on the face surface of the support bolt (Fig. 1, pos. 4). The support bolt can be fixed in place with a matching socket screwdriver.

  – Set the total gap between the two brake pads and the brake disc with the aid of the groove nut (Fig. 1, pos. 5a).

  Please note:
  This is best done by pressing one brake pad against the brake disc and setting the total gap (e.g. 1.0 mm) between the disc and the opposite brake pad using a feeler gauge.

  – Tighten the two groove nut (Fig. pos. 5b) firmly.

- Adjusting the gap
  Depending on the alignment of the brake disc axis and the position of the brake calliper, the brake chamber generates a tipping force which may create an unequal gap between the right and left brake pads and the brake disc. In extreme cases, one brake pad may rest against the brake disc, while the other is separated from the disc by the full gap. In such cases, the one brake pad would rub constantly against the brake disc.

  Thus the gap must be adjusted so that the brake pads are equidistant from the brake disc on both sides with the aid of the threaded pins (Fig. 1, pos. 13):
  – Use the threaded pin (Fig. 1, pos 13) that is pressed against the sheet metal bracket due to the tipping force (Fig. 1, pos. 19).
  – Turn this pin until the gaps on each side are equal.

- Turn the opposite threaded pin (Fig. 1, pos. 13) until it comes in contact with the sheet metal bracket (Fig. 1, pos. 19).

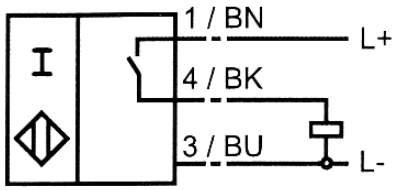
- Release the air pressure. The brake closes and the full clamping force can be applied.

5.4 Installing and connecting for the inductive proximity switch (optional)

In this option, an inductive proximity switch (NBB2-12GM50-E2-V1-Y89923 made by Pepperl+Fuchs GmbH) is delivered unmounted with the unit. A matching threaded bore is located on the brake chamber (Fig. 3, pos. 27 and/or Fig. 4, pos. 31).

Switching function	: PNP (closer)	Switch gap	: 2 mm flush
Op. voltage	: 10....30 V DC	Op. current	: 0...200 mA
Idle current	: < or = 17 mA	Residual current	: < oder = 0,5 mA
Voltage drop	: < or = 3 V	Short-circ. protection	: cyclical
Volt reverse protection	: protected	Control display	: multipoint LED
Temp. range	: -25 to +70°C	Safety class	: IP 67
Connection	: V1 plug	Housing	: stainless steel

Fig. 2: Proximity switch wiring scheme



The proximity switch (Fig. 3, pos. 27) must be positioned in such a way that it is actıvated (the LED glows) by the spring plate (Fig. 3, pos. 5) when pressure is applied (pressure above 5.5. bar) to the brake chamber. When pressure is removed, the brake closes and the spring plate moves out of the range of the switch (which is no longer activated). The LED goes out.

Procedure for installing or replacing the proximity switch:

The following instructions apply to the sensor shown above with a 2-mm switch gap.

Caution: Danger of equipment damage!
Please observe the following instructions exactly. Otherwise the proximity switch may be damaged:

- **Ensure that the brake chamber is under pressure** and screw the proximity switch (Fig. 3, pos. 27) into the bore until it abuts with the spring plate (Fig. 3, pos. 5).
- From this position, turn the proximity switch back carefully ½ to 1 revolution counter-clockwise.
- Secure it in this position with the counternut.
- Connect the proximity switch. The sensor LED must glow.
- Test the proximity switch for proper function by activating the brake calliper several times in succession. When the brake calliper is activated, the LED must react (glow) regularly and reliably.

5.5 Running-in procedure

Optimum braking effect is achieved only when both brake pads (fig. 1, pos. 2) are in full contact with the brake disc and the brake pads have attained a temperature of approx. 200°C. This requires multiple, brief braking with small compressed air admission (1 to 2 bar) while the brake disc is rotating (run-in).

Please note:
If breaking-in is not performed, the braking forces cited in our catalogue no. 46 cannot be achieved. Reductions of up to 50% are possible.

6. Maintenance

Maintenance should be performed on the brake calliper at intervals of 4 to 12 weeks, depending upon the frequency and duration of operation.

