

Factsheet

Technology Area Industrial Hydraulics

Bosch Rexroth. The Drive & Control Company

Bosch Rexroth is one of the leading specialists worldwide in drive and control technology. Under the brand name Rexroth, the company supplies tailored solutions for driving, controlling and moving. Bosch Rexroth is a partner for industrial applications and factory automation, mobile applications and using renewable energies. The Drive & Control Company is the supplier of choice to more than 500,000 customers for high quality electrical, hydraulic, mechatronic and pneumatic components and systems. In more than 80 countries Rexroth is a reliable partner for its customers, supporting their production of safe and efficient machines and thereby contributing to the economical use of natural resources.

Multi-disciplinary know-how is the basis for innovative solutions that are used as components or customized systems. Because Rexroth offers a complete range of drives and controls, advice to customers is free of technological bias, resulting in the most appropriate solution for the task at hand. Rexroth technologies are used in all branches of industry. As system-level partner, service provider and supplier, Rexroth has a fund of knowledge in more than 30 industrial sectors. Comprehensive service offerings fortify Rexroth's leading position worldwide as a partner for machine and system manufacturers.

In 2008, Bosch Rexroth achieved sales of around 5.9 billion Euro with 35,300 employees. The company was created in 2001 through the merger of Bosch Automationstechnik and Mannesmann Rexroth. The entrepreneurial tradition of both companies continues under one roof. In the case of the Rexroth family this extends back to 1795 and in the case of the Bosch family back to 1886.

1. Short Profile of the Technology Field Industrial Hydraulics

Rexroth is a worldwide leading manufacturer of hydraulic components and systems with over 50 years of experience in this field of drive technology. The completely scalable product program comprises both standard and application-specific products as well as customer-specific high-quality special solutions. As a leader in electro-hydraulic technology Rexroth is combining the specific advantages of hydraulics, such as a high power-density ratio, the straightforward generation of motion with high dynamics and precision with the advantages of the latest microelectronics. Hydraulics-compatible closed loop control electronics and open loop motion controls simplify the incorporation into modern open control architectures, at the same time ensuring greater flexibility and efficiency. Rexroth combines extensive system know-how in applications

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centers for various industries. Rexroth is therefore the ideal partner in the development of highly-efficient machines and in the engineering of turnkey systems – from the first contact through to commissioning as well during the complete life cycle of the machine or installation.

2. Products

Hydraulic pumps and motors, hydraulic cylinders, shift valves, proportional valves, electronic components and systems, open loop motion controllers, control plates, memory and memory fittings, power units and accessories, hydraulic and electromechanical automation solutions for mass-produced machines or individual projects, if required including overall project responsibility.

3. Industries

Metallurgy, Machine tools, Mining, Presses, Plastic processing and die-casting machines, Wood, printing and paper, Renewable energies, Marine applications, Stage technology, Entertainment, Motion systems, Testing and simulation technology, Research technology, Energy technology, Materials handling, Civil engineering, Transport technology, Ship lifts, Dredgers, Offshore, Special technology, Naval technology

4. Trends in Technology

Quieter, more energy-efficient and safer: current development trends show how much potential modern hydraulics still have to offer. In the area of noise reduction, Rexroth is setting the standard with its whispering pumps and power units. New axial piston pumps operate at significantly reduced noise levels and induce less pulsation in the lines. Power units especially optimized for noise control reduce noise emissions by up to 20dB(A). Rexroth is opening up new possibilities with its variable speed pump drives. Outside production periods and during operation at reduced load, the frequency converter reduces the speed of the electric motor and the fixed pump. As soon as the hydraulic system requires more performance, the converter adjusts the speed appropriately.

An increase in performance with electro-hydraulics: Electro-hydraulics performance data substantiates the new dimensions in performance: Acceleration speeds of up to 80 G, rapid travel of up to 10 m/s and control cycles measured in milliseconds have in the meantime become standard industrial practice. With nibbling machines, Rexroth axes move 30 tons of

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power with up to 1,500 double strokes per minute, in engraving mode even up to 4,000 double strokes. With aluminium die-casting machines, electro-hydraulic axes are producing deceleration times from 10 m/s to 0 within 30–40 ms. Depending on the position measuring device, precise measurements of up to 1µ for feed axes with clamping machine tools are state-of-the-art technology.

