	Installation and Operating Instructions for Brake Calliper DV 30 FPA spring-activated, pneumatically released automatic wear adjustment with proximity switch in the brake chamber		E09.718e	
	Issue: 22.08.2012	Version : 1	drawn: Su	reviewed: Su

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; 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 agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either the manufacturer or an accredited 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 information

These installation and operating instructions apply to:

- the DV 30 FPA with right-mounted brake chamber as shown in Fig. 1 in Section 3, for mounting on a disc brake (disc thickness 12.5 mm);
- the DV 30 FPA with left-mounted brake chamber;
- the DV 30 FPA with adapter for sensor installation but without inductive proximity switch;.
- various types of brake-pads, e.g. with wear alarm cable, increased glide speed, double friction surface or other special 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.

2. Configuration and function

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

Braking force is generated by springs in the brake chamber (1). It is released (opened) pneumatically with compressed air. If brake pads (pos. 2, Fig. 1) are wear, an automatic wear adjustment occurs

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

2.1 Safety instructions

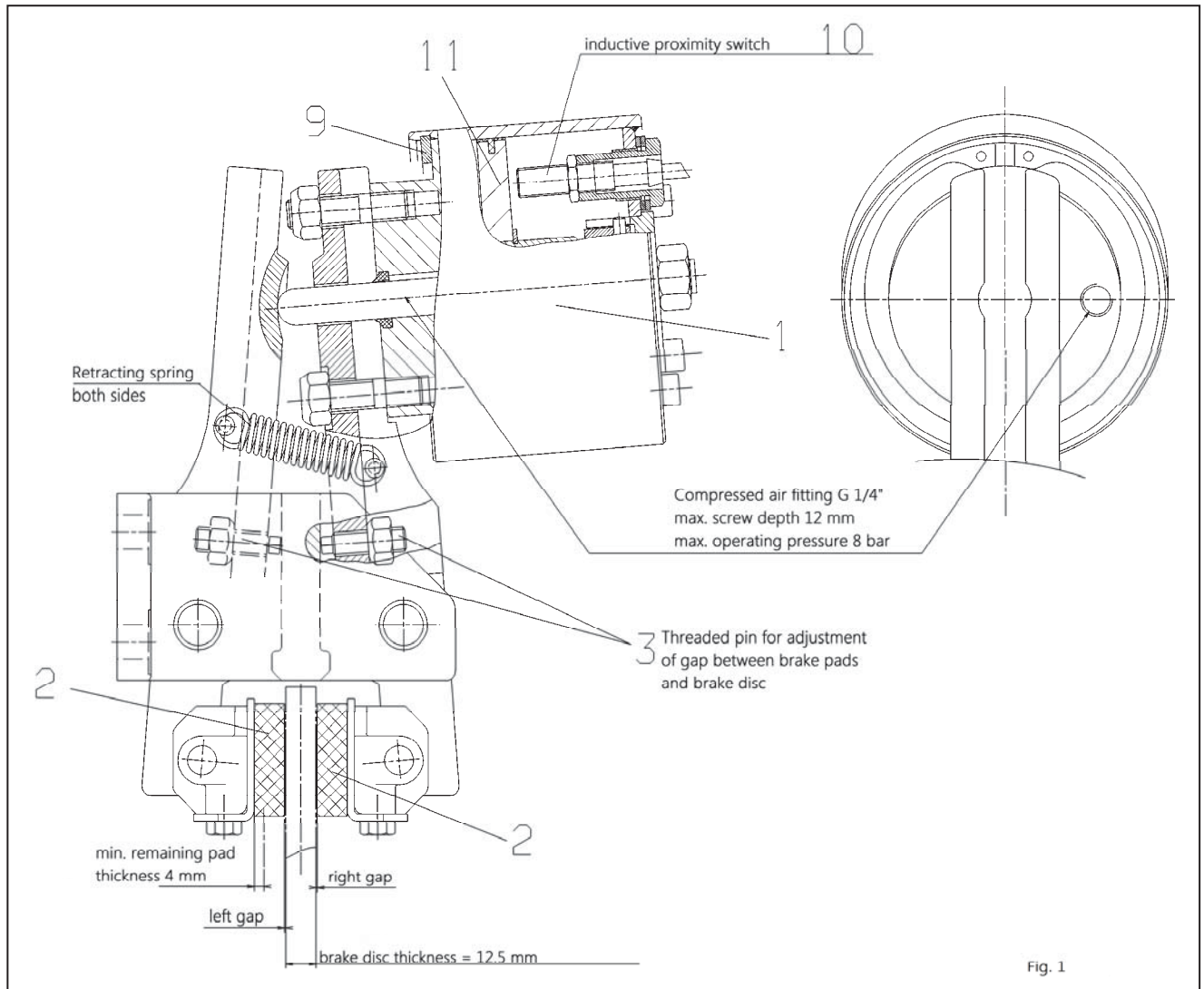
The brake chamber (Pos.1, see parts list) may be dismantled by the manufacturer only.



