



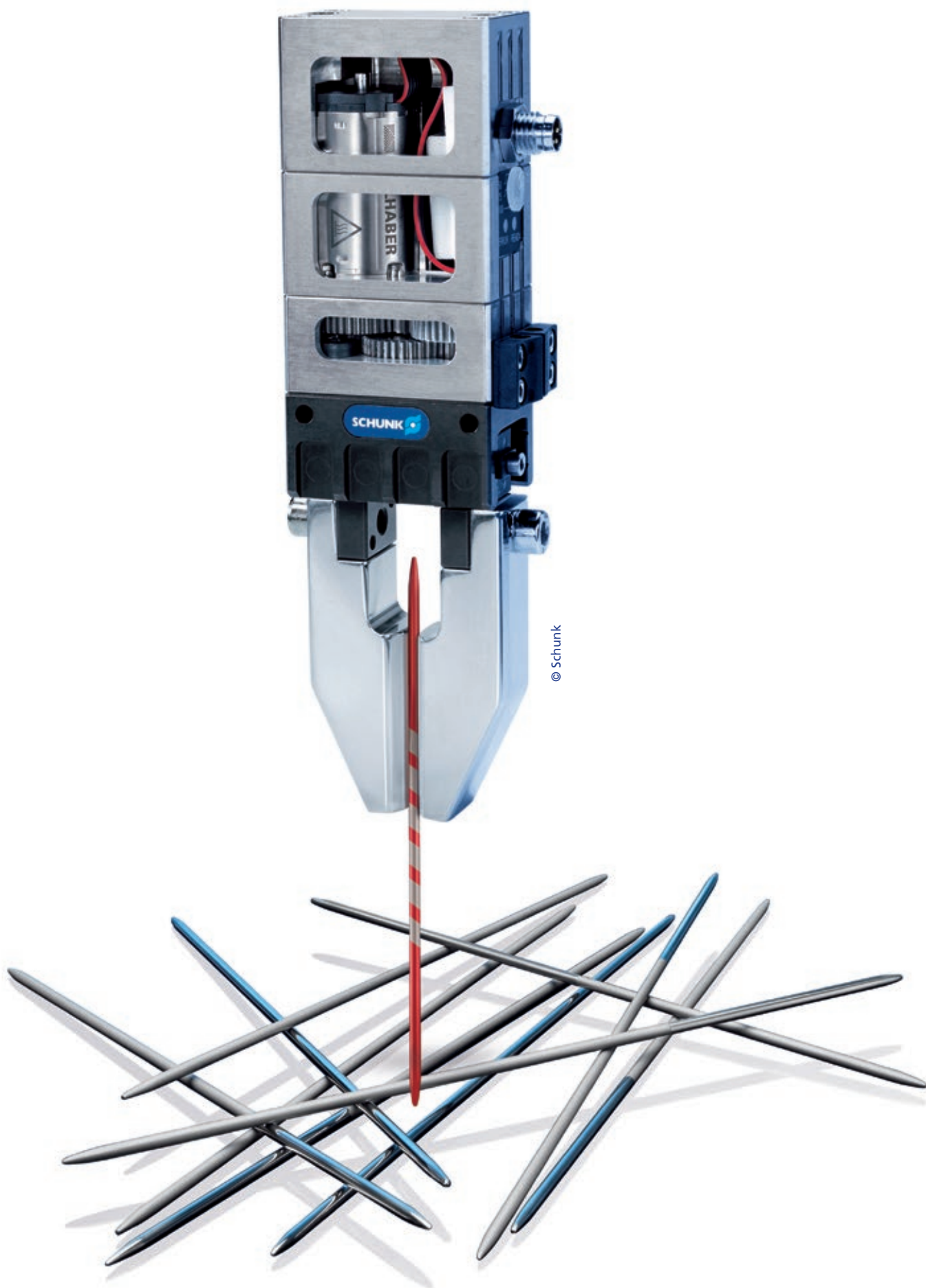
**FAULHABER**



FAULHABER Market solutions

# Drive Systems for Robotics & Automation

**WE CREATE MOTION**



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# Get a grip on the automation of tomorrow

An industrial world without robotics or automation has today become inconceivable. In this context, process safety, reliability and economic efficiency are on the forefront when it comes to the application of such systems in modern production lines.