Rexroth relies throughout on **open systems** and **internationally accepted standards**. Software is increasingly replacing hardware in automation. By means of digitalization, Rexroth has achieved a **decoupling of drive physics and automation**. With regard to control technology, it is now of little significance whether a motion is carried out electrically, pneumatically or hydraulically. **Engineering environments, programming, parametrization and diagnostics possibilities are in line with common standards**. Specially developed software modules from Rexroth automatically balance any non-linearities that occur in hydraulics. In this way the closed loop control electronics compensates for the impact of the differential cylinder, linearizes the flow, pressure loss and solenoid characteristics of the valves, or indicates the degree of damping of the drive by means of condition feedback. During assembly, the machine manufacturer connects the intelligent hydraulic axis to the superordinate open loop control system, which is then put into operation by the software. Additionally, there are **intelligent technological functions for special applications**, which further facilitate commissioning. With the complete Plug & Run Axes, Rexroth assumes the dimensioning, manufacture and calibration to deliver complete, pre-tested and ready-to-install axes.

System responsibility: By combining digital closed loop control electronics and proven mechanics, Rexroth is also offering **complete electro-hydraulic systems** incorporating mechanics, electronics and software. In this way the hydraulics specialist assumes responsibility for the whole system. In close agreement with the customer, Rexroth designs the axes with the help of specially-designed simulation programs, on the basis of the necessary framework data such as speed, distance, dynamics and positioning accuracy, as well as integrated control and fieldbus systems. The complete, pre-tested and ready-to-install systems are delivered directly for assembly onto the machine or to the site.

Application- and customer-specific solutions: Customers are increasingly demanding competent and overall support when **developing innovative drive and control solutions**. Internationally operating Rexroth applications centers are available as partners for the development of a wide range of applications. They offer advice on project design, development and testing, right through to the stage where the product is ready for series production. Highly-specialized personnel work in these industry-structured applications centers. These specialists offer expertise not only in the field of hydraulics, they also keep a focus on the customer application. Work is continually being carried out in close

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contact with leading research institutions to optimize process engineering and systems.

The systems and engineering specialists work together with customers wishing to pass on their projects to a single source supplier. The engineering process ranges from the project planning and design stage right through to commissioning and looking after complex turnkey systems, depending on customer requirements. This enables Rexroth customers to concentrate on their own core competences. The application of extensive industry-specific know-how in individual cross-technology special or one-off solutions is one of the particular strengths of Rexroth. The latest calculation and simulation techniques for analysing oscillations and component deformations make efficient engineering possible, redefining quality standards for the industry time and again. Here Rexroth utilizes the broad synergy potential of an integrated technology company. With the know-how of the leading motion specialist worldwide and in close co-operation with the customer, highly specialized teams are realizing solutions using state-of-the-art technology.

5. Production Sites



Lohr/ Main, Germany (Site 1)

- On/off valves
- Control blocks
- Screw-in valves
- Hydraulic cylinders
- Power units



Lohr/ Main, Germany (Site 2)

- Vane pumps
- Internal gear pumps
- Proportional and servo valves
- Electronic components
- Electrohydraulic closed loop control systems

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Ober Ramstadt, Germany

- Logic elements
- Pressure control valves
- Sandwich plates



Chemnitz, Germany

- Power units
- Test stands
- Didactic systems



Fellbach, Germany

- On/off valves
- Compact hydraulics
- Industrial pumps
- Control blocks
- Power units



Nürnberg, Germany

- External gear units



Bruchmühlbach, Germany

- Control blocks
- Power units

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Horb, Germany

- Axial piston units



Bonneville, France

- Tie-rod cylinders



Cernusco, Italy

- Directly-controlled control valves
- Power units
- Control blocks



Boxtel, The Netherlands

- Cylinders

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Stockholm, Sweden

- Tie-rod cylinders
- Closed profile cylinders



Glenrothes, Scotland

- Radial piston motors



Bethlehem, USA

- Proportional valves
- Electronic components and electrohydraulic closed loop control systems
- Tie-rod cylinders – NFPA standard
- Control blocks
- Compact hydraulics
- Power units



Fountain Inn, USA

- Axial piston units

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Tsuchiura, Japan

- Axial piston units



Ahmedabad, India

- On/off valves
- Logic elements
- Hydraulic cylinders (closed profile design)
- Vane pumps
- Control blocks
- Power units



Changzhou / Wujin, China

- ABS cylinders
- Tie-rod cylinders
- Closed profile cylinders
- Control blocks
- Power units



Carapachay, Argentina

- Power units
- Cylinders

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