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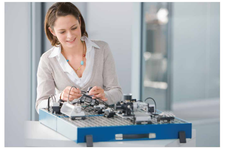
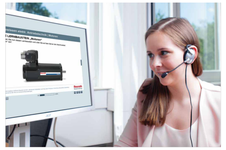
Training
At Rexroth, knowledge is always transferred using state of the art technology and with the very latest methods and media: face-to-face training, eLearning, eTraining with online access via the Rexroth LearnWorld, special practical training, and blended learning, which perfectly combines the advantages of face-to-face events and eLearning. No matter which training method is used, the principle of customer focus is always to the fore.



Training system
The modular training systems developed by Rexroth specialists provide beginners and more advanced learners alike with tangible technical know-how and problem-solving expertise. Standard industrial components, internationally standardized programming languages and open interfaces are used to provide a direct experience of our practical knowledge.

Media
Rexroth prides itself on providing training and learning media that incorporating very latest technology, while maintaining a strong practical relevance. As a result, itincludes state of the art eLearning and eTraining modules which are using a lot of animations and simulation-based learning units. We also supply printed technical books and manuals, e-books, apps and software.



Knowledge Portal
Knowledge on the Internet – that's what Rexroth has been working on by setting up its Knowledge Portal. In addition to the topics from the existing Rexroth LearnWorld, the portal will develop into a multimedia contact point for everything in the area of drive, control and motion technology. The aim is for it to be the central element of our professional and college training in the future. It gives users unique access to high quality information. Community and Wiki functions enable structured sharing of knowledge and experience for the first time.

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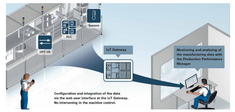
System Solutions and software

Open Core Engineering (OCE) – New freedom and efficiency in software engineering:
- **IT Automation** to connect ERP, MES or own tools with the machine control (PC - Windows, Linux, Mac OS) – Visual Studio(VB/C/C++/C#), NetBeans,Eclipse(Java), Any Editor Eclipse(Lua), OPC UA, Xcode (Objective-C, Swift), MS Office Tools, MES-Systems, etc.
- **Smart Device** for a convenient machine operation and diagnosis: Google Android (Eclipse-C/C++, Java), Apple iOS(Xcode-Objective-C, Swift)
- **Rapid Control Prototyping** and Model Based Engineering to improve algorithm design and testing – LabVIEW(G), MATLAB, Simulink, SimulationX Dymola (Modelica)
- **Individual Functions** to supplement and secure your know-how PLC application for IndraControl (vxWorks, JavaVM, LuaVM) C/C++, Java, Lua

Open Core Interface (OCI) for Drives – Easy Automation Library with sercos Internet Protocol (SiP)
- For IndraDrive and IndraMotion MLD (MLPI for MLC/XLC/MTX)
- Provided as Software Development Kit (SDK) – Complete set of full documentation, libraries and comprehensive application examples
- Motion, PLC variables, Variable read/write, Parameter read/write, I/O read/write and others



IoT Gateway – Get ready for Industry 4.0!
Combination of control hardware and software to connect new and existing machines to Industry 4.0 environments:
- **Dashboard app**: for system administration, configuration, parameterization and visualization of process data
- **Devices App** – establishes connections with peripherals (such as sensors), connection option for: analog voltage and current signals, digital voltage signals, OPC UA, OCI for Controls, RFID, Siemens S7, Bluetooth LE.
- **Processing App** – fast processing and forwarding of process data: Production Performance Management, Bosch Sensor Cloud, Bosch Energy Platform, ODIN, MES Systems, databases.

ActiveCockpit – Interactive communication platform for the manufacturing industry
- Real-time collection, processing and visualization of all relevant data of a manufacturing facility for the exchange of information between people, machines and production process on the shop floor
- Interactive software for the diagnosis and optimization of machines and processes, and disorder management
- Browser-based Internet standards and openness to third-party applications
- Easy connection to back-end systems (MES / ERP)

Product eConfigurators:
- Comprehensive configuration documentation (including 3D CAD)
- Configuration possible by material number, typecode or function

Engineering and sizing Tools:
- Advanced functionalities (planning, design, calculation...)
- Offline availability, supports purchasing process
- LinSelect, Linear Motion Designer, MTpro, IndraSize, Inline-Builder, SytronixSize and others.

