

Techn. Information 39/89: Maintenance and Repair Instructions for Hydr. Fixed Caliper Disc Brakes

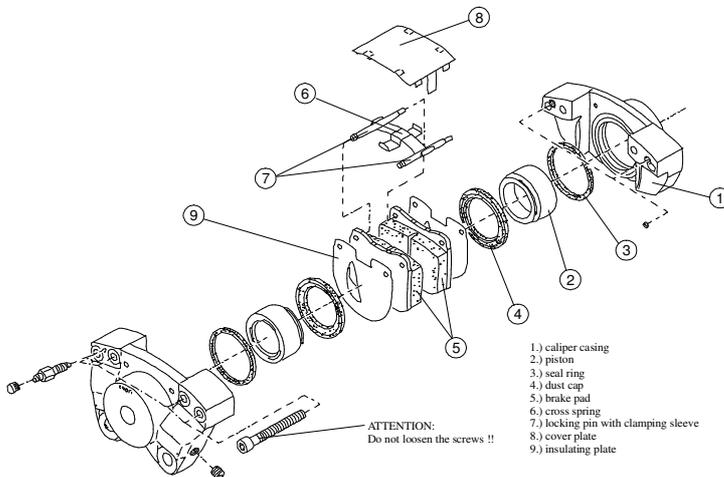
1. Functional characteristics of hydraulic fixed caliper disc brakes

As Fig. 1 shows, the brake disc is enclosed by a split-design cast casing. A caliper well between the housing and the brake disc accommodates two disc brake pads which are axially guided by means of locking pins. A non-positive connection is formed between the brake lining plates and the locking pins by means of a cross spring.

Depending on the brake type, two or more pistons are mounted in a cylinder bore in the caliper halves. The pistons are sealed using a rectangular sealing ring and protected from the outside from the effects of water and dirt by means of the dust cap.

To produce hydraulic pressure in the braking system, the pistons are moved in the direction of the brake disc, so pressing the disc brake pad against the two braking surfaces of the brake disc. This creates a peripheral force at the brake disc which generates a certain braking torque as a result of the distance to the brake disc rotary axle.

If the fluid pressure is reduced to the ambient level, the pistons are retracted slightly as a result of the elastic deformation forces of the sealing rings, so releasing the brake pads from the brake disc. However, if, due to excess brake lining wear, the elastic deformation properties of the sealing ring are exceeded, the pistons slide by this amount out of the borehole. When the brake is subsequently released, however, the pistons are only retracted by the stroke of the elastic deformation of the sealing rings. The result is that in these brakes, a constant clearance is created.



General information:

From a residual lining thickness of 2 mm on the most markedly worn brake pad, linings must be exchanged. We wish to expressly point out that linings may only be exchanged per complete axle set to avoid the possibility of variations in braking performance. When changing linings, the thickness of the brake discs should always be checked. As soon as the discs deep scorings or have fallen below the minimum disc thickness specified by the vehicle manufacturer, they must be exchanged or the brake surface turned in accordance with the manufacturer's instructions.

The special mineral oil resistant version of the brake is marked with a green spot and a stamped „M“. This version must not be filled with brake fluid, otherwise the sealing elements swell and the brakes do not function.

2. Exchanging linings

2.1 Removing the brake pads

After removing any existing cover plates, the locking pins which serve as guides to the linings must be removed. If the locking pins are axially guided by means of clamping sleeves, a pin punch as depicted in Fig. 2 must be used. Otherwise, remove the safety clips using a screw driver and pull or knock out the locking pins using pliers or a pin punch, taking care to ensure that the cross spring, which is pretensioned, does not spring out in an uncontrolled manner. In certain brake models, before removing the brake pads, the wear warning contacts at the relevant plug-in connections must be separated.

Take the brake pads and the intermediate or insulating plates out of the caliper well using a standard commercially available extractor hook, if necessary with the aid of screw drivers. Then clean the caliper well using spirit, de-rust the edge of the disc and push the pistons back into the housing. To do this, mount a hose on the corresponding bleeding valve, open it and press the piston back using a suitable tool. Before removing the hose, close the bleeding valve, as otherwise air could gain access to the brake system.