The industrial-grade drive components from FAULHABER convince the customer with their high endurance and performance in a robust and compact design. Whether for exact and highly dynamic positioning tasks, for example in SMT assembly machines, handling devices and electrical grippers, conveyor systems or sensitive and low-noise operations in artificial robotic hands.

## **Further applications of Robotics & Automation with FAULHABER Drive Systems**

- Bottling and packaging automation
- Conveyor systems
- Industrial dosing systems
- Welding equipment
- Wire processing equipment
- Textile industry automation
- Laser cutting and plotting
- Machine tools
- Tool monitoring
- Linear positioners / positioning stages





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# Electrical grippers

A small gripping system that is both quick and powerful – up to now, was often only possible with pneumatics. Because with compressed air, large amounts of pressure can be conveyed virtually without any time lag. A compressed air supply requires a complex infrastructure, however, and having to provide it for every production step is difficult and expensive. Fortunately, this is no longer necessary, thanks to compact mechatronics-based grippers. This new type of gripper system easily achieves the same performance of its pneumatic counterpart. The drive that makes this performance possible is a Brushless DC-Servomotor from FAULHABER.

## MORE INFORMATION

[www.faulhaber.com/grippers/en](http://www.faulhaber.com/grippers/en)

## FAULHABER Drive Solution

### Drive System

- Ø 22 mm 4-pole brushless DC-Motor
- Integrated speed / motion controller

### Benefits

- Compact size
- High power density
- Highly dynamic

### Options

- Mechanical adaptations
- Special software
- Preconfigured controller

### Related Applications

- Robotic manipulators
- Gripping systems





# Torque drivers

Every handyman intuitively knows how to tighten a screw: according to feel. In the hobby room, this is generally sufficient for achieving the correct amount of tightening torque. In industrial production, on the other hand, the demand for secure screw fixing is much greater. Motors and gearheads used in micro torque drivers play an extremely important role.