6.1 General maintenance

- Check both brake calliper arms for ease of movement.
- Clean all bearings and glide points.
- Lubricate all bearing and glide points.

Please note:
Brake pads must not be come in contact with lubricants.

- Check for tight bolt / screw connections:
  - brake calliper to machine component
  - brake chamber to brake calliper arm
  - support bolt to brake calliper arms
- Check the following for proper seal / leaks:
  - brake chamber
  - hose connection

6.2 Checking break pad wear

Brake pad material must have a thickness of at least 9 mm (Then the maximally possible lagging of the brake levers is used and it is available no more braking force) Brake pads must always be replaced in pairs.

6.3 Checking / adjusting braking force

- Check braking force and spring tension.
- Measure the distance between shoulder ring and spring plate with closed brake calliper; dimension “V”, (see fig. 3).

Please note:
When brake pads are worn, tension in the spring is reduced of the pressure springs increases with closed brake calliper, since the brake levers must be further spread. The measure " V" becomes larger This reduces braking force. If the measure " V" the value of 46 mm, at the latest, braking force must be readjusted as described in Section 5.3.

7. Replacement of friction pads

Safety note: Friction pads should only be replaced while the installation or the operating machine is standing still ! Ensure also that the load which is being held by the brake is prevented from turning because the brake must be released in order to exchange the friction pads.

Mounting hints: The spring bracket (fig.1, pos. 16) which support the swivel mounts (fig.1, pos 15) against the lever arms (fig..1, pos. 9) must not be released!

- Apply air pressure
- Remove the plastic protecting cap (fig. 3, pos 23) at the end of pressure cylinder.
- Retain the spring plate (fig.3, pos. 5) in the released state by means of a screw M16 length 40 to 60 mm which sits on the shoulder ring (fig. 3, pos. 6).

Note: This ensures mechanical safety should a loss of pressure occur.

- Loosen the two grooved nuts (fig.1, pos. 5a and 5b) on the support bolt (fig.1, pos. 4).
- Position the support bolt to dimension 74 + 4 mm (see fig. 1), the theoretical starting dimension with new friction pads.
- Now tighten the grooved nuts by hand only because they will need to be released again during the adjustment of the air gap later on.
- Remove the two return springs (fig.1, pos. 6), the four screws (fig. 1, pos. 20), the four discs (fig. 1, pos. 21) and the sheet metal bracket (fig. 1, pos. 19).
- Turn the threaded pins M16 (fig. 1, pos. 13) back far enough until you are able to ease out the friction pads with a wire hook or pliers in the direction of the end of the brake lever.
- Insert the new friction pads but make sure that the slotted back plates of the friction pads are positioned over the holding discs (fig. 1, pos. 17) of the swivel mounts so that the friction pads are held against the swivel mounts.
- Re-mount the previously removed parts (screws, discs, sheet metal bracket and return springs).
- Now remove the safety screw M16 with which the brake chamber was secured.
- Reinsert the plastic protecting cap.

Note: The safety screw can only be removed at fully applied air pressure.

- Readjust the air gap, as described in chapter 5.3.

8. Removal and replacement of worn parts in the brake chamber

The brake chamber is defective if the pushrod (fig. 3, pos. 9) does not move when compressed air is applied and released or when air escapes from the brake chamber. The brake chamber should be overhauled by the manufacturer. If this is not possible the procedure described in Section 8.2 and/or 8.4 should be followed.

