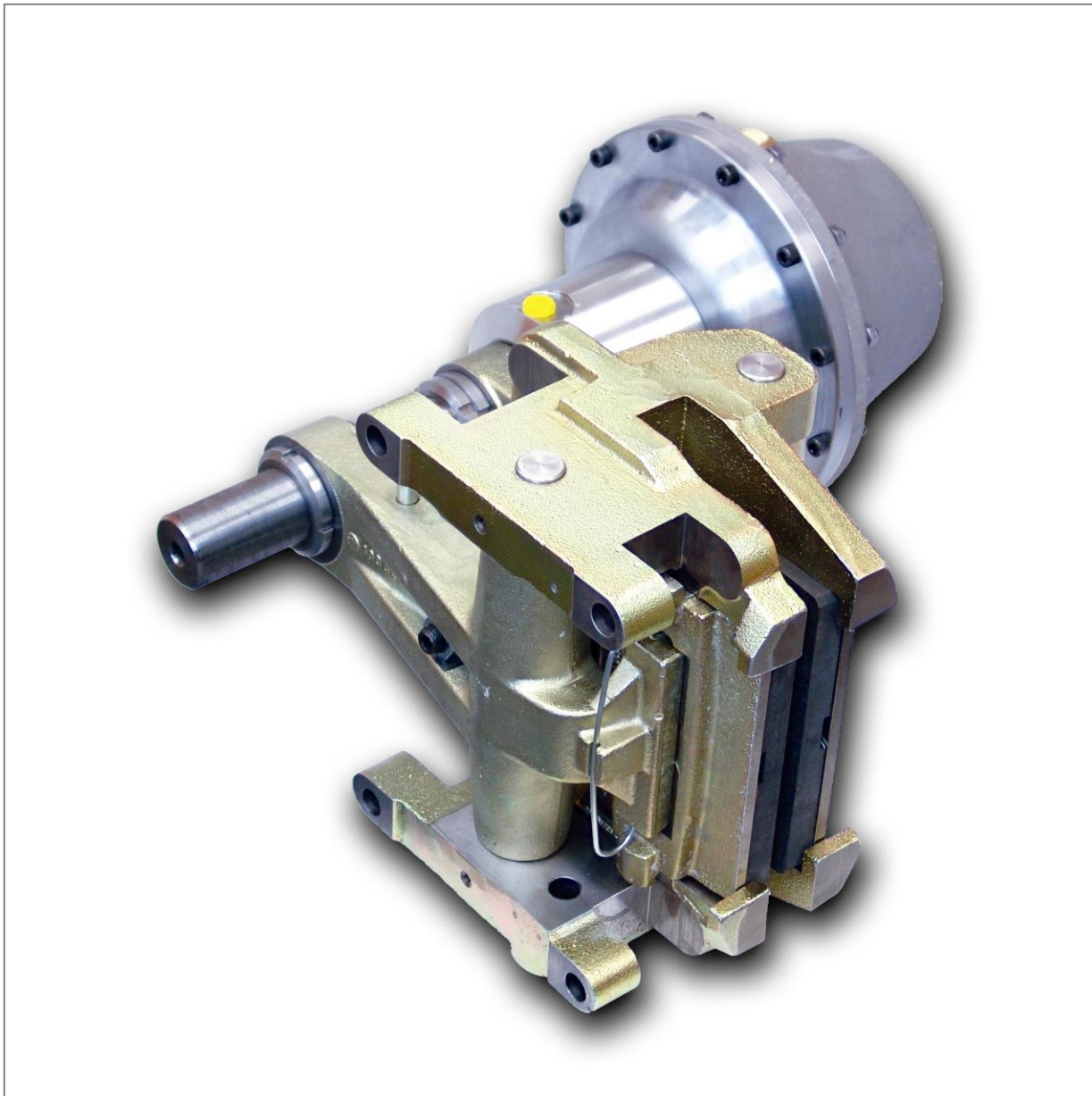


**Installation and Operating Instructions for  
Brake Caliper DU 060 FHM**

**E 09.747e**



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## 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 warranty 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.