IndraWorks – The universal engineering framework, single point of engineering – design, setup, programming, diagnostics and visualization in one environment, CamBuilder, PLC and motion logic programming based on CoDeSys V3 with object-oriented language extensions

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Tightening, Resistance welding

Tightening systems – Increased productivity and reliability

Tightening spindles:
- Torque range 0.6 ~ 1 000 Nm
- Versatile and Modular construction, true redundancy possible
- Maintenance free for 1 million full load cycles for long service life
- Handheld nutrunner: Torque range 1 ~ 220 Nm with Ergonomic design for reduced operator fatigue

Compact and Modular Control systems:
- Reliable and easy to use single-channel controllers for handheld-nutrunners or tightening spindles
- Touch screen or display, variant with integrated logic
- Space-saving and economical multi-channel controller supporting up to six tightening channels
- Wide range of communication protocols

Cordless WiFi nutrunner:
- Requires no external controller
- Data transfer via WiFi or mini USB
- Torque range 1.8 ~ 50 Nm
- 36 V slide-in battery pack 2.1 Ah

Resistance welding systems

Welding controllers:
- AC and Medium-frequency(1000 Hz) modular resistance welding controllers
- Maximum quality when welding all combinations of sheet thicknesses from steel to aluminum.
- Currents of up to 360 kA, air cooled/water cooled
- Adaptive current/voltage control algorithms for consistent weld quality and reduced expulsion
- Tools and user interfaces provide process monitoring and overview for weld control and quality monitoring
- Maximum flexibility in the I/O and network with plug-in modules such as PROFIBUS, PROFINET IO, DeviceNet and EtherNet/IP

Powerful compact medium frequency transformers:
- Integrated temperature monitoring of the winding package and the rectifier unit, current sensor and safety resistor
- Process monitoring by integrated current measuring coil
- Output up to 250 kVA (20 % ED)

Bosch Rexroth Thailand
7/426 M.6 Amata City Industrial Estate Rayong Mabyangporn, Pluak Daeng District,
Rayong 21140, Thailand
Tel.: +66(38)958-937
Email: RexrothCenter@th.bosch.com
www.boschrexroth.com/en/th/

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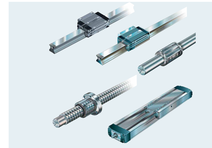
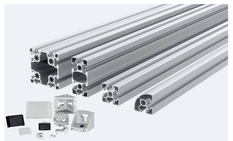
Factory Automation

Electric Drives and Controls



Linear Motion Technology



Basic Mechanical Elements

Assembly Technologies

Tightening, Resistance Welding

System Solutions and Software

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Electric Drives and Controls

Electric drives IndraDrive – unique scalable drive platform:
- Common platform for power range from 100W up to 4 MW
- Different types: compact converters, modular inverters/power supply, single- and double-axis inverters, distributed cabinet-free drive technology with motor-integrated and near motor drives
- Multi connectivity: Ethernet-based multi-protocols (SERCOS, PROFINET IO, EthernetIP, EtherCAT, Powerlink), ProfiBus, CANopen, DeviceNet, Analog, and Parallel interfaces
- Intelligence: advanced firmware functions, integrated motion logic and PLC with a wide range of libraries including ready-to-use technology functions, free programmability (IEC 61131-3), integrated safety technology, etc.

IndraDyn Motors – extensive range:
- Power range from 50W up to 132kW
- Synchronous (low and medium rotor inertia) and Asynchronous housed servo motors up to 631 Nm (including explosion-proof enclosure, forced fan and liquid cooling)
- High-speed (up to 22 500 rpm) and torque (up to 13 800 Nm), Linear ironcore (up to 21 500 N) and ironless (up to 3 320 N) kit motors
- From standard to high precision single- and multiturn encoder systems, single cable connection technology
- standard planetary and high-precision planetary servo gearboxes with up 97 %

IndraControl systems –complete and universal automation solution:
- Scalable platform for all system solutions from Bosch Rexroth: PLC IndraLogic, Motion controller IndraMotion MLC, CNC IndraMotion MTX
- Extensive range from IndraControl L10 to L85 Intel Core2Duo with cycle time from 0.25 ms, 64 axes and 20 tasks; new family IndraControl XM from XM12 (Dual-core ARM Cortex A9/600 MHz, Multi-Ethernet Master/Slave, USB2.0, Gigabit-Ethernet) to XM4X
- Open connectivity: RS232, Ethernet TCP-IP/UDP, PROFIBUS (Master/Slave), SERCOS, PROFINET RT, EtherNet/IP, EtherCAT
- I/O extension modules: IP20/IP67, local and distributed, digital/analogue I/Os, temperature, technology, communication, safety.

