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Quiet, please!

Low noise motors offer designers new horizons

Apart from their mechanical qualities, quiet running is another important criterion for selection in the field of small electric motors deployed in numerous drives. One option for minimising generated noise is through reduction of the typical synchronous motors cogging torque, the other by reducing the effects of the alternating magnetic field. The Rotek manufacturer has taken this to heart in his ›Roslyde‹ motor development - an extremely quiet, smooth running motor. This feature renders the motor the preferred choice for noise-sensitive environments.

► **SYNCHRONOUS TECHNOLOGY HAS** its advantages in many applications. Reason: The motors are particularly energy-efficient and of highly compact construction thanks to their powerful permanent magnet rotors and efficient stator windings - the main difference compared to conventional capacitor start AC motors. They offer constant speed irrespective of load and allow starting and stopping within fractions of a second. The detent torque, which renders brakes superfluous, is also typical.

Many customers are becoming increasingly sensitive about noisy drives. This

is where the often advantageous detent torque of synchronous motors is a disadvantage. Magnetic ›locking‹ of the rotor poles to stator teeth causes oscillations which manifest as structural sound.

The frequency and time characteristics of sound will, among other, determine whether the sound is perceived as disturbing. Certain frequencies are perceived to be louder than they actually are. Penetrating, shrill sounds such as whistling or screeching are perceived as unpleasant. We also perceive sound containing non-harmonising frequencies as

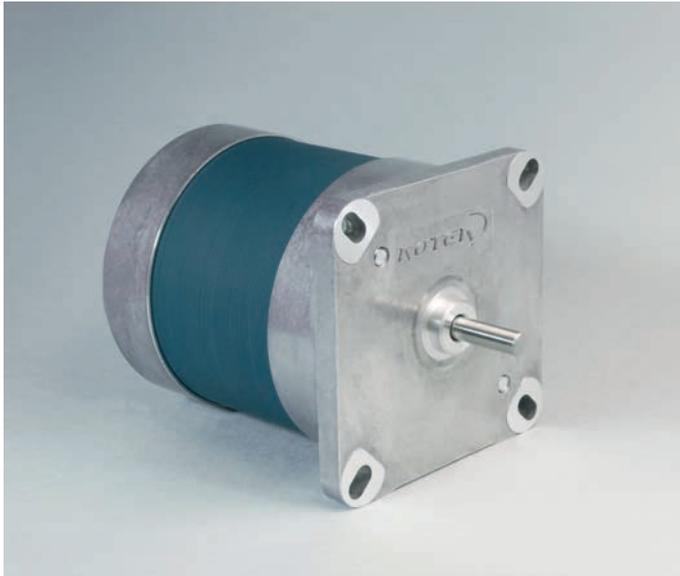
► SAVINGS TIP

If you are a designer needing to combine individualised small drives with the top economy you will typically find in standard products, then Rotek is the place to be. The company from the North can offer its customers a modular system with millions of product variants. The motto in Bremerhaven is flexible manufacturing, offering tailor-made solutions to any application. The low noise Roslyde motors have the same external design as the conventional synchronous Rotek motors, meaning that virtually all the components in a range will fit. A comprehensive range of gears complements the motor programme. The motors are available for voltages of 24 V to 230 V single phase, 230 V three-phase for converter operation and 400 V three-phase. Rotek will also manufacture designs for special voltages and increased power for short-time operation.



annoying. Deep and coarse noises such as buzzing or humming are also deemed disturbing. Specification of the pure acoustic pressure level in dB is therefore of limited use to the customer. This is because acoustic pressure is only one aspect of our perception. What is much more decisive is whether the sound is pleasant and appropriate to the product. The sound of the roaring machine of a heavy motorcycle is generally welcomed. Drives

which are used in living areas, however, are not generally expected to generate annoying parasitic noise. Even acoustics without noticeable frequency excursions are optimal in electric motors, with rather subdued high and low frequencies and no prominent individual sounds. The objective is an even, subdued and hardly audible humming. This is the objective which the Bremerhaven manufacturer Rotek has achieved with his new ›Ros-



lyde‹ synchronous motor type series. The extremely smooth running motor is an in-house development and its design is termed SmoothDrive technology. Its silent and smooth running fully justifies its name.