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## 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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## 1. General remarks

These installation and operating instructions apply:

- the DU 060 FHM, brake chamber mounted on the right (see Fig. 3.1 in Section 3).
- the DU 060 FHM with left-mounted brake chamber.
- the DU 060 FHM with inductive proximity switch in the brake chamber.
- for installation on a brake disc with a thickness of 25.0 and 40 mm.
- for various types of brake-pad materials.

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

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

### 1.1 Brake chamber design and recognition features

There are 4 versions of brake chamber. They differ in their structure, the strength of their feathers, and thus in their power. For more information, see catalog 46.



#### **Danger to life and limb!**

**It is essential to secure the entire drive train against inadvertent starts during brake installation and maintenance. Rotating components can cause severe injuries.**

**Therefore, rotating components (e.g. brake disc) must be secured by the operator to prevent accidental contact.**

## 2. Configuration and function

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

The brake power is produced by springs; the brake is opened by hydraulic pressure. 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).

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

### 2.1 Installation – safety notes



#### Caution – danger of injury!

In the brake chamber located springs are fitted under strong bias. When loosening or removing the screws of the cylinder flange, the bias of the springs is not fully canceled. The brake chamber should only be dismantled at the factory

### 3. Drawing and parts list

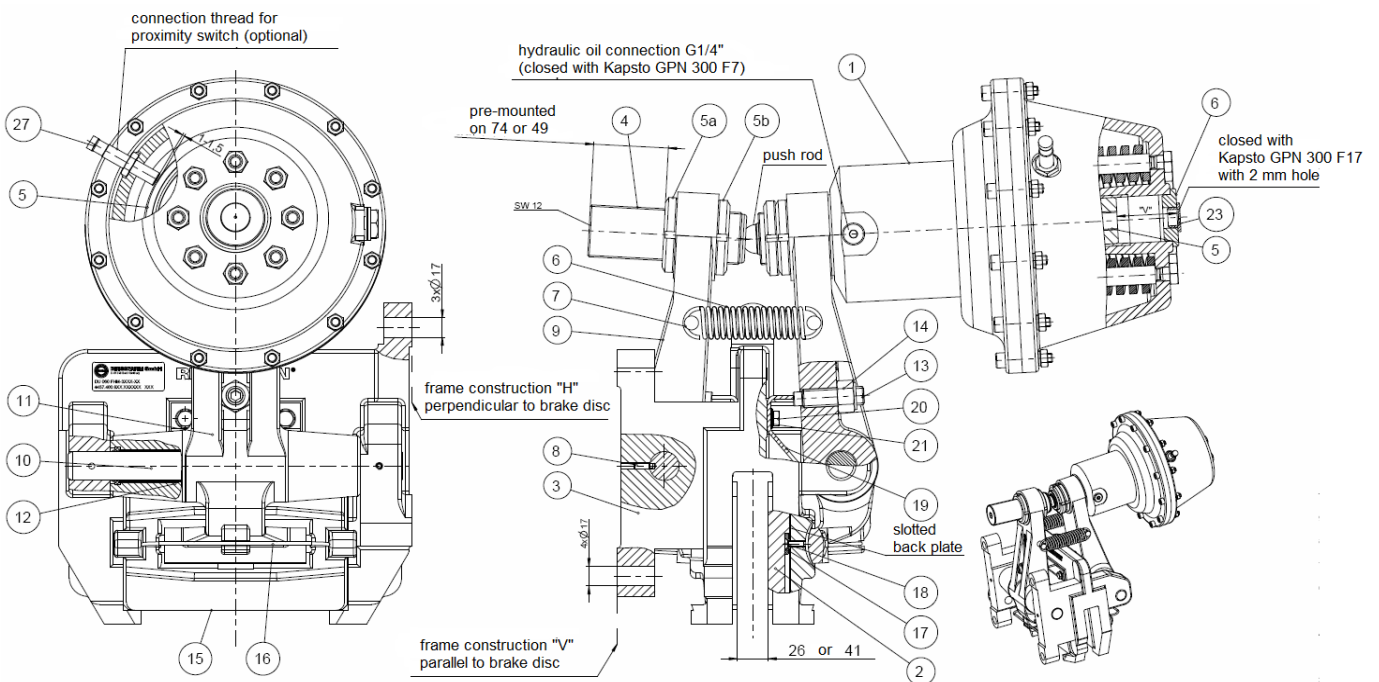


Fig. 3.1

#### Parts list:

Part	Nomenclature	Quantity	Part number
1	Brake chamber 370-25	1	3514-230111-000000
	Brake chamber 340-25	1	3514-230114-000000
	Brake chamber 350-25	1	3514-230115-000000
	Brake chamber 360 -25	1	3514-230116-000000
2	Standard brake pad for brake caliper: 000000	2	2472-040025-A00102*
	Brake pad BK 6905 for brake caliper: A00103	2	2472-040025-A00103*
	Brake pad BK 4199 for brake caliper: A00104	2	2472-040025-A00104*
	Brake pad BK 8006 for brake caliper: A00105	2	2472-040025-A00103*