NYCe6000 – compact multi-axis motion control system with integrated drive technology for high-tech machines in Semiconductor, Plastic Electronics, Solar and Measuring industries:
- Powerful 32 kHz position control, data collection 32 ch @ 32 kHz
- Various motors: stepper, DC brushed, AC brushless, piezo, etc.

IndraControl FM – unique cabinet-free IP65 control with:
- build-in 6 stepper motors drives, Multi-Ethernet, CAN interface
- on-board 48 I/Os, optional embedded PC (with Linux), SMEMA

Control panels: compact and hand-held operator panels, embedded and panel PC, IPC; Display sizes from 4.3'' up to 21.5''; membrane keys, touch or multi-touch.

Frequency Converters Rexroth:
- V/f and SVC control (sensorless vector control), torque control, synchronous motor control
- Power range from 0.4 kW up to 185 kW, cold plate (0.4 ~ 4 kW)
- Power supply: 1 x AC 230 V or 3 x AC 400 V
- Multi-Ethernet interface (sercos, EtherCAT, Ethernet/IP, Profinet IO, Modbus TCP), CAN Open, ProfiBus, Modbus RTU, mini-USB
- Application specific firmware: multi-pump control, winder
- Multi parameter set, power loss ride through, energy saving counter, protection against pump rotating without water, etc.
- Extension cards (I/Os, relays, encoder, resolver), STO safe torque-off, side-by-side mounting, LED/LCD panels.

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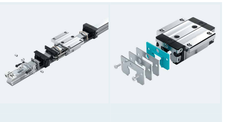
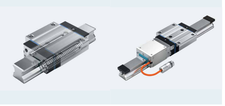
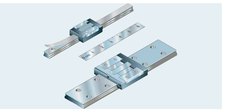
Linear Motion Components



Ball and Roller Rail Systems:
- High load capacities with limitless interchangeability, highest level of system rigidity thanks to preloaded O-configuration
- 14 types of runner blocks, 6 accuracy and 4 preload classes
- Sizes 15 / 20 / 25 / 30 / 35 / 45 / 55 / 65 and 85 /100/125
- Load ratings C0yn: 3900 N to 1000 kN
- Steel, aluminium, corrosion-resistant steel, matte silver or black hard chrome-plated, high speed, self-alignment capabilities, etc.
- Guide rails: mounting from above/below, corrosion-resistant versions, cover strips, plastic and steel hole plugs, bellows etc.
- Maximum rail length 6000 mm one-piece, composite guide rails available



Integrated Measuring System IMS (Absolute or Incremental)
- Contactless inductive measuring system – scale and sensors are not corrupted by external magnetic fields
- IP67, resistant to contamination and vibration
- Wear and maintenance-free, not susceptible to EMV interference
- Repeatability: +/- 0.25µm, position resolution: 0.025µm, scale accuracy: +/- 3µm/m, system accuracy: +/- 4µm/m.
- Output signals IMS-I: 1Vss, TTL 1µm, TTL 10µm.
- Interfaces IMS-A: SSI+1Vss, HIPERFACE®, DRIVE-CLiQ, ol(FANUC)
- Simplified design with guide integration, no attachments needed
- No sealing air necessary



Miniature Ball Rail Systems:
- High dynamic ratings: up to v = 5 m/s, a = 250 m/s2
- All steel parts of the runner block and the guide rail are made of rust and acid resistant material
- Interchangeability of runner block and guide rail within the accuracy class
- Sizes 7 / 9 / 12 / 15 / 20 and available wide sizes 9, 12, 15
- 4 types of runner blocks, 3 accuracy and 2 preload classes
- Low friction seal
- Clean room certificate Class 10
- Maximum rail length 2000 mm one-piece, composite guide rails available

Ball Screw Assembly(BSA)/ Planetary Screw Assembly(PLSA):
- Numerous nut types in DIN, JIS and Rexroth layout
- Economic Solution due to precision-rolled screw
- Especially smooth running due to optimized ball pickup and recirculation
- Single Nut w/o axial play possible, no reduction ratings (PLSA)
- Diameter: 6 - 80 mm, Lead: 1 - 64 mm
- Accuracy: T3, T5, T7, T9 acc. to ISO 3408
- Load ratings up to: C + 900 kN (dynamic) C0 = 3000 kN (static)
- Length: up to 13 000 mm (5 000 mm for PLSA)
- D x n value: 150 000 for all nuts

