Function of the disc brake

It is generally known that "hydraulic transmission" will yield the best results with regard to response time, pressure build-up time and uniform force transmission while allowing a sensitive brake application.

The simultaneous braking of all wheels (provided with brakes) is possible because of *Pascal's principle* which states: "Pressure applied at any point of an enclosed fluid is transmitted without loss to all other parts of the fluid".

The hydraulic pressure is built up in the main brake cylinder by actuating the brake pedal and acts (in a closed system) on the wheel cylinders and caliper pistons. The pressure acting on the caliper pistons thereby generates the clamping force, pressing the brake liners simultaneously against the rotating disc.

$$\text{Fluid pressure (P)} = \frac{\text{Force (t)}}{\text{Cross section area (s)}}$$

This shows that the braking effect is determined by the contact pressure of the brake liners, which in turn increases with the pedal force thus generating the hydraulic pressure.

In disc brakes, the sliding piston is sealed against the caliper housing (fluid part) by a sealing ring (see Fig. 2).

This pre-stressed rubber seal which surrounds the caliper also serves to retract the piston after pressure decrease (roll-back) and to automatically readjust excessive brake clearance due to pad wear.

The rollback force of the sealing ring causes the piston to return to its original position when the pressure decreases.

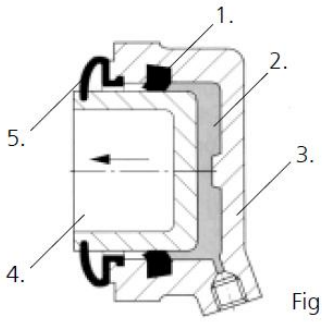

Fig. 2

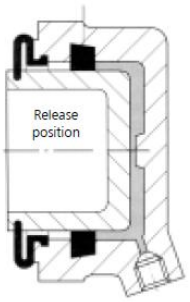

Fig. 3

1. Sealing ring
2. Fluid
3. Housing
4. Piston
5. Dust seal (dust cover)

To prevent clearance increase due to disc distortion, excessive disc runout or heavy vibration during regular driving, it is possible to slightly displace the piston in the direction of the caliper housing. However, the knock-back effect will always retract the piston into its original position (see Fig. 3).

With increasing clearance (due to wear) the piston has to travel a longer distance (than with new pads). The piston will slip through the sealing ring, as its retracting force is now less than the friction force. The readjustment takes place infinitely, i.e. adapting to the wear.

A dust seal is provided to prevent contamination of the piston and cylinder surfaces from the outside (road dust, abrasive pad wear, splash water, etc.).