SCHAEFFLER

Bearing Supports and Components for Hydraulic Drives and Fluid Pumps

LUK INA FAG

Expertise through knowledge and experience

FAG Kugelfischer was the pioneer of the rolling bearing industry. In 1883, Friedrich Fischer designed a ball mill. This idea is regarded as the historic beginning of the rolling bearing industry. INA's success story began in 1949 with the development of the needle roller and cage assembly by Dr. Georg Schaeffler, an ingenious idea that helped the needle roller bearing achieve an industrial breakthrough. With our two strong product brands INA and FAG, we currently have a high-performance range of rolling bearings as well as products and services of unsurpassed quality due to the joint research and development of both brands.

Our comprehensive range of INA and FAG products for hydraulic systems and fluid pumps is consolidated in the Fluid Technology sector. Bearings and components for these demanding applications must be extremely reliable and efficient. The Fluid Technology sector primarily meets these requirements by developing customized solutions, or, in some cases, by using sophisticated standard components.

Fluid & Pneumatics Sector Management – Your strong partner for hydraulic systems and pumps

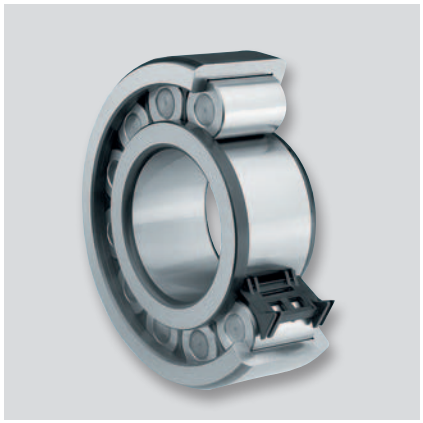
- Expert support
- Complete bearing product range
- Improved efficiency through tighter tolerances
- Extended service life
- X-life premium products
- Certified quality to ISO/TS 16949:2002
- Optimized bearing, seal and material combinations
- BEARINX® calculation program® for the best possible product selection
- State-of-the-art manufacturing facilities for volume-produced, high-precision fine blanked parts, pistons, valves and other products
- Good availability
- Services for all rolling bearing products and applications