8.1 Drawing and spare parts list for brake chamber with coil spring set

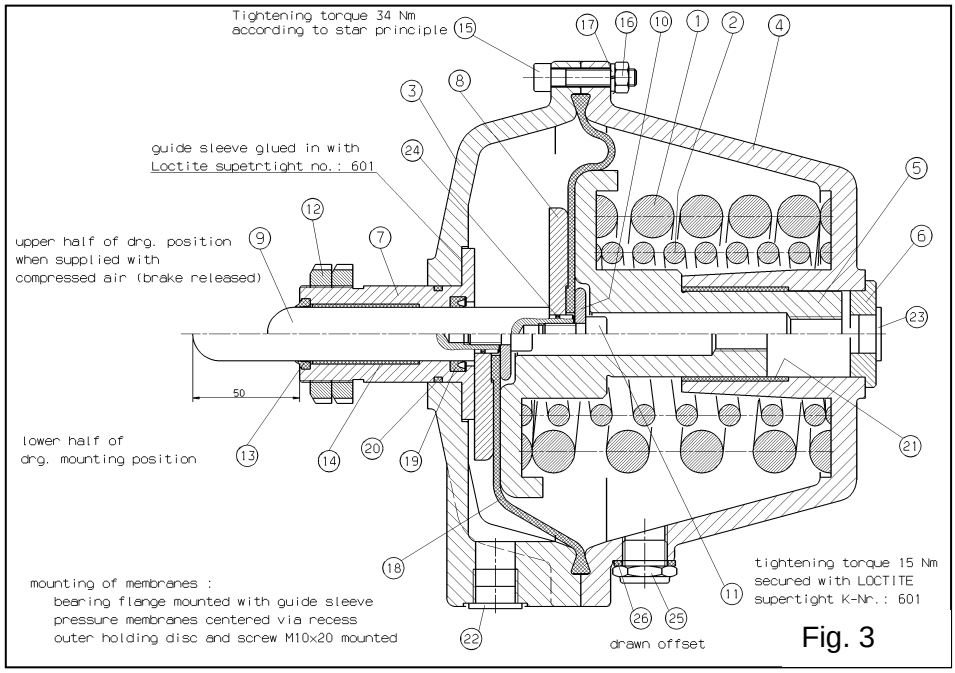


Fig. 3

Spare parts list for brake chamber with coil spring		
Part	Nomenclature	Quantity
1	pressure spring	1
2	pressure spring	1
3	housing bearing flange	1
4	housing FPM	1
5	spring plate	1
6	shoulder ring	1
7	guide sleeve	1
8	pressure disc	1
9	pushrod	1
10	holding disc	1
11	cylinder screw M 10x20 DIN 912	1
12	grooved nut	2
13	wiper	1
14	DU-dry sliding bearing	1
15	cylinder screw M 8x40	12
16	hex. nut M8	12
17	split-ring lock washer 8	12
18	Membrane / Diaphragm	1
19	grooved ring	1
20	O-ring 39,2x3	1
21	glidebush	1
22	closure plug	1
23	plastic protecting cap	1
24	O-ring 15x1,5	1
25	filter stopper F12-G1/2	1
26	Usit-ring U 21,5x28,7x2,5	1
With brake chamber with inductive proximity switch		
4	housing FPM for installing of switch	1
27	Inductive proximity switch PNP (closer)	1

8.2 Disassembling, assembling brake chamber with coil spring set; replacing worn parts.

- Remove (unscrew) the brake chamber from the brake calliper arm.
- Remove the flange screws (15), nuts (16) and lock washers (17).
- Replace worn or damaged parts (e.g. the diaphragm). Ensure that the outside bulge of the diaphragm lies exactly inside the ring grooves of the two halves of the casing.
- Clean all parts and the inside walls of the two halves of the cylinder casing before reinstalling parts.
- Grease the glide bearings (Fig. 3, pos. 14 and 21) with a thin coat of BVH 71-461 grease (Fa. Klüber Lubrication München KG).
- Assemble and install the individual parts as shown in Fig. 3.
- Tighten the M8x40 DIN 912 (15) flange bolts uniformly in a crosswise sequence to block contact (torque 24 Nm).

