Free of Problematic Slipping Noises Ingeniously Simple - Simply ingenious!

Unique patented alignment mechanism guarantees slip-free operation for caliper brakes

The electromagnetic spring applied brake ROBA®-diskstop® from *mayr*® Antriebstechnik is built similar to the brake calliper on a car disk brake. Such calliper brakes are at the forefront of elevator drive technology. They are usually noise-damped and equipped with release monitoring and hand release devices. The ROBA®-diskstop®, however, differs from other designs in one very important technical detail. It is equipped with a so-called 'alignment mechanism' which ensures that the brake disk runs slip-free between the friction linings in all operation conditions.

ROBA®-diskstop® safety brakes are usually mounted onto a brake disk which is connected directly with the drive sheave. In a de-energised condition, including during emergency off or power failure, they are closed. Using the force, of helical springs, brake linings 'clamp' the brake disk and ensure reliable system stoppage. On magnetic coil energisation, an armature disk is pulled against the helical spring force to the coil carrier and the brakes are released. A microswitch monitors the brake release. This prevents the drive starting up before the brakes are open. The built-in hand release allows mechanical opening of the de-energised brake for inspection or maintenance work.

Such modern, floating bearing calliper brakes are, today, the accepted and approved standard technology in elevator technology. They are robust and extremely reliable. Operational experience, however, has shown that noises can occur, caused by light contact of the friction linings against the brake disk, which is usually made of grey cast iron or magnetisable steels. Because of the floating brake bearing and the magnetic effect caused by the energised coil, the brake follows the movement of the brake disk.

This behaviour leads to continuous slipping. This has no negative effect on the friction surface wear and produces no torque worthy of note. However, it produces noises, which in many applications prove unacceptable. Elevator passengers become nervous if they hear noises which they cannot interpret or cannot identify as familiar sounds. A grinding noise sounds threatening, even if it is completely harmless from a safety point of view.

In order to solve the problem of continuous slipping on a released brake, the brake specialists *mayr*® Antriebstechnik have developed an alignment mechanism. It ensures that there is an equal air gap on both the left and the right sides of the brake disk. Even if the friction surfaces wear unevenly, this patented construction ensures that the brake disk can rotate freely, when it is released, between the two friction surfaces due to the equal air gap.

The problem has been solved with the help of a bracket-type friction and clamping device. This device is frictionally locked with the fixed bolt, onto which the brake housing is also floating bearing-mounted. The bolt is anchored to the fixed machine housing. One end of the friction and clamping device is fixed to the axially moveable armature disk, the other to the floating bearing-mounted brake housing. This arrangement ensures that as the brake is released, the movement of the armature disk simultaneously produces a movement of the brake calliper in the opposite direction, resulting in an even air gap on both sides of the brake disc. The frictionally locked clamping on the attachment bolt acts as a pivot.

Before the alignment mechanism 'invention', engineers tried to solve the problem by exact alignment of the air gap. This, however, was not a reliable solution. The load on the cables caused the drive sheave to bend during operation. This caused relative motion between the fixed housing and the rotating brake disk. This in turn led to continuous slipping on the armature disk friction linings if the relative motion was larger than the preadjusted air gap.

Continuous slipping can, as mentioned previously, also occur simply because of the magnetic attraction between the brake

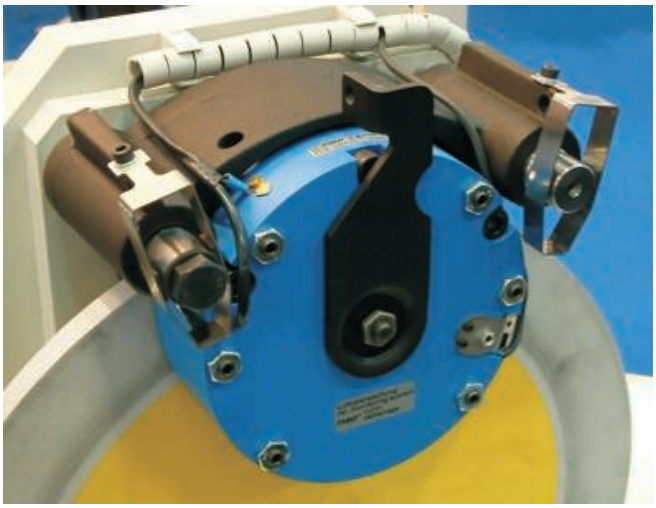

Fig. 1: The ROBA®-diskstop® is exceptionally robust and reliable. A patented alignment mechanism ensures that the brake disk runs slip-free between the friction linings during operation. The brake works with a relatively large air gap and is equipped with a highly effective patented noise-damping system which minimises switching noise even with worn linings and increased air gaps.