The product range

• Needle roller bearings

• Plain bearings and
spherical plain bearings

• Fine blanked parts



• Roller bearings

• Inner rings

• Locknuts

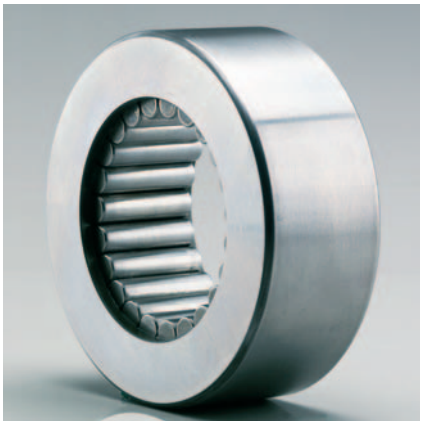
• Ball bearings

• Steel sealing rings

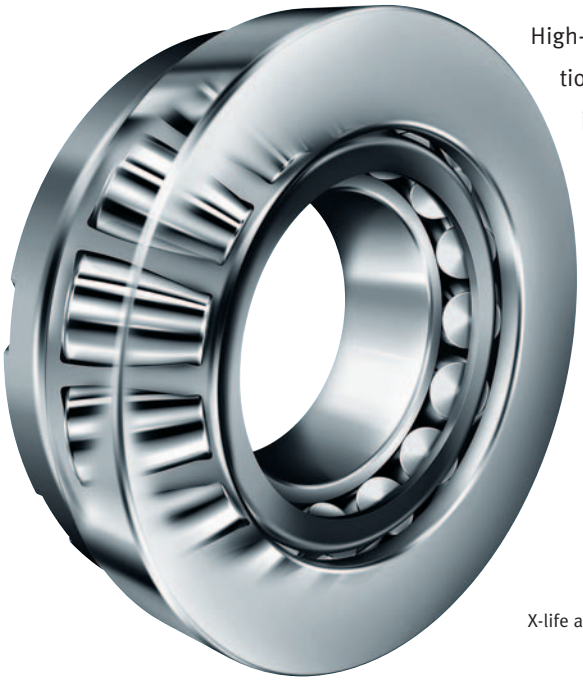
• Pistons and valves

High-torque motors in radial piston or cam ring design

Cam curves of a high-torque motor



Yoke-type track roller with optimized load ratings



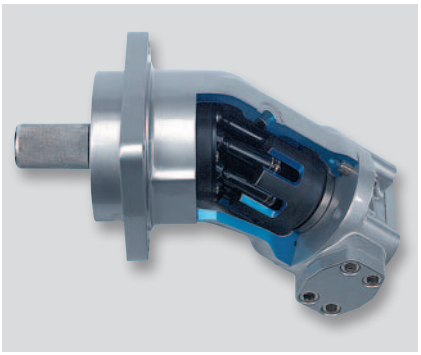
X-life axial spherical roller bearing

High-torque motors – ideal for operations requiring high torques, involving hard stops and abrupt reverse motions. Classic applications include machines and equipment, agricultural machinery, crushers, feed devices, rolling mills, paper machines and transport facilities for bulk material. Extremely high torques (e. g. 1,400,000 Nm) are achieved under rough operating conditions. High-torque motors replace conventional gearboxes and motors and typically offer low start-up friction and stick-slip free motion at low speeds. The high-quality cylindrical roller bearings, inner rings ground without spiral marks, low-friction axial spherical roller bearings and other components made by Schaeffler contribute to the functional reliability of these powerful motors.

Typical for INA bearings and components

- Cylindrical roller bearings provide smooth operation with high static and dynamic radial load carrying capacity.
- Steel sealing rings are characterized by low leakage and a small contact-force. The sealing force is precisely determined to ensure efficient seals and minimal friction.
- Optimally adjusted, low-wear components, such as rolling elements with special coating, are used in high-torque motors.

Bent axis pumps and motors



Bent axis pump

Tapered roller bearing for drive flange

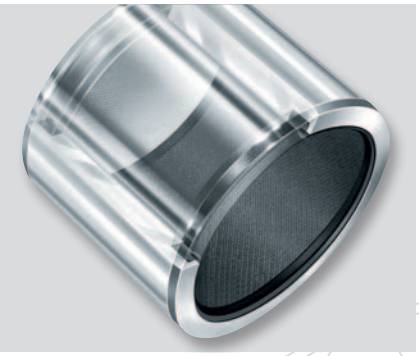
Bent axis pumps are ready-to-mount functional units used in hydraulic systems to generate pressure. The stroke motion of the axially oscillating pistons is generated by the main output axis that is bent towards the rotor axis.

Besides bearings, Schaeffler offers geometrically accurate steel sealing rings with split butt joints in designs with centered or eccentric crowned outside diameter as well as with other contours. Our product range also includes high-precision control disks and other fine blanked parts with consistently accurate contours and smooth, perpendicular cutting surfaces that can also be produced from metal composites.

INA steel sealing rings DRG with excellent surface quality

- Low contact force, minimal leakage
- Low-wear, high resistance against abrasion
- Oil and temperature resistant
- Application-specific designs

Hydraulics in construction machinery



Hydraulics is regarded as an indispensable source of power for earth moving equipment and transporters. Hydraulic cylinders with maintenance-free spherical plain bearings made by ELGES are coated with ELGOGLIDE® in the sliding area, eliminating the need for lubrication. Our low-friction dry plain bearings with high load-carrying capacity are particularly suitable for oscillating motion with heavy loads. The stable, moisture-resistant connection between the sliding layer and the support body has been a successful solution for many years now. The sliding material does not swell, does not weld with metal and is largely chemically resistant.

- Maintenance-free and environmentally friendly
- Small dimensions, high performance
- Easy to install, little space required
- Individual designs based on customer requirements

Axial piston pumps in swash plate design

The inclined drive pulley and the swash plate are firmly attached to the drive shaft while the cylinder block is stationary. The axial bearings transmit the high forces from the pistons that act in the direction of the stroke. Out of balance and radial forces are supported by stable, speed-optimized cylindrical roller bearings.