## FAULHABER Drive Solution

### Drive System

- Ø 22 mm 4-pole brushless DC-Motor

### Benefits

- High peak torque
- Light weight
- Excellent controllability

### Options

- Special cable with connector

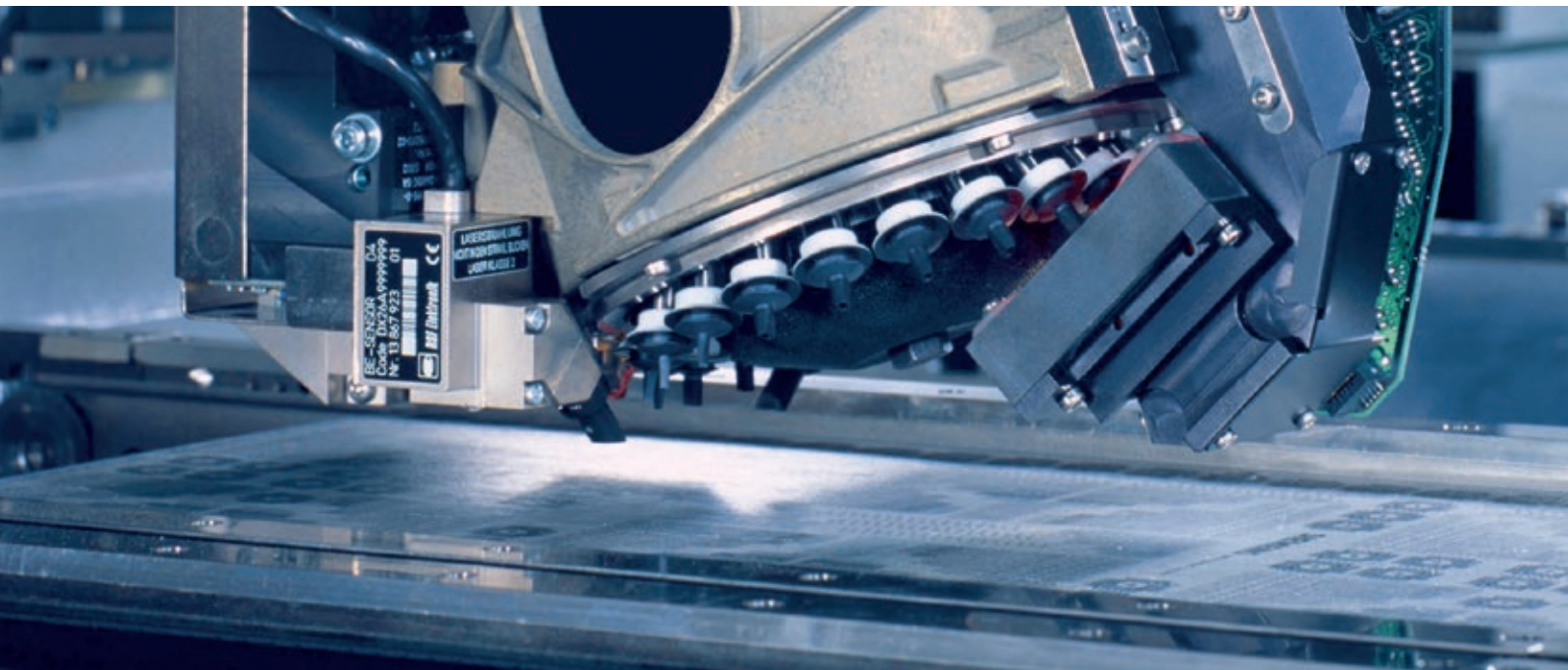
### Related Applications

- Industrial tools
- Assembly tools



## MORE INFORMATION

[www.faulhaber.com/torque-driver/en](http://www.faulhaber.com/torque-driver/en)



# SMT assembly

Today, mass-market electronics are manufactured almost exclusively on high-performance assembly machines. Given the nature of these fast-moving products, time is literally money. Therefore, two aspects are of particular importance for the production equipment deployed within this area: maximum quantities and minimum changeover time. For the manufacturer of such machines this means ensuring the best possible output, combined with simple processing in a continuous operation. This requirement can only be fulfilled if the complex operational sequence remains accurate and reproducible at all times. An essential component: micromotors with superior functionality and a micro footprint for placement and feeder systems.

## MORE INFORMATION

[www.faulhaber.com/smt/en](http://www.faulhaber.com/smt/en)

## FAULHABER Drive Solution

### Drive System

- Customized brushless DC-Motor
- Customized controller electronic

### Benefits

- Ultra-light
- Highly dynamic
- Long lifetime
- Development partnership

### Options

- Hollow shaft
- High resolution / accuracy encoder

### Related Applications

- Lithography machines
- Wafer inspection systems
- Wire bonding machines
- IC test handlers





# Printing machines

Printing machines are used to transfer information and colour onto paper. Whether for magazines or packaging materials, speed and optimal colour rendering is what really counts for modern printing facilities. The intensity of the individual colours has always been adjusted at the inking unit to achieve these optimal results. Today, automatic colour zone adjusting devices facilitate work previously carried out by manual controls. Compact miniature drives, designed as motor-potentiometer-gear assemblies, are particularly well suited for such applications. These drives can be quickly installed and allow both manual adjustment from the control panel and easy, automatic adjustment of known values at the push of a button, reducing both set up time and waste volume.