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armature disc and the brake disk itself. Further influence variables are the air gap and the so-called brake disk 'impact'. The smaller the air gap and the larger the impact, the higher is the danger of brake disk slipping and noise production when the brake is released. Some brake manufacturers work with very small air gaps in order to keep the switching noises low. This can lead to continuous slipping and to unreliable function of the release monitoring microswitch due to the very small brake switching paths. The switch may signalise malfunctions although the brake is working correctly.

The ROBA®-diskstop® from *mayr®* Antriebstechnik works with a relatively large air gap, yet switches virtually silently. It is equipped with a highly effective patented noise-damping system which minimises the switching noises even with worn linings and increased air gaps. All standard drive conceptions produce caliper brakes which work directly onto a brake disk which is fixed permanently to a drive sheave. This design can be used to reach high braking torques. The braking torque level can be calculated from the diameter of the disk on which the brakes are mounted and the number of brakes which are distributed evenly on the circumference. Usually, at least two brakes are used. In this design, the ROBA®-diskstop® is authorised by TÜV (Technical Inspectorate) for drive systems with the highest safety demands, such as elevators for people. Because of the direct drive sheave arrangement, the ROBA®-diskstop® is also a suitable protective device for upward-moving lift cages against excessive speeds.

mayr® Antriebstechnik's program includes brake systems for all modern elevator drive concepts. With the market launch of ROBA-stop®-Z, the ROBA-stop®-silenzio®, the ROBA®-disk stop® and countless usage-optimised brake solutions, the firm have introduced a completely new and technologically superior generation of elevator brakes. The drive technology specialist from Mauerstetten also offers the widest and most modern product palette of safety brakes, based on decades of experience in development, production and usage.

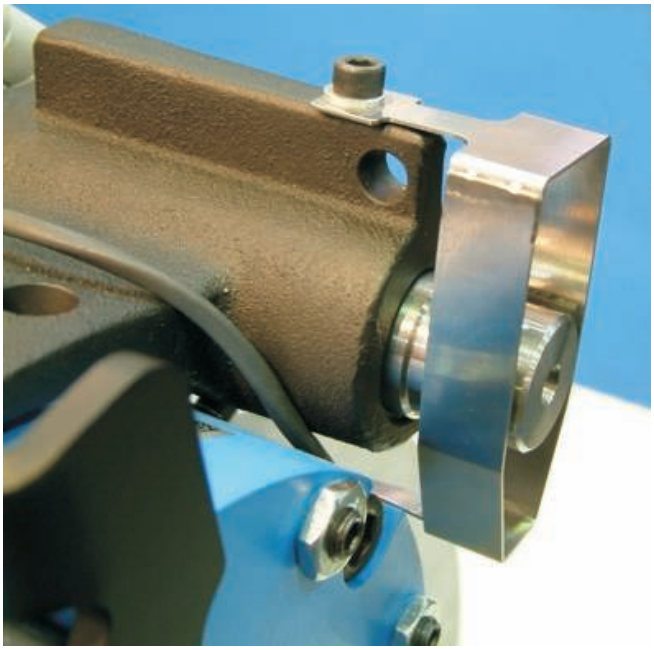

Fig. 2: The alignment mechanism is an ingenious patented device. It ensures that, on release of the brake, the movement of the armature disk simultaneously produces a movement of the brake calliper in the opposite direction, creating an even air gap on both sides of the brake disk. The frictionally locked clamping on the attachment bolt acts as a pivot.

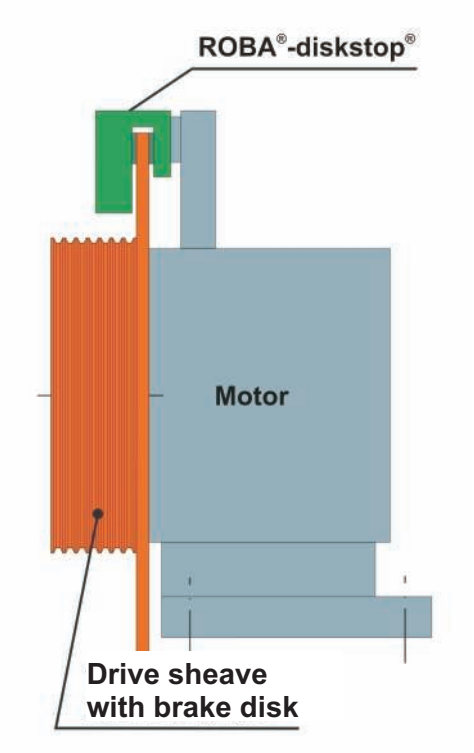

Fig. 3: The braking torque level can be calculated from the diameter of the disk on which the ROBA®-diskstop® brakes are mounted, and the number of brakes which are evenly distributed on the circumference. Usually, at least two brakes are used.

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