Favorable bearing technology

- Smooth and low-friction operation even with extremely high loads
- Good static and dynamic load carrying capacity

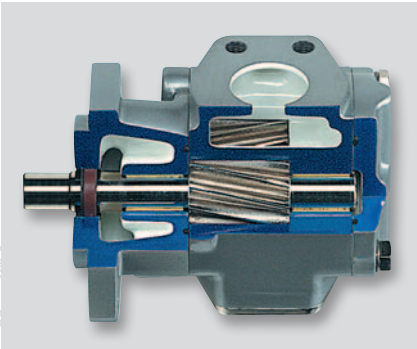
Axial roller bearing

Swash plate pumps with adjustable cradle

INA bearings provide support for the precise operation of excavators or road construction equipment with highly accurate positioning and constantly changing strength ratios. Full-complement or nearly full-complement cylindrical roller bearings allow precise settings for the flow rate, even at high pressures. Components such as bearing segments, pressure pads and steel sealing rings are also preferred choices. Ground inner rings with extremely wear resistant ceramic coating minimize leakage and abrasion of the seals.

Cradle bearing

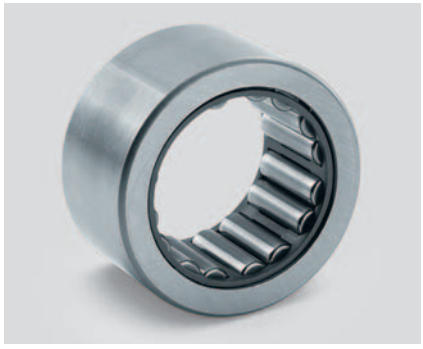
Gear pumps



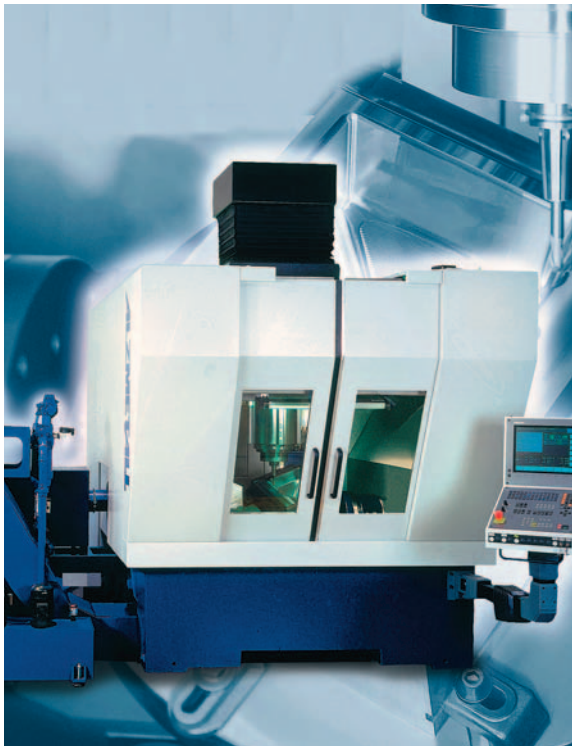
Gear pumps are use in almost all industrial sectors – they are inconspicuous and effective. These pumps supply coolants, transport foods, keep hydraulic systems in motion and are also used in mobile equipment, agricultural machinery and municipal vehicles. INA metal-polymer composite plain bearings or high-quality needle roller bearings ensure that gears move with hardly any losses. The supply medium is generally used as a lubricant for the bearings.

For the supply of fluids with little lubrication effects, needle roller bearings are increasingly used instead of plain bearings in order to achieve the longest service life possible for the gear pump. In addition, higher speeds can be achieved with decreasing heat generation.

Customer-specific fine blanked parts



Twinset needle roller bearing



Hydrostatic gearboxes

These gearboxes transfer continuously variable driving force in quads, riding lawnmowers, tractors and all-terrain vehicles. In addition to rolling bearings and plain bearings, INA precision parts such as hollow pistons, valves and fine blanked parts ensure reliable operation.