## FAULHABER Drive Solution

### Drive System

- Servo unit designed for the customer application

### Benefits

- Wide speed range
- Precise angular positioning
- Reliability
- Development partnership

### Options

- Multiturn encoder

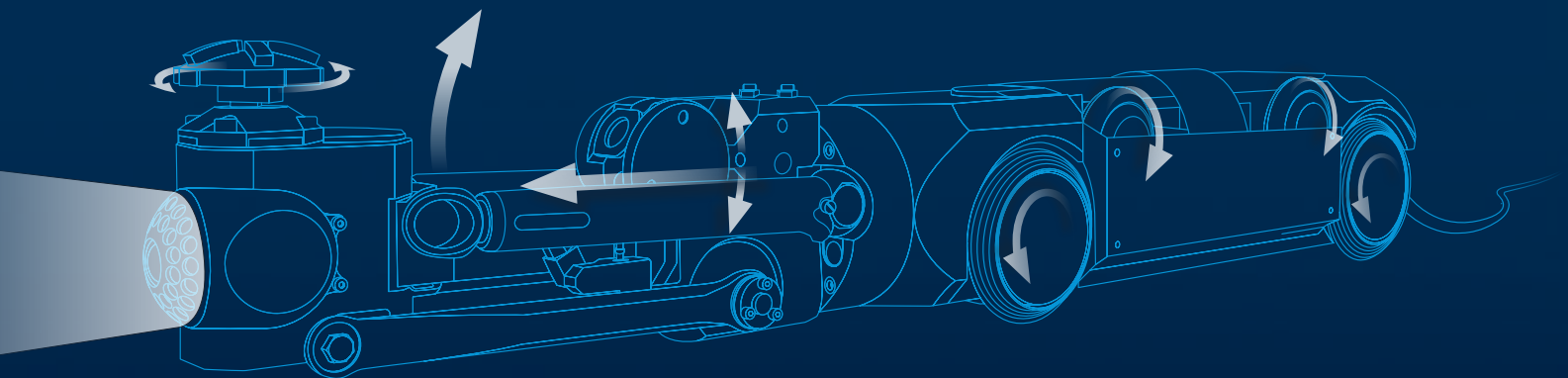
### Related Applications

- Banknote printing machines
- Presses and finishing systems



## MORE INFORMATION

[www.faulhaber.com/printing-machine/en](http://www.faulhaber.com/printing-machine/en)



# Inspection robots

The days when conventional construction teams went to work on the sewer system, digging up roads and crippling the traffic for weeks are a thing of the past. It is much more pleasant if the inspection and renovation of the pipes take place below ground. Today, sewer robots can perform many tasks from the inside. They play an increasingly important role in the maintenance

of urban infrastructure. Motors from FAULHABER are used for camera control, tool functions and the wheel drive.



## MORE INFORMATION

[www.faulhaber.com/pipeline-inspection/en](http://www.faulhaber.com/pipeline-inspection/en)

## FAULHABER Drive Solution

### Drive System

- Ø 15 mm DC-Motor with precious metal commutation
- Ø 32 mm 4-pole brushless DC-Motor

### Benefits

- Compact size
- High overload capability
- Robustness and shock resistance

### Options

- Mechanical customization
- Wide range of supplementary gearheads and further components

### Related Applications

- Sewers
- Crawlers





# Remote controlled manipulators

Today, mobile robots are often deployed in critical situations that are simply too dangerous for humans to handle – as part of industrial operations, law enforcement or anti-terror measures, e.g. to identify a suspicious object or disarm a bomb. Owing to the extreme circumstances, these “manipulator vehicles” have to meet particular requirements. Exact manoeuvring and precision handling of tools are two essential prerequisites. Of course, the device also has to be kept as small as possible in order to allow access through narrow passageways. Naturally, the drives used for such robots have to be equally impressive. Special high-performance micromotors have become an essential component.

## FAULHABER Drive Solution

### Drive System

- Ø 23 mm DC-Motor with graphite commutation
- Ø 38 mm DC-Motor with graphite commutation

### Benefits

- Reliability
- Compact design
- High efficiency
- High precision

### Options

- Special output shaft

### Related Applications

- Unmanned ground vehicles
- Remotely operated vehicles (ROV)



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#### MORE INFORMATION

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[www.faulhaber.com/mrov/en](http://www.faulhaber.com/mrov/en)

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# Logistic robots

Microdrives and Motion Controllers from FAULHABER are what make the TORU picker robot from Magazino so versatile. With an eye to the constantly growing sector of online retail, logistics and material flow are coveted playing fields for technical progress – with the goal of increasing efficiency through automation and digitalisation. Magazino, the still-young company from Munich, has set out to intelligently combine autonomous driving and robotics with one another. The solution is called TORU and has what it takes to revolutionise logistics. For the handling operations in the self-driving logistics robot, Magazino uses drive solutions from FAULHABER with integrated Motion Controllers.