Caution! Danger of injury!

Brake chambers are equipped with high-pressure pre-tensed springs. When the safety ring (9) is loosened or removed, spring pressure is released abruptly.


3. Drawing and parts list



Parts list:

Part	Nomenclature	Quantity	Part number
1	Brake chamber for 12.5 mm thick brake disc	1	3514.100.133.000000
2	Standard brake pad for brake calliper: 4457.301.636.000000	2	2472.005.013.A00112*
	Brake pad from BK 6905 for brake calliper: 4457.301.635.000000	2	2472.005.013.A00117*

*) Part number for 1 pad

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4. Condition on delivery

The brake calliper is delivered with a clamping gap of approx. 9.0 mm between brake pads. Under air pressure (5 - 6 bar), the brake calliper opens to the pre-defined clamping gap of 13.5 mm (brake disc thickness 12.5 mm plus 0.5 mm gap on each side between the brake disc and the brake pads).

5. Installing the 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 a 25.0-mm-thick brake disc, the brake calliper must be released (opened). This is possible once the compressed air supply has been connected (see Section 5.2).



Please note:

The pressurisation (without disc) may only be once, otherwise the automatic wear adjustment reduces the clamping or mounting gap.

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 (strength class 8.8).

5.2 Compressed air connection

The system requires pressure of at least 5 bar; maximum permissible pressure is 8 bar.

A flexible hose connection is required. Please use hoses with a diameter of 6 mm. Hose pressure must be at least 7 bar (preferably 12 bar) with a temperature range of approx. - 20°C to + 80°C.

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Air hoses are connected (Fig. 1, Section 3) to the brake chamber with a G 1/4 " fitting (Whitworth threaded pipe, DIN ISO 228-1).

Compressed air must be filtered to remove all dirt, pipe chips, rust and condensation. Purified air must then be enriched with a fine oil mist injected by a standard, commercially available conditioning unit. The quantity of oil added depends on the nominal air flow rate in l/min and is specified by the manufacturer of the conditioning unit.

The following types of oil are recommended for conditioning units:

<u>Suitable types of oil</u>	<u>Viscosity at 20°C (m m²/s)</u>
Avia Avilub RSL 3	34
BP Energol HLP 40	27
ESSO Spinesso 34	23
Shell Tellus Öl C 10	22
Mobil VAC HLP 9	25,2

Maximum air consumption per braking operations is approx. 48 cm³ .

5.3 Adjust the air gap between the brake disc and brake pads

The brake calliper is set by the manufacturer with a gap of 0.5 mm on each side between the brake disc and the brake pads. The gap is set with the threaded pins (3).

The brake calliper is not aligned exactly symmetrical to the brake disc thickness, the air gaps on either side will be different. The side-mounted brake chamber can generate tipping force, depending upon the position of the brake calliper and the disc axle. In extreme cases, one brake pad is pressed against the disc, while the entire gap is left on the other side. The result is constant rubbing of the one pad against the disc during operation. The gap can be adjusted by turning the threaded pins (3) accordingly.

The gap must be reset:

- during initial installation
- when brake pad wear has been detected
- following brake pad replacement

- The brake must be released (pressurized to at least: 5 bar).
- Turn both threaded pins (3) counter-clockwise, approx. 2 full turns.
- The full of larger gap is now set at the brake calliper arm with the mounted brake chamber. Turn the matching threaded pin (3) clockwise until the gap is uniform on each side.