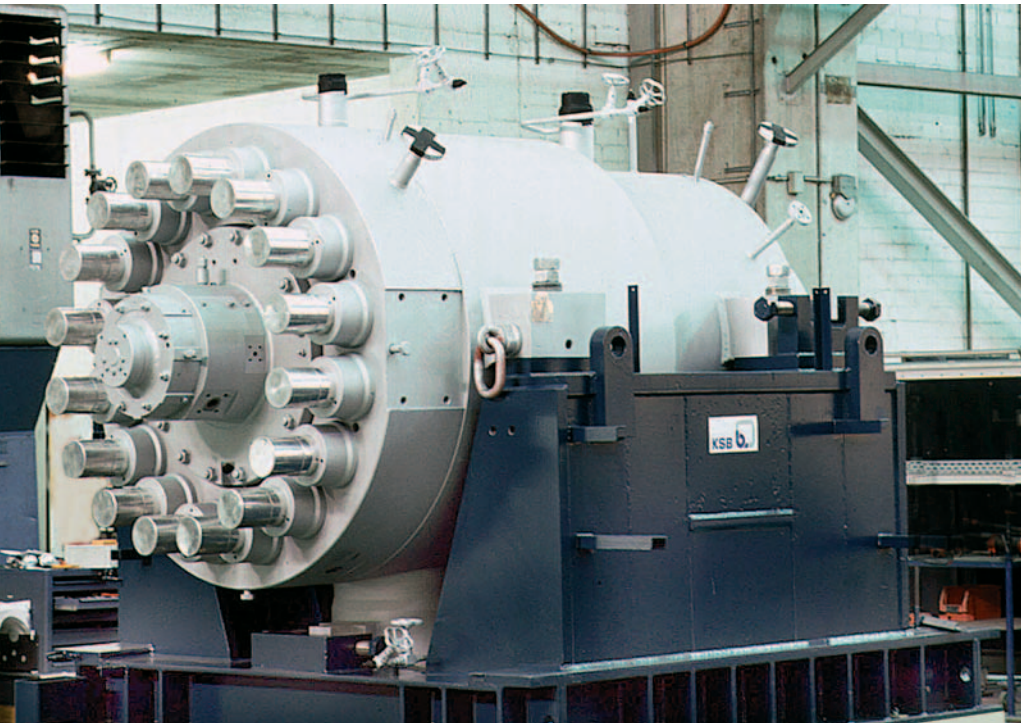
Quad ride (Photograph courtesy of: Reinert Ranch, Trebendorf)

Advantages of these components

- Made from hardened rolling bearing steel
- Cost-efficient
- Low-mass
- Wear-resistant

Deep-drawn pistons and valves

Fluid pumps, valves and butterfly valves

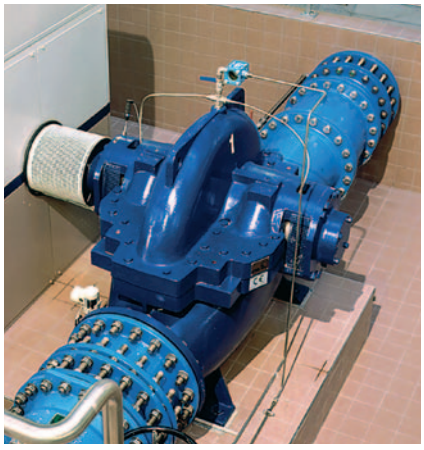


Barrel-type pump for power engineering (Photograph courtesy of: KSB Frankenthal)

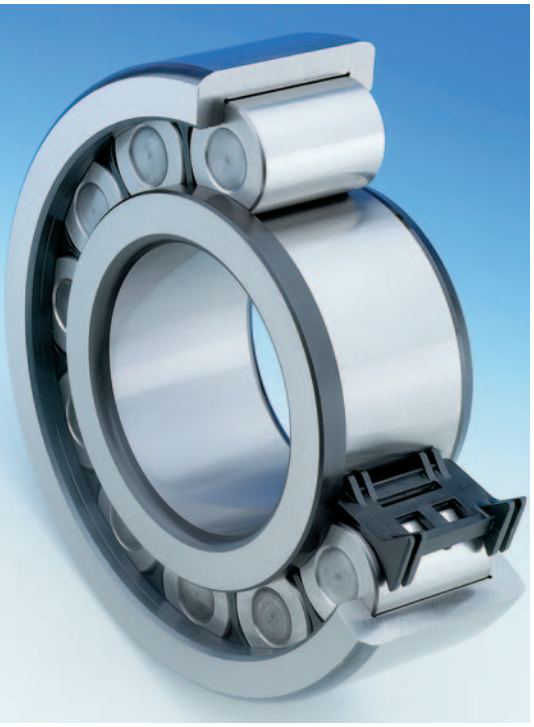
The Fluid & Pneumatics Sector Management offers efficient rolling and plain bearings for all pumps: Those used to supply drinking water, water for firefighting or hot water or cooling water, to supply aggressive and abrasive media and to dispose of wastewater as well as convey high-viscosity materials. They ensure smooth operation over a long period of time. The pump speed and load determine whether ball bearings, cylindrical roller bearings, spherical roller bearings or plain bearings are installed. Rolling and plain bearings from the INA and FAG brands help ensure that valves and butterfly valves work reliably even after long downtimes, both manually and when a drive is used.