## MORE INFORMATION

[www.faulhaber.com/logistics-robot/en](http://www.faulhaber.com/logistics-robot/en)

## FAULHABER Drive Solution

### Drive System

- Ø 32 mm 4-pole brushless DC-Motor with integrated Motion Controller

### Benefits

- Short time overload capability
- Small size and low weight
- Motor and Motion Controller in one package
- CANopen interface

### Options

- Adaptions and modifications to customer needs and requirements
- Output shaft configuration
- Cabling and connector

### Related Applications

- Automatic postage and packaging systems
- Driverless transport vehicles
- Mobile robots





# Humanoid robotics

Since time immemorial, people have dreamed of creating artificial human beings. Nowadays, modern technology is capable of realizing this dream in the form of the humanoid robot. Even if there is still a considerable amount of development work necessary, every project has to take those first steps. As an initial stage in this process, a humanoid service robot that works autonomously already offers a wide range of benefits. Apart from the interaction of the many components used, the main challenge is the power supply and the space required for the various parts. Microdrives represent an ideal solution for resolving these two key issues. Their considerable power density, combined with high efficiency and minimal space requirement, improves the power-to-weight ratio and allows the robot to operate for long periods without having to recharge batteries.

## FAULHABER Drive Solution

### Drive System

- DC-Motor with precious metal commutation and integrated encoder
- DC-Motor with graphite commutation and integrated encoder

### Benefits

- High power density
- High efficiency
- Miniature size
- Short time overload capability
- Quiet running

### Options

- Cable length
- Encoder with line driver

### Related Applications

- Service robots
- Collaborative robots



## MORE INFORMATION

[www.faulhaber.com/icub/en](http://www.faulhaber.com/icub/en)



# Drive Systems for Robotics & Automation

For robotics and automation applications, highly dynamic drive systems are very important. Very often the motor shall operate at full speed or torque in shortest time. FAULHABER Drive Systems offer this feature thanks to their ironless winding technology and flat speed-torque curves. High performance motor families such as the FAULHABER BX4 or BP4 series provide the high power density that is required in this environment.

The demand for precise positioning and speed control may be realized with the wide portfolio of optical, magnetic and absolute encoders and the speed and motion controllers from FAULHABER. Equipped with either CANopen or EtherCAT interfaces and optional STO function they allow the integration of the complete drive system in demanding robotics or automation applications with process control systems.

## Benefits

- Highly dynamic
- Compact size
- High power density
- Short time overload capacity
- Development partnership with customers
- CANopen / EtherCAT interface

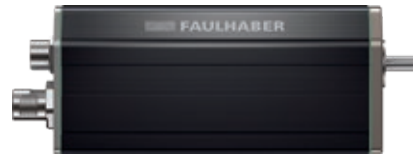


## FAULHABER Drive Systems at a glance



### DC-Motors

Outer diameter	6 ... 38 mm
No-load speed	up to 20 200 min <sup>-1</sup>
Cont. output torque	0.17 ... 224 mNm



### Motors with integrated electronics

Outer diameter	15 ... 40 x 54 mm
No-load speed	up to 16 300 min <sup>-1</sup>
Cont. output torque	1.8 ... 160 mNm



### Brushless DC-Motors

Outer diameter	3 ... 44 mm
No-load speed	up to 61 000 min <sup>-1</sup>
Cont. output torque	0.01 ... 217 mNm



### Stepper Motors

Outer diameter	6 ... 52 mm
Steps per revolution	up to 24*
Cont. output torque	0.25 ... 450 mNm

\* Full step per revolution



### Linear DC-Servomotors

Stroke length	15 ... 220 mm
Speed	1.8 ... 3.2 m/s
Continuous force	1.03 ... 9.2 N



