

Linear drives unplugged

TR-Electronic, manufacturer of sensors and actuators, has joined forces with Bosch Rexroth AG to produce wireless linear drives

During the Hannover Messe Industrie trade fair Swabian company TR-Electronic demonstrated completely wireless linear direct drives with position feedback for the first time. Key components are magnetostrictive linear encoders with drive components from Rexroth.

Modern handling and positioning systems fulfill high requirements on speed and precision, but also require a high level of preventive maintenance. Cables and cable carriers in particular are subject to constant wear, which increases considerably as the dynamic movement increases. The LP46 magnetostrictive linear encoders from Swabian manufacturer TR-Electronic GmbH offer a significant advantage. The sensor cable can be permanently installed as the actual measuring system is fixed, and only a small permanent magnet is moved along the closed measuring tube (see box). A complete linear drive system which is free from wear-prone cable connections has been created in cooperation with the drive specialists at Rexroth. The usual arrangement of the IndraDyn L ironless linear motors from Rexroth has also been inverted. The compact secondary part with permanent magnets is moved along the fixed primary part.

The omission of moving cable guides results in reduced friction losses and a reduction in the drive power required. Assembly and maintenance effort are considerably reduced, and the number of plug connections can also be reduced. The wireless linear drive system is much less sensitive to stress caused by shocks and vibrations.

Travel paths up to 450 mm long have already been implemented, and distances of up to one meter are possible. Repeat accuracies in the range of hundredths of a millimeter are possible with the LP 46 wear-resistant, contact-free magnetostrictive linear measuring systems from TR-Electronic. Reference runs are not required, as the system delivers absolute position values at all times.

Successful cooperation

The developers at TR-Electronic have succeeded in reducing cycle times and significantly increasing the resolution of the proven LP46 magnetostrictive linear measuring system. At the same time Rexroth has adapted its compact IndraDrive Cs control devices to the increased range of the position data transmission and prepared the IndraDyn L ironless linear motors for inverted operation. The high performance of the new system solution is apparent in highly dynamic pick-and-place applications for the semiconductor industry. Availability, lifetime and cost effectiveness are considerably increased in comparison to conventional linear axes.

Complete drive system

The LP46 absolute position measuring system has a profile housing

made of extruded aluminium. This flat housing contains the actual sensor element, which absolutely detects the position of one (or several) permanent magnets without contact and wear-free (see box). The profile geometry allows different fixing variants. For linear drives open permanent magnets are used, which are carried along by the guide system of the drive and do not contact the profile of the measuring system. This allows completely contactless position sensing at maximum speed. Alternatively, guided magnetic slides can be used. They enclose the profile head and are moved by push rods mounted on spherical bearings, which allows higher tolerances between drive and measuring system. The LP 46 has been developed by TR-Electronic as a standard system for industrial applications. It is available with most standard interfaces for direct integration into local control loops as well as field bus and Industrial Ethernet networks.

Cost-efficient and compact linear systems are enabled in combination with Rexroth's IndraDyn L ironless linear motors. Linear guides can be smaller in size as they are not subject to shear forces, thanks to the symmetrical design of the motors. Movements with high dynamics and precision are also possible, as the position control of the control devices is not affected by interfering latching forces. As a result higher controller gains can be set.

In addition to a space-saving design and impressive performance data, the IndraDrive Cs servo controllers from Rexroth also feature an extensive portfolio of Ethernet-based communication interfaces. Integrated, certified safety functions enable the implementation of modern safety concepts. IndraDrive Cs support a multitude of encoder types as standard.

A long lifetime and very smooth running characterize the BSHP series of ball rail systems used. Rexroth supplies an extensive range of ball rail systems, roller rail systems and track roller guidance systems for many applications. Miniature ball rail systems are available for especially compact arrangements.

BOX

Magnetostrictive linear measuring system

TR's magnetostrictive linear position sensors detect linear movements and emit them as an electrical signal. The measuring principle of these linear encoders is based on a travel time measurement. A protecting tube contains a tensioned magnetostrictive wire (waveguide), through which current pulses are transmitted. This generates a circular magnetic field around the wire. A non-contact permanent magnet serves as a position sensor, touching the waveguide with its magnetic field. The two differently aligned magnetic fields meet at the measuring point. This triggers a torsion pulse, which moves along the wire in both directions at the speed of sound. The time difference between the emission of the torsion pulse and its arrival at the encoder in the sensor head is converted by the measuring electronics into a displacement-proportional signal, which is made available as a digital or analog output signal.

File 19899

MCL ironless linear motors from Bosch Rexroth (photo: Bosch Rexroth AG)



File 14089

IndraDrive Cs servo controllers from Bosch Rexroth (photo: Bosch Rexroth AG)



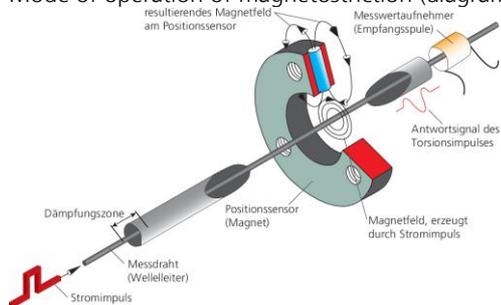
File LAL-LP 46 - 0007_1

Magnetostrictive measuring systems LA46 (tubular housing) and LP46 (profile housing) (photo: TR-Electronic)



File TR-WEGSEN_2012

Mode of operation of magnetostriction (diagram: TR-Electronic)



File Bild_PL_BSHP

Linear guides in the BSHP series (photo: Bosch Rexroth AG)