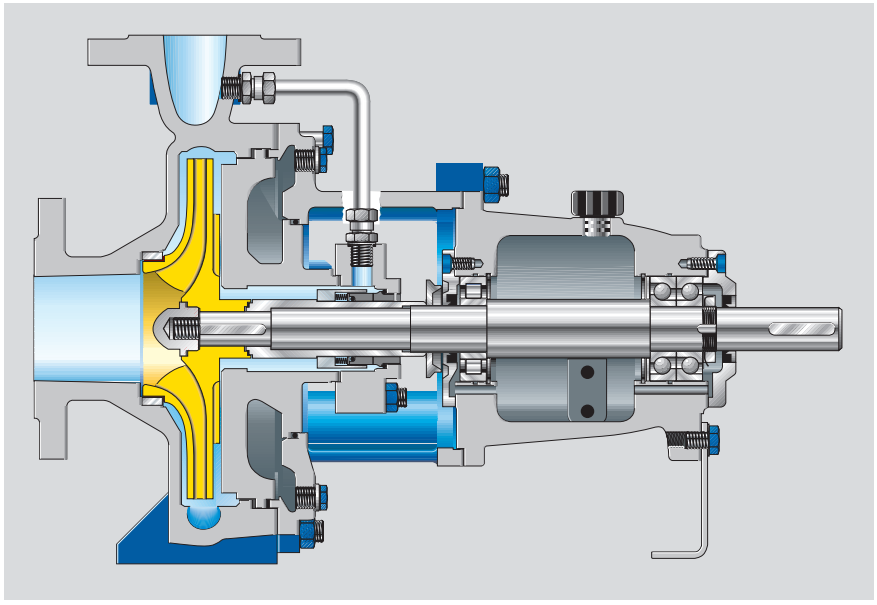
Various pump designs and the wide range of applications in fluid technology require a large number of bearing types, designs, cage variants and seals. A team of experts makes sure that you receive a custom-made solution for any application you can think of. For instance, we may use X-life bearings that satisfy even the highest requirements.

Generation C deep groove ball bearing



Pump for water supply
(Photograph courtesy of: KSB Frankenthal)





Bearing supports in a standard chemical pump (Photograph courtesy of: KSB Frankenthal)

More cost-efficiency.
More operating safety.

X-life stands for premium products from the brands INA and FAG and provides development engineers with totally new design perspectives. State-of-the-art manufacturing technologies enable a better, more uniform surface to be achieved over the whole contact surface between the rolling elements and race-way. As a result, under identical load there is a significant reduction in the stress conditions present on the rolling elements and raceway.

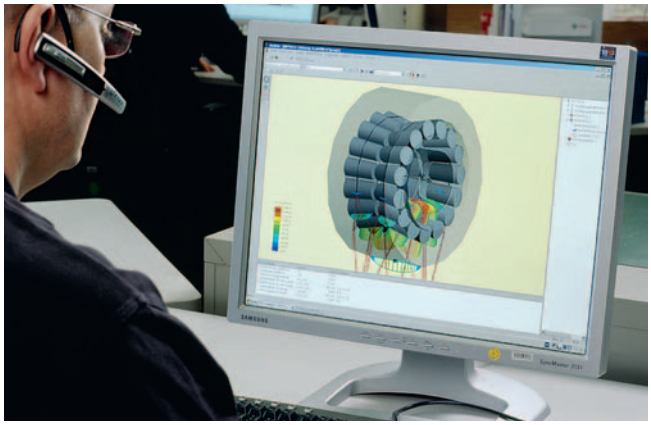
This means

- reduced friction and lower bearing temperatures
- less strain is placed on the lubricant
- a higher basic dynamic load rating
- an increased basic rating life.

Therefore, the operating life of X-life bearings is considerably longer under the same operating conditions. Alternatively, higher loads can now be applied while maintaining the same rating life values.

With their optimized characteristics, X-life bearings enable, for example, downsizing of the bearing support. Furthermore, the improved price/performance ratio ultimately increases the overall cost-effectiveness of the bearing support.

Comprehensive service – With in-depth understanding of fluid technology



Expert technical consultation

Our fluid and pneumatics technology team offers technical consultation for all aspects of the lifecycle of rolling and plain bearings as well as customer-specific components. Our experts possess an outstanding level of knowledge of fluid technology. Customers can expect expert consultation and support with bearing design and product selection.