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<b>3</b>	Frame (25 mm brake disc thickness)	1	2474-300001-000000
	Frame (40 mm brake disc thickness)	1	2474-300003-000000
4	Support bolt	1	2725-045604-000000
5a / 5b	Groove nut KM 9	2	5130-045002-000000
6	Return spring	2	2701-025008-000000
7	Shoulder pin	4	5236-012004-000000
8	Threaded pin M 6x16	4	5012-006055-000000
9	Lever arm	2	2475-320001-000000
10	Shaft	2	2714-025601-000000
11	Sliding bearing	4	5313-025004-000000
12	Wiper	4	5139-025102-000000
13	Threaded pin M 16x60	2	5012-016053-000000
14	Hex. nut, self-locking	2	5113-016001-000000
15	Swivel element	2	2476-206001-000000
16	Spring bracket for swivel element	2	2701-157001-000000
17	Holding disc for brake pad	2	2771-018103-000000
18	Countersunk screw M 5x16 DIN EN ISO 10642	2	5005-005120-000000
19	Sheet metal bracket	2	2789-110002-000000
20	Hex. screw	4	5019-008004-000000
21	Disc 8,4 DIN 125-St	4	5105-008001-000000
27	Proximity switch PNP (closer)	1	3502-112004-B024VG

\* Part number for 1 brake pad

#### 4. Condition on delivery

The brake caliper is delivered with a clamping gap of approx. 25 mm or 40 mm between brake pads. Under hydraulic pressure (20 to max. 125 bar, see catalog) the brake caliper opens to the pre-defined clamping gap of 26,0 or 41 mm (brake disc thickness plus 0.5 mm gap on each side between the brake disc and the brake pads).

For the "proximity switch as a signal generator for signal brake open / closed" the proximity switches are included separately from the brake caliper, so that through the Transport these sensors are not damaged.

#### 5. Installing the RINGSPANN brake caliper

Before installing the brake caliper, the brake disc must be cleaned with alcohol, e.g. ethyl or isopropyl alcohol or a water-based surfactant solution (soapy water, etc.).

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.

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**Caution!**

Oil and rustproofing residues reduce the friction coefficient and thus the transmissible braking torque substantially!

Prior to installation to a 25.0-mm-thick or 40.0-mm-thick brake disc, the brake caliper must be released (opened). This is possible:

- once the hydraulic pressure 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 screw (length 40 – 60 mm).  
Apply hydraulic pressure to the brake chamber.  
Remove the plastic protecting cap (Fig. 3.1, pos. 23).  
Turn the screw into the thread from the spring plate (Fig. 3.1, pos. 5) until the brake is open.