The ›secret‹ of silent motors: the quietest possible running

Explains Klaus Treusch, Technical Manager and Developer at Rotek: »The first point of attack to minimise acoustic emission should always be the motor itself as the source of vibrations.« To achieve the quietest possible and vibration-free running characteristics, Rotek focused on two aspects in their development of the Roslyde. The alternating magnetic field generated by the stator winding excites vibrations in the drive; this effect could be minimised through optimisation of the winding method. The typical synchronous motor cogging torque was simultaneously minimised through permanent magnet rotor design modifications. Since the rotor is ground between two centres, it is balanced well →

Small electric motor in Rotek's ›Roslyde‹ range. Especially the optimised winding technique and permanent magnet rotor design modifications are reasons why the motor is among the quietest on the market, says the manufacturer.



The manufacturer complements this motor with his equally silent, low vibration gearbox. We should after all always consider the drive unit in its entirety, because an unsuitable gearbox may cause it all to vibrate.

enough to obviate any additional work steps.

The bearings are also a potential source of noise. The more accurate they are, the better. Since Rotek always uses specially lubricated high-quality ball bearings, these require no modifications either. And the particularly precise machining of the bearing shields ensures symmetrical support.

The housing often resonates with the vibrations

The level of noise of a drive is furthermore decisively affected by mechanical components such as gearboxes. »We should always analyse the entire drive

bres and modern plastics, also have a significant effect.

Particularly efficient operation as AC motors

Rotek can offer particularly quiet gearboxes for applications sensitive to noise; together with the low vibration Roslyde, these lead to optimal results, according to the Bremerhaven-based company. This is because airborne sound is not the only important parameter in the drive. Vibrations may cause the housing of the entire application to resonate, like the body of a violin. The thus amplified structural noise of the drive creates not only unpleasant vibrations, but also undesirable emission of noise.



»No drive can be absolutely silent. But we are not far from it. «

Klaus Treusch, Technical Manager and Developer at Rotek in Bremerhaven

unit, because the majority of small motors are combined with gearboxes,« says Klaus Treusch. The vibrations of the motor are transferred to the gearbox. The mechanical gear components also generate their own running noises. This is why, apart from the precision, especially the type of meshing and the backlash significantly affect the generation of noise. Lubricants and dampening materials for toothed gears, such as hard fi-

The Roslyde motors distinguish themselves by more than quiet, smooth running and low vibrations. The manufacturer points out another positive aspect: They are also very energy-efficient. Especially as three-phase motors they can reach excellent efficiencies of up to 90 percent, says Rotek, with little heating up. The single phase motors produce output powers from 11 to 20 W and three-phase motors deliver up to 40 W.

The speed of 50 Hz four pole AC motors is 1500 rpm.

The motors are available for conventional voltages of 24 V to 230 V single phase and 230 V three-phase for converter operation and 400 V three-phase. Special ratings up to 500 V three-phase are also available on customer request.

»We have in the course of this development ensured that the Roslyde motors fit perfectly into our modular system,« reports Rolf Treusch, Rotek's Commercial Manager. »Virtually no new parts are required for these motors and they may be combined with all existing motors and gearboxes.« Three new flat gearbox type series were included in our range, for torques from 10 to 30 Nm. Other options include special gearboxes, mechanical adaptations of the housings, special shafts, individual power terminals with special cables and plugs and also optional accessories such as encoders.

Whenever silence is required

Roslyde motors are used, for instance, as screw conveyor drives in pellet kitchen stoves and wood burning fireplace inserts. They may also drive the rotor of rotary heat exchangers. They also find application in silent dosing pumps and analysis apparatus in hospitals and laboratories. They are also first choice when silence is needed and when new design solutions are demanded for additional markets. Designer Klaus Treusch is quite sure: »No drive can be absolutely silent. But we are not far from it.« ■

INFO

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