Linear Bushing and Precision Steel Shafts:
- Numerous types for Ø d 3 - 80 mm: self-alignment, closed/open, heavy load, rugged design, linear sets, corrosion-resistant etc.
- Excellent low friction, compensation of misalignments
- Precision shafts sizes Ø d 3-110 mm, shafts with shaft support rail, heat-treated steel/corrosion-resistant, hard chrome plated

Ball Transfer Units
- Conveying speed up to 2 m/s, Size 8(130N) to 120 (40 000N), rail, heat-treated steel/corrosion-resistant version available

Cam Roller Guides
- Dynamic(v = 10 m/s), various formats, zero-clearance adjustment

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Linear Motion Systems

Compact Modules CKK/CKR:
- Extremely high rigidity due to two integrated zero-clearance ball rail systems
- Compact and low aluminum profile, various connecting elements
- Online-configurator and creation of 3D-CAD models
- Sizes: 70, 90, 110, 145, 200
- Drive: Ball screw assembly (CKK), Toothed belt drive (CKR)
- Length: freely configurable up to 5500 mm (CKK), 10 000 mm (CKR)
- Velocity: up to 2.5 m/s (CKK), 5.0 m/s (CKR)
- Repeatability: up to +/- 0.005 mm (CKK), +/- 0.1 mm (CKR)

Linear Modules MKK/MKR/MLR:
- Integrated zero-clearance ball rail systems (MKK/MKR), and with cam roller guide (MLR); two carriage length available
- Online-configurator and creation of 3D-CAD models
- Motor flange/coupling or timing belt side drive, gear unit
- Sizes: 40, 65, 80, 110, 145 (two rails), 165
- Drive: Ball screw assembly(MKK), Toothed belt drive(MKR/MLR)
- Length: MKK up to 4 900 mm (MKK), 12 000 mm (MKR/MLR)
- Velocity: up to 2.5 m/s (MKK), 5.0 m/s (MKR), 10.0 m/s (MLR)
- Repeatability: up to +/- 0.005 mm (MKK), +/- 0.1 mm (MKR/MLR)

Electromechanical Cylinder EMC:
- Precision rolled ball screw drive (T7) with preload
- Compatibility with pneumatic products according to ISO 15552
- 7 sizes: 32, 40, 50, 63, 80, 100, 100XC
- Protection class: IP54, IP65 or hygienic design (optional)
- Stroke: 30 – 1500 mm (variable in 1 mm intervals)
- Axial force: up to 56 kN
- Velocity: up to 1,6 m/s
- Repeatability: up to +/- 0,005 mm
- Mounting elements, force sensor and other accessories
- Online-configurator and creation of 3D-CAD models

Electromechanical Cylinder EMC-HD:
- Robust cylinder available with ball or planetary roller screw drive
- Precise positioning, high dynamics, powerful drive and long service life due to the use of highly precise screw drives
- Sizes: 085, 105, 125, 150, 180; Protection class: IP65
- Stroke: up to 1700mm (variable in 1 mm intervals)
- Axial force: up to 290 kN; Dyn. Load rating: up to 470 kN
- Velocity: up to 1,0 m/s
- Repeatability: up to +/- 0,01 mm
- Mounting elements, force sensor and other accessories
- Online-configurator and creation of 3D-CAD models

Precision Modules PSK:
- High-precision linear modules with steel profile frames in very compact design, running tracks ground into the frame

Feed Modules VKK:
- High precision, high thrust capabilities make feed module ideal for vertical motion in Z-axes

Omega modules OBB:
- Special design for applications that require main body motion (e.g. to access workspace in machines)

Linear Motion Slides SGK, SGO, SOK, SOO:
- Economical linear axes for many applications

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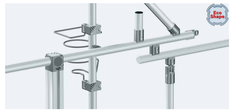
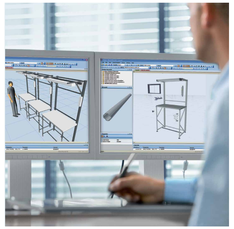
Basic Mechanical Elements

Aluminum Profile System:
- Most comprehensive Modular system as the basis for a wide range of industry
- Over 100 different strut profile cross sections
- Highly durable standard profiles, largest slot retention force
- Innovative special profiles, profiles with closed slots
- Finely graduated profile size range (20, 30, 40, 45, 50, 60, 80, 90, 100 mm)
- 3 slot systems: 6, 8, 10 mm with groove-independent connectors
- Slot retention forces up to 24 000 N
- Patented special profiles
- Integrated air duct
- Guaranteed performance data, highest stability criteria
- Customized finishes without drawings – Quick & Easy