**Caution!**

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

5.1 Installation

The brake caliper 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 caliper is mounted to the machine component with using 4 M16 (with frame construction V or 3 screws M16 (with frame construction H) the strength class 8.8. Tighten the screws with a torque wrench (Tighten torque 195 Nm).



**Caution!**

Check to ensure that the brake disc rotates freely.

5.2 Connection for hydraulic oil

Hydraulic hoses are connected to the brake chamber with a G ¼" 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 connection is to one of the two pressure oil connections G ¼ from the brake chamber. The second hole serves as vent hole.

The required pressure is at least 20 bar, max. 125 bar (see catalog).

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For initial installation, gasket replacement or other work performed on the hydraulic system the hydraulic system must be bled.

If the system is designed for circulation from hydraulic oil, the hydraulic system can be bled by circulating the hydraulic oil.



**Caution!**

Oil expelled from the system must be removed completely. Leaks must be repaired immediately.



**Caution!**

The brake caliper has two hydraulic fluid connections size G ¼ (Whitworth pipe thread DIN ISO 228-1). A hydraulic fluid connection should be used for venting. The hydraulic system must never be operated at a higher pressure than is specified for the system. The maximum permissible operating pressure is 125 bar.

Oil volume: max. Oil volume (at max. brake pad wear) = 158 cm<sup>3</sup>

Alloyed mineral oil, Group HLP as defined in DIN 51525, or API class SC, SD or SE may be used as pressure fluid.



**Please note!**

The purer the hydraulic fluid, the longer service life of the brake system.

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.**



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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 caliper must be readjusted.
- Actual operating pressure must be equal to or greater than the setting pressure, as otherwise the brake caliper 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 (hydraulic pressure is active).
- Turn the two M16 threaded pins (Fig. 3.1 pos. 13) counter-clockwise, approx 2 revolutions.

Setting the total gap

- Loosen the groove nut (Fig. 3.1, pos. 5b) and turn it back in the direction of the end of the support bolt.
- Set the total gap between the two brake pads and the brake disc with the aid of the groove nut (Fig. 3.1, pos. 5a).
- Turn the groove nut (Fig. 3.1, pos. 5b) in place and tighten both groove nuts firmly.



**Caution!**

It is essential to ensure that the brake pads (2) do not rub against the brake disc when the brake is released.



**Please note!**

In the support bolt (Fig. 3.1, pos. 4) is in the face a hexagon socket SW 12. With a corresponding hexagon key can the support bolts be kept.



**Please note!**

Conveniently, you press a friction pad against the brake disc, to then tune in the desired overall game (of eg 1, 0 mm) with a feeler gauge at the opposite brake pad.

Adjusting the gap

Depending on the alignment of the brake disc axis and the position of the brake caliper, 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. 3.1, pos. 13):

- Use the threaded pin (Fig. 3.1, pos. 13) that is pressed against the sheet metal bracket due to the tipping force (Fig. 3.1, pos. 19).
- Turn this pin until the gaps on each side are equal.
- Turn the opposite threaded pin (Fig. 3.1, pos. 13) until it comes in contact with the sheet metal bracket (Fig. 3.1, pos. 19).
- Release the hydraulic 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 is delivered unmounted with the unit. A matching threaded bore is located on the brake chamber (Fig. 3.1, pos. 27).

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	: < or = 0,5 mA
Voltage drop	: < or = 3 V	Short-circ. protection	: cyclical
Volt everse protection	: protected	Control display	: multipoint LED
Temp. range	: -25 to +70°C	Safety class	: IP 67
Connection	: V1 plug	Housing	: stainless steel

The proximity switch (Fig. 3.1, pos. 27) is to be arranged so that this at by pressure impinged brake chamber (hydraulic pressure see catalog) from the spring plate (Fig. 3.1, pos. 5) is attenuated (the LED glows). 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.