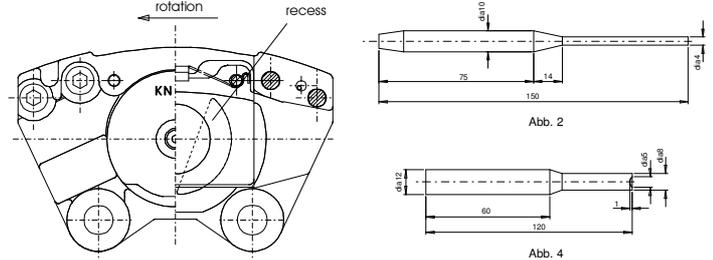
We wish to expressly point out that only spirit should be used for cleaning, and no agents containing mineral oil, as these could attack the rubber components. Cleaning work with sharp-edged instruments should also be strictly avoided due to the danger of damage to the dust cap.

2.2 Mounting brake pads

Initially, introduce the intermediate plates into the caliper well, paying attention that any recesses in the insulating plates are located on the inlet side of the disc (cf. Fig. 3). Then introduce the new brake pads, after first plugging in any wear warning contacts.

The cross springs and locking pins should only be used again if in excellent condition. When mounting, ensure that a locking pin is punched in first. Then suspend the cross spring on one side and push the free end in the direction of the brake disc far enough to permit the second locking pin to be mounted without problems. If locking pins with clamping sleeves are used, ensure that the slots of the clamping sleeves are always pointing downwards so as to prevent the accumulation of dirt and splash water. Use a pin punch as shown in Fig. 4 to drive in the pins.

After the brake lining has been mounted, actuate the brake pedal several times to allow the brake lining to adjust to the disc thickness. Then check the level of the brake fluid in the tank and carry out a seal, function and performance test.



3. Changing seals

For the repair of leaks must be used. Original-Knott- seal set or repair set (incl. piston). By the change of the seal elements must be principle changed all seal elements of the brake. Should be established by the servicing that the dust caps are cracky or hardened through high temperature, so must these caps changed by Original-Knott-seal set.

3.1 Removing the brake caliper

The faulty disc brake caliper must be removed from the vehicle, the linings taken out and the caliper cleaned as described under point 2.1 of these instructions.

Using a rounded tool (flattened mounting needle or similar), remove the dust caps from the housing. Then press the caliper pistons out of the housing using compressed air.

Warning: 10 bars pressure create a piston force of up to 6000 N.

Proceed by first fixing the pistons on one side in the housing using a screw clamp and a wooden slab around 8 mm thick. Then press the opposite pistons out of the housing and close the open cylinder bores with the aid of self-produced sealing plates. Then press out the remaining pistons.

Then remove the sealing rings from the cylinder grooves using a rounded plastic needle.

Warning: The screw fitting of the caliper halves may not be loosened on any account. Otherwise any warranty claims will not be accepted.

3.2 Cleaning and examination

All components of the brake caliper must be cleaned thoroughly using spirit and then blasted with dry compressed air. Ensure that no cleaning agents containing mineral oils are used. Cylinder bores and piston skirts must be carefully checked for damage such as deep scorings or corrosion. Damaged and rusty pistons must be changed (repair - set).

3.3 Mounting the brake caliper

After cleaning all components, cylinder bores and grooves as well as pistons and sealing rings must be wetted using KNOTT assembly and pressure fluid.

Insert the sealing rings carefully into the relevant cylinder grooves, ensuring that the sealing surfaces are not damaged in the process.

Then insert the pistons straight into the bores in turn and press them in, if necessary with the aid of a standard commercially available piston insertion tool. Take maximum care not to allow the pistons to tilt inside the bores.

Following the space between piston and cylinder hole must be filled app. half with Knott-silicon-groose of the seal- or repair set. Check that the area where the dust cap will be fixed, is free of silicon groose to guarantee the best fit of the dust cap.

The next work process is to upturn the dust sealing caps over the ends of the pistons and to press them into the relevant grooves of the housing. In some versions, remember that the dust sealing plugs must be secured in the housing using a clamping ring. In four-piston fixed caliper brake types, the clamping rings must be fastened so that the recesses are positioned opposite each other.

The brake caliper must then be remounted in the vehicle, taking care to observe the instructions of the vehicle manufacturer as regards the fixing screws and tightening torques used.

Mount the brake pads as described under point 2.2, fill the brake unit with brake fluid and bleed according to the provided instructions.

After completing final seal, function and performance testing, check the level of the brake fluid again in the tank and correct if necessary.