***medias*® – Much more than just a catalog**

Our electronic support and selection system ***medias*®** *professional* provides information on more than 40,000 standard products for approximately 60 industrial sectors. For all bearings, ***medias*®** *professional* lets you calculate the modified rating life to DIN/ISO 281. You will find the ***medias*®** product catalog on the Internet at: http://medias.schaeffler.com

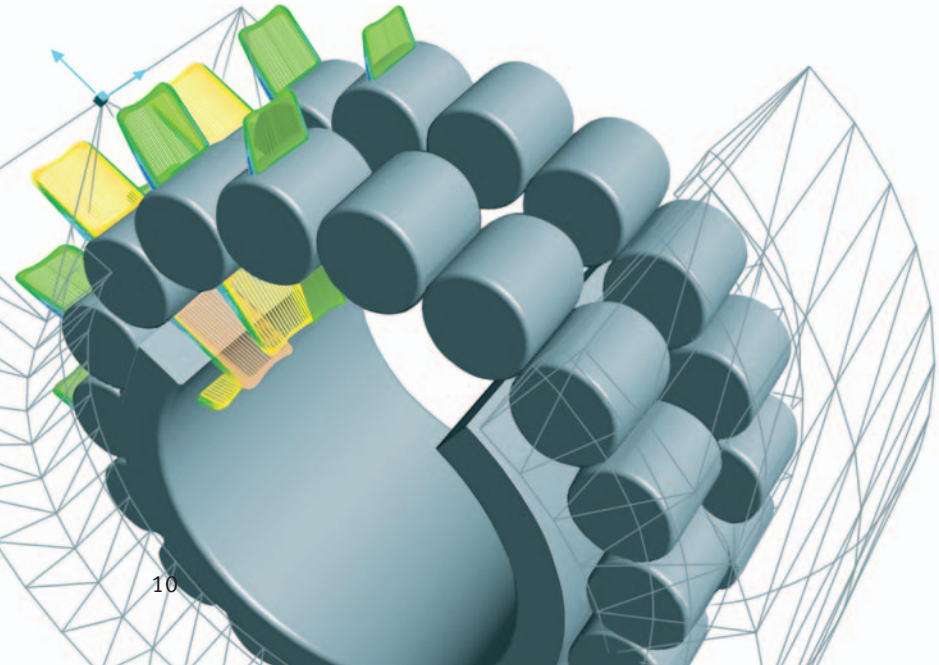
Reliable calculation with BEARINX®

BEARINX® can be used to perform detailed analyses on rolling bearings including individual rolling contacts in order to calculate their suitability for each application. Rolling bearing loads in complex machine systems can be calculated, represented and documented by taking a large number of ambient conditions into account. The same applies for natural frequencies, natural vibration forms, critical speeds and out-of-balance responses for shaft systems.

With the BEARINX®-online “Easy Friction” module you can now determine the friction values of Schaeffler rolling bearings according to a detailed procedure.

Thin coating – Great effect

Rolling bearings that are “correctly” coated have a longer life because surface coating is an effective means of preventing friction, corrosion and wear.



Schaeffler supplies finished coated products in a modular system depending on the purpose. Bearings supplied with the Triondur® coating system, for example, can significantly reduce friction. We are continuously developing new coatings and the relevant desposition techniques in our in-house Surface Technology Center. Our modular system already contains around 40 different surface coatings.

Our range of services –
Your market success

Our global network of manufacturing and service locations and consistent application of the total cost of ownership principle are milestones on the path to joint business success. As part of its industrial services, Schaeffler offers high-quality products, services and training in the areas mounting, lubrication, condition monitoring and reconditioning of rolling bearings. An example:

Monitoring ensures safety

The FAG SmartCheck – intelligent machine monitoring in a new dimension: Easy to handle and operate without expert knowledge. With its new technologies and forward-looking functions, this innovative sensor makes a valuable contribution to optimizing processes and increases the safety of your machines and systems. In combination with Schaeffler's unique full service for all aspects of machine diagnostics and rolling bearings, our compact monitor is an important milestone in TCO.

FAG SmartCheck:
The advantages at a glance

- Reliable machine and process monitoring
- Optimization of processes by bundling information
- Reporting provided as a customer service
- Patented, innovative alarm function
- Access concept for data security
- Several years of history data can be stored
- Easy to mount and integrate in your machine control system

You will find further information and publications available for download and to order on the Internet at:
www.schaeffler.de/fluid_technology

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