Please note:

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

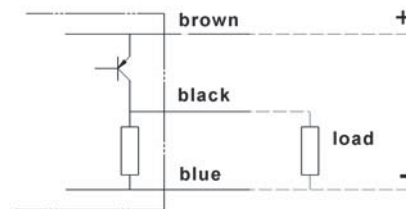
- Release pressure from the brake chamber. The brake closes and full braking force (holding torque) is available.

5.4 Electrical connection for the inductive proximity switch

A DC 12V02PSLK inductive proximity switcher manufactured by DIEL is installed:

Switching function	: PNP (closer)	Switching distance	: 2 mm flush-mountable
Operating voltage	: 10....35 V DC	Max. op. current	: 0...200 mA
Voltage drop	: < or = 1,5 V	Polarity reversal-resistant:	yes
Temp. range	: -25 to +80°C	Safety class	: IP 67
Connection	: 2m PVC- cable	Housing	: M12x1 V4A

Fig. 2: Circuit diagram, PNP technology



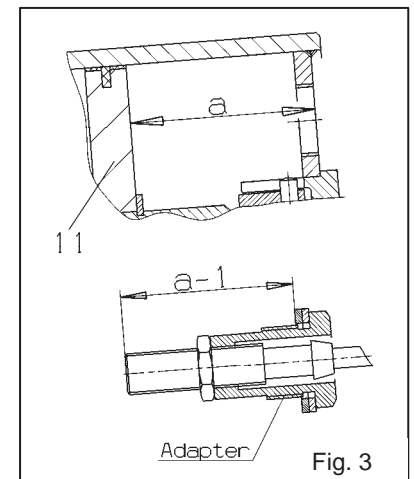
The proximity switch (Fig. 1, Pos. 10) is positioned in such a way that it is closed by the reference plate when spring pressure is exerted (air pressure > 5 bar) (Fig. 1, Pos. 11). When air pressure is released, the brake closes and the reference plate moves out of the range of the switch (the switch is no longer closed).

Procedure for installing or replacing the proximity switch:

The following instructions apply to the proximity switch listed above, with 2-mm switching distance.

To prevent the connecting cable from twisting, mount the proximity switch before making the electrical connection.

Apply air pressure (5 – 6 bar) to the spring pressure cylinder. The brake calliper opens, the reference plate is pressed into the end position. Measure gap "a". Mount the proximity switch to the adapter with a length of "a-1mm" (Fig. 3) and secure the switch in place with a counter-nut. Screw the adapter with the washer into the spring pressure cylinder and tighten the adapter firmly. Test for proper function by activating the brake calliper several times in succession. When the brake calliper is opened (air pressure is applied), the proximity switch must be closed and current can flow through.



Example of an optical display:

A monostable switch relay is required.

Contact 0 - 1 : relay in passive state (rest) $I_L = 0 \text{ mA}$
Braking force is applied - Lamp A glows.

Contact 0 - 2 : Relais relay in active state (inductive proximity switch
closed) $I_L > 0 \text{ mA}$
No braking force is exerted - Lamp B glows.

