



