Accessories
- Comprehensive range of accessories with more than 1300 individual parts
- Specific solutions as well as basic element for manual workstation and transfer systems
- Reliable and secure connectors with extensive accessories
- 25 types of connectors in more than 280 variants



EcoShape Tubular Framing System – Versatile, Simple, Efficient:
- EcoShape enables easy connections between square and round elements
- Can be combined with components from Rexroth's Manual Production Systems (MPS) to create individual solutions for equipment such as workstations, material shuttles, or flow racks
- In line with the kaizen or poka-yoke principles



MTpro Pinanning Software
- Software for the planning and design of assembly technology systems: selection, configuration and ordering of products
- MTpro supports following product lines:
  - Basic Mechanical Elements
  - MPS Manual Production Systems
  - Material and Information Flow Technology (Conveyor and Transfer Systems)
- Assembly of catalogue components to form modules and sys tems in a virtual 3-D scene without CAD system
- Automatic order list generation of all accessories
- Layout Designer for planning and constructing complete frames and conveyor systems without a CAD system
- Exporting the 3-D layout as a solid into all common CAD systems and save in CAD exchange formats (STEP, SAT, IGES, ...)
- The ManModel function in MTpro makes designing of ergonomic work stations easier through simulation
- Two versions of MTpro: MTpro light is restricted to the Layout Designer and available for download. The full version of MTpro can be ordered on DVD and has many more features.

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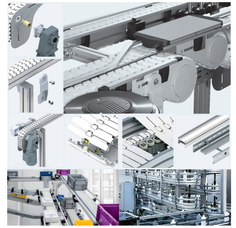
Assembly Technologies



Conveyor System VarioFlow plus:
- Simple to project: using a modular principle and MTpro layout designer with automatic generation of parts lists
- High flexibility: universal basic units with separate drive kits allow free selection of motor mounting position on site
- Rivet-free assembly of the slide rail: for fast, error-free set-up and low-noise, easy maintenance operation
- Low friction: for long conveyor sections per drive, low wear, reduced down times and low costs
- Comprehensive product range in aluminum and stainless steel, in sizes 65, 90, 120, 160, 240, 320 mm
- Identical components for all system widths
- FDA-compliant materials, e.g. stainless steel ball bearings with food-grade grease
- Conveyor speed up to 60 m/min, in special cases up to 100 m/ min
- Seven types of chains
- Quiet chain run (minimal stick-slip effect)
- High chain tensile force of 1250 N for all sizes
- Easy-to-exchange chain plate from a size of 160 mm

Transfer Systems:
- Wide range for different applications: TS1, TS2plus, TS2pv and TS5 for payloads up to 400 kg
- Pallet based conveyors are divided into 3 categories based on pallet size - belt, flat top chain or roller chain
- Pallets are precision machined with accurate locator bushings which allow positioners to hold pallets within +/-0.02mm for automated processes
- Identification systems to recognize and store object-related data, for optimally managed production and conveying processes
- Online Solid Models & CAD Library

ActiveMover – an innovative transfer solution for short cycle time:
- Magnet coupling: low friction between linear motor and work-piece pallet
- Fully independent control and integrated collision avoidance by each workpiece pallet, Reverse operation
- Stop repeatability +/- 0,01 mm
- Speed up to 150 m/min
- Changeover time workpiece pallet from 0,1 s
- Acceleration up to 4 g
- Permissible payload workpiece pallet up to 10 kg
- Robust structural design

Manual Production Systems (MPS):
- Custom workstations and accessories offer variable dimensions and versatile components
- Height-adjustable workstation can be individually adapted
- ESD protection – offers a large selection of products to protect your products from damage caused by electrostatic discharge.
- Ergonomics – adapting workstations to tasks and employees
- Bosch-Rexroth has created a guide book concerning the optimal methodical proceeding during the ergonomic design of work-places. The planning templates in the scale 1:10 help easily optimizing and organizing the design of equipment, tools, etc.

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The Drive & Control Academy

Bosch Rexroth is the leading manufacturer of Drive & Control technologies. It has expert know-how of the latest technical trends and innovations. Along with the best practical training methods.

Our training fields

Industrial Hydraulics
Mobile Hydraulics
Electric Drives and Controls
Automation
Mechatronics
Linear and Assembly Technology
Safety Technology
Energy Efficiency