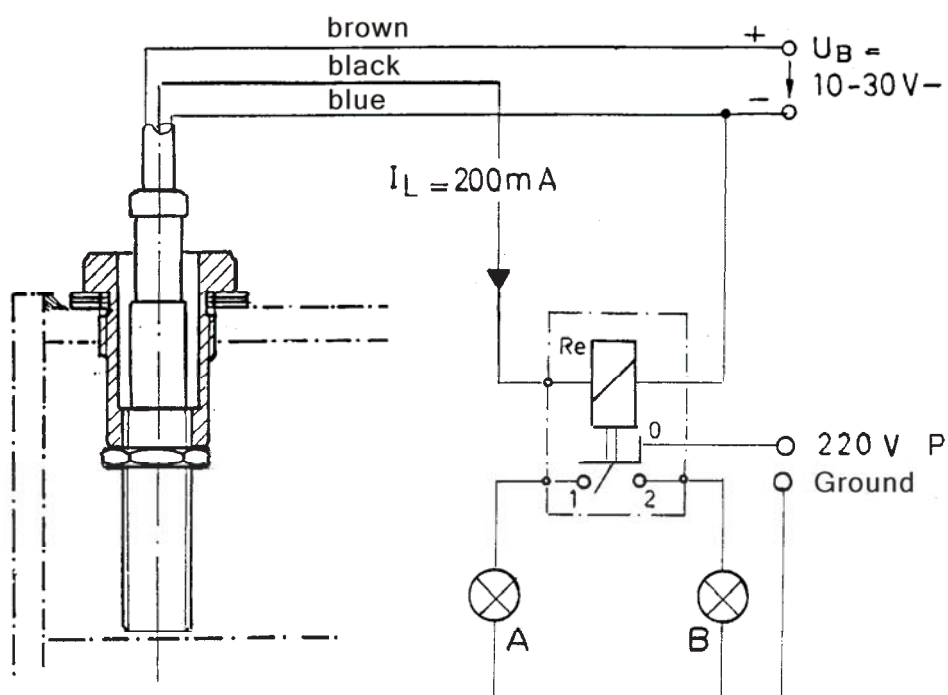


Fig. 4

5.5 Running-in procedure

Optimum braking effect is achieved only when both brake pads (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 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.

Note:

If it is not possible to break in the unit while the brake calliper is fully engaged (exposed to full spring pressure), braking force can be reduced by decreasing air pressure (1...4 bar).

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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 levers for ease of movement.
- Clean all bearings and glide points
- Lubricate all bearing and glide points.
- Check to ensure that the brake pads do not rub against the brake disc when the brake calliper is open, i.e. hat the gap is uniform on both sides. Adjust the brake gap is required (see Section 5.3).



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 lever
 - brake pads to brake lever

- Check the following for proper seal / leaks:
 - brake chamber
 - hose connection
(leaks can be detected quickly and easily using e.g. "Güpoflex LECKSUCHER", manufactured by GÜPO GmbH, 77694 Kehl, telephone ++49/7851/4044-45, or equivalent products).

6.2 Checking break pad wear

Brake pad material must have a thickness of at least 4 mm (from the top surface of the brake pad to the top surface of the steel mounting plate) Brake pads or brake linings (pos. 2) must always be replaced in pairs.

7. Replacement of brake pads



Before replacing brake pads, ensure that the mass held by the brake is secured against movement, as the brake must be released while the brake pads are replaced.

Required tools: Fixed spanner or ring spanner SW 13
 Socket screw wrench SW 6
 Thickness gauge or metal plate (thickness 1.0 mm)