### Precision Gearheads

Outer diameter	3.4 ... 44 mm
Reduction ratio	from 4:1 to 983 447 : 1
Cont. output torque	0,88 mNm ... 16 Nm



### Encoders

Principle	optical, magnetic
Channels	2 ... 3 / absolute
Lines per revolution	16 ... 10 000 / 4 096 absolute



### Drive Electronics

Power supply	4 ... 50 V
Cont. output current	up to 10 A
Interfaces	RS232, CANopen, EtherCAT

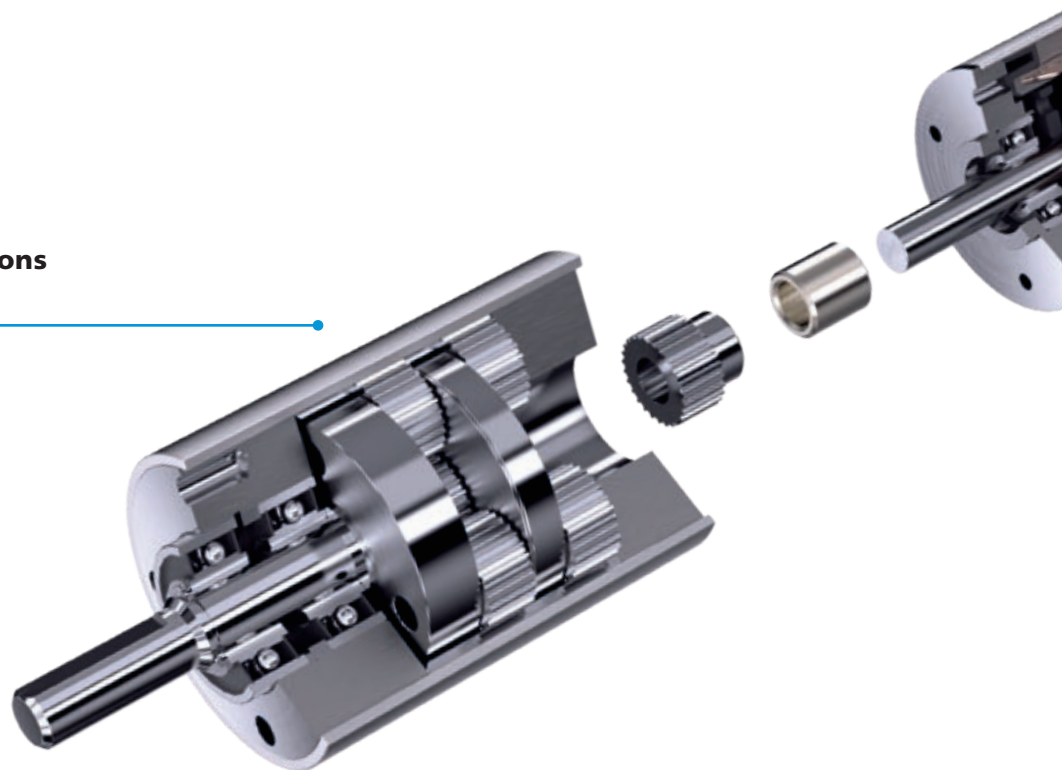
# From Standard to Custom Solution

The FAULHABER standard range can be combined in more than 25 million different ways to create the optimum drive system for a particular application. At the same time, this technological „construction kit“ is the basis for modifications which allow us to configure special versions to meet the specific needs of customers.

High-performance engineering and extensive application expertise also make us a valued partner for the development and production of customer-specific drive solutions. The solutions range from special components specifically or custom-designed for the application to system partnership with automated production for complex mechatronic assemblies.

## Gearhead modifications

- Special output shaft and mounting flange
- Customized pinion
- Special lubricant





### Encoder modifications

- Encoder cable and connector
- Line driver
- Alignment between encoder and motor/gearbox flange
- Programmable encoder output signal



### Motor modifications

- Hollow shaft
- Special winding
- Customised pinion
- Laser inscription on the housing
- EMI filter
- Special cable and connector

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#### MORE INFORMATION

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[www.faulhaber.com/products](http://www.faulhaber.com/products)

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## More information



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