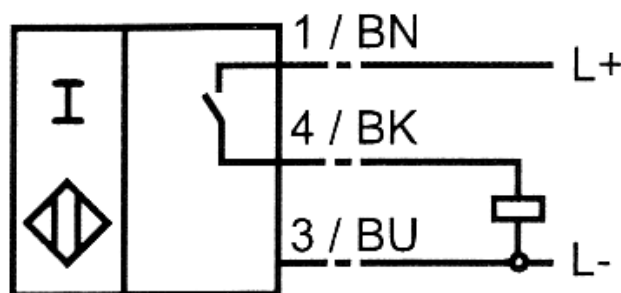


Fig. 5.1: Proximity switch wiring scheme

#### Procedure for installing or replacing the proximity switch:

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



#### **Caution!**

Please observe the following instructions exactly. Otherwise the proximity switch may be damaged!

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- **Ensure that the brake chamber is under pressure** and screw the proximity switch (Fig. 3.1, pos. 27) into the bore until it abuts with the spring plate (Fig. 3.1, 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 caliper several times in succession. When the brake caliper 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 while the brake disc is rotating (run-in).



#### **Caution!**

If running-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 caliper lever arms for ease from movement
- Clean all bearings and glide points
- Lubricate all bearing and glide points



#### **Caution!**

Brake pads must not be come in contact with lubricants.

#### Check for tight bolt / screw connections:

- brake caliper to machine component
- brake chamber to brake caliper lever arm
- support bolt to brake caliper lever arms

#### Check the following for proper seal / leaks:

- brake chamber
- hose connection

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## 6.2 Checking brake pad wear



### Caution!

Brake pad material must have a thickness of at least 9 mm. (this is then the maximum possible pivoting movement of the lever is utilized, and then any more braking force available). Brake pads or brake linings (Pos. 2) must always be replaced in pairs.

## 6.3 Checking / adjusting braking torque

Check the brake torque or spring preload.

Measure the distance between shoulder ring (pos. 7) and spring plate (pos. 6) with closed brake caliper; dimension "V", (see Fig. 3.1).



### Caution!

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

## 7. Replacing brake pads



### Danger to life and limb!

Friction pads should only be replaced while the equipment system or the working machine is complete standstill! Ensure also that the load which is being held by the brake is prevented from turning because as the brake must be released in order to exchange the brake pads.



### Caution!

The spring bracket (Fig. 3.1, pos.16) and the swivel elements (Fig. 3.1, pos. 15) which hold the lever arms (Fig. 3.1, pos. 9) can not be solved.

- Applying the brake chamber with the min. Hydraulic pressure see catalog information between 20 bar and 80 bar. Remove the plastic protecting cap (Fig. 3.1, pos. 23) at the end of brake chamber.
- Retain the spring plate (Bild 3.1, Pos. 5) in the released state by means of a screw M16 length 40 to 60 mm which sits on the shoulder ring (brake caliper open).

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

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- Loosen the two grooved nuts (Fig. 3.1, pos. 5a and 5b) on the support bolt (Fig. 3.1, pos. 4).
- Position the support bolt to dimension 74 + 4 mm or 49 +4 mm (see Fig. 3.1, 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. 3.1, pos. 6), the four screws (Fig. 3.1, pos. 20), the four discs (Fig. 3.1, pos. 21) and the two sheet metal brackets (Fig. 3.1, pos.19).
- Turn the threaded pins M16 (Fig. 3.1, pos. 13) back far enough until you are able to ease out the brake pads (Fig. 3.1, pos. 2) 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. 3.1, pos.17) of the swivel elements so that the brake pads are held against the swivel elements.
- Re-mount the previously removed parts (screws, discs, sheet metal brackets, return springs).
- Now remove the safety screw M16 with which the brake chamber was secured.
- Reinsert the plastic protecting cap.



**Caution!**

The safety screw can only be removed at fully acting hydraulic pressure.



**Caution!**

Readjust the air gap, as described in chapter 5.3.