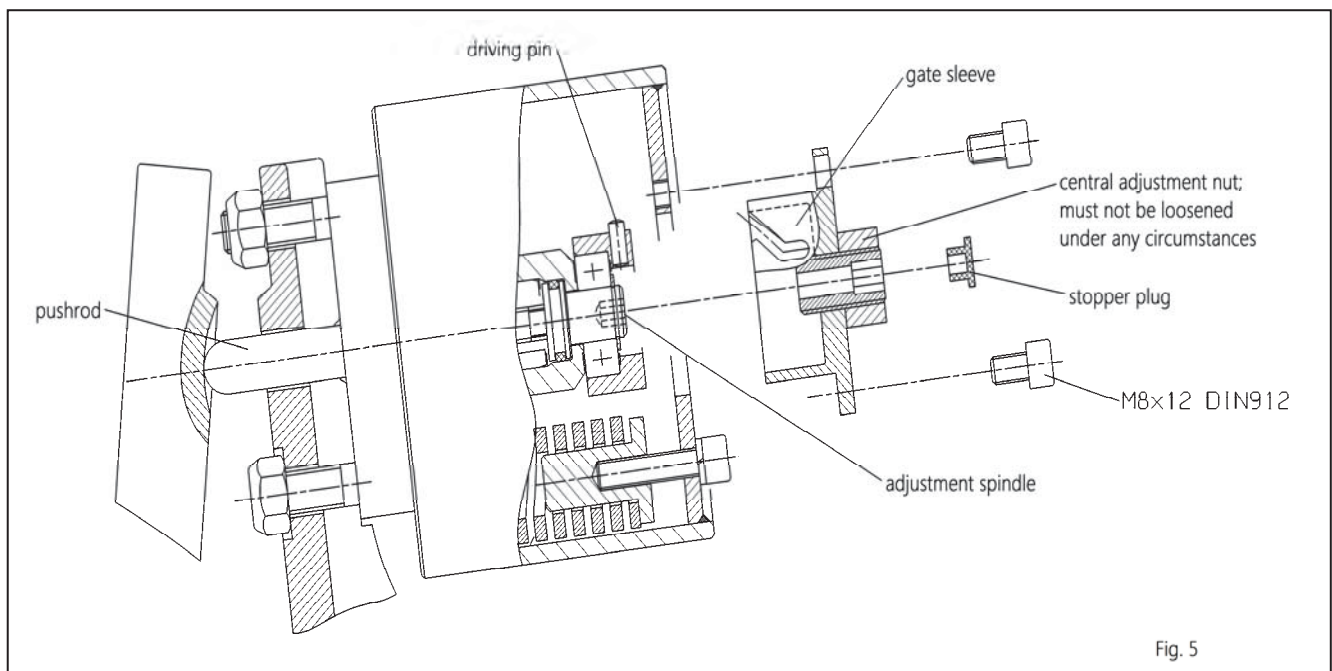


Fig. 5

- The central adjustment nut must not be loosened under any circumstances!
- The brake chamber should not be pressurized, i.e. the brake is closed.
- Remove the two socket head screws (M8x16 -DIN 912) and the gate sleeve.
- Pressurize the brake chamber to at least 5 bar. The brake is released (opened).
- Turn the adjustment spindle clockwise (to the right) using a socket screw wrench (SW 6). This retracts the plunger and enlarges the gap between the brake disc and the brake pads. Turn the pushrod back until it comes to a stop, but do not tighten.
- Turn the threaded pin (3) which controls symmetrical gap adjustment back until the brake pads can be easily replaced.
- Replace the worn brake pads including carrier plates. To do so, a ring spanner or fixed spanner SW 13 is needed.
- Remove pressure from the brake. The brake closes.
- Assemble the gate sleeve again. To first turn the driving pin with the freewheel outer ring clockwise turn until it is in the angular position is (see Fig. 6).

Turn the drive pin only clockwise. When installing the sliding sleeve be careful on it so that the drive pin engages in the slide groove. The groove chamfered to facilitate this operation. Turn the sleeve in the clockwise until screw holes are exactly aligned. Insert the screws M8x12 and tighten firmly.

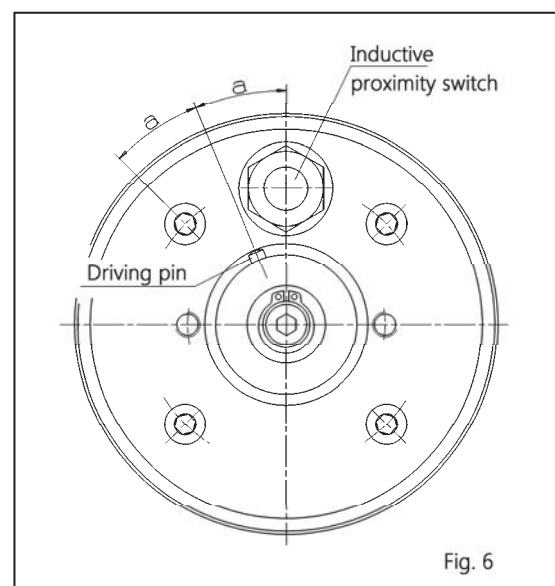


Fig. 6

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- Reapply air pressure to the brake chamber, min. 5 bar.
- Remove the central stopper. Then set the gap between the brake pads and the brake disc to 0.5 on each side. This is most effectively accomplished by pressing one pad against the disc and setting the full gap of 1.0 mm on the opposite side, using a feeler gauge. This is done by turning the adjustment spindle counter-clockwise (to the left) with a socket screw wrench (SW 6) until the feeler gauge is lightly clamped.



Please note:

The adjustment spindle cannot be turned clockwise when the coulisse sleeve is mounted. Any attempt to do so by applying force may cause damage to the automatic wear adjustment system.

- Remove the thickness gauge and replace the stopper.
- Adjust the gap between the brake pads and the brake disc as described in Section 5.3. The brake is now ready for operation.

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