8.3 Drawing and spare parts list for brake chamber with 8 equally strong compression springs

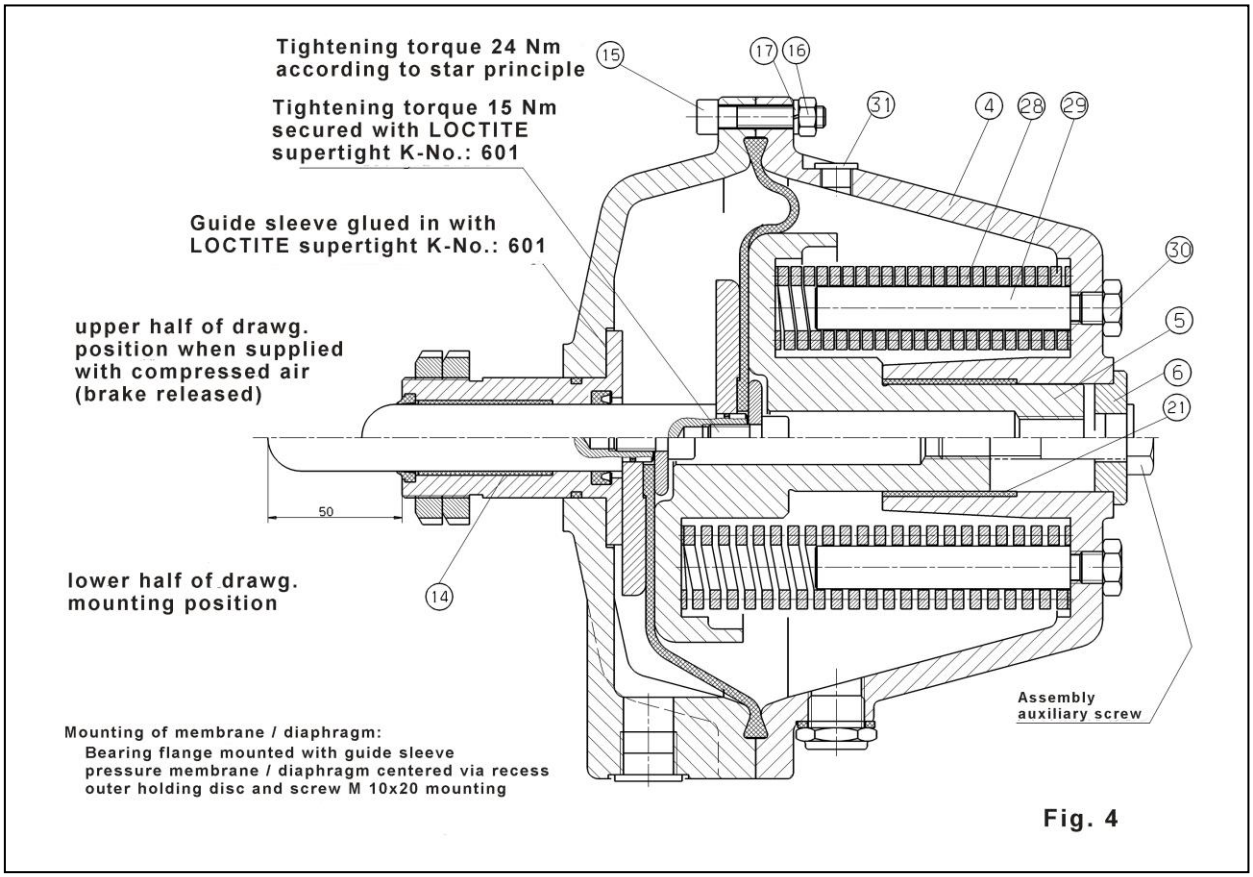


Fig. 4

Brake chamber with 8 equally strong compression springs		
Part	Nomenclature	Quantity
4	Housing for 8 springs and installing of switch	1
28	Pressure spring	8
29	Guide bolt for spring	8
30	Hexagon nut M12 DIN936	8
31	5025.016.001.000000	1

8.4 Disassembling, assembling brake chamber with 8 equally strong compression springs; replacing worn parts.

- Remove (unscrew) the bracke chamber from the brake calliper arm.
- Screw an M16 installation helper bolt (length 79 mm) that abuts with the shoulder ring (Fig. 4, pos 6) into the spring plate (Fig. 4, pos. 5) until the bolt makes contact. Then turn the bolt clockwise ¼ to ½ revolution in order to keep the residual tension of the 8 springs centred.
- Remove the flange screws (15), nuts (16) and lock washers (17).
- You can now remove the M16 installation helper bolt and this release the residual spring tension centrally.
- Replace worn or damaged parts (e.g. the diaphragm). Ensure that the outside bulge of the diaphragm lies exactly inside the ring grooves of the two halves of the casing.
- Clean all parts and the inside walls of the two halves of the cylinder casing before reinstalling parts.
- Grease the glide bearings (Fig. 3, pos. 14 and 21) with a thin coat of BVH 71-461 grease (Fa. Klüber Lubrication München KG).
- Reassemble the parts as shown in Fig. 4 in the reverse order.
- Tighten the M8x40 DIN 912 (15) flange screws uniformly in a crosswise sequence to block contact (torque 24 Nm).
- Do not forget to remove the centrally positioned M16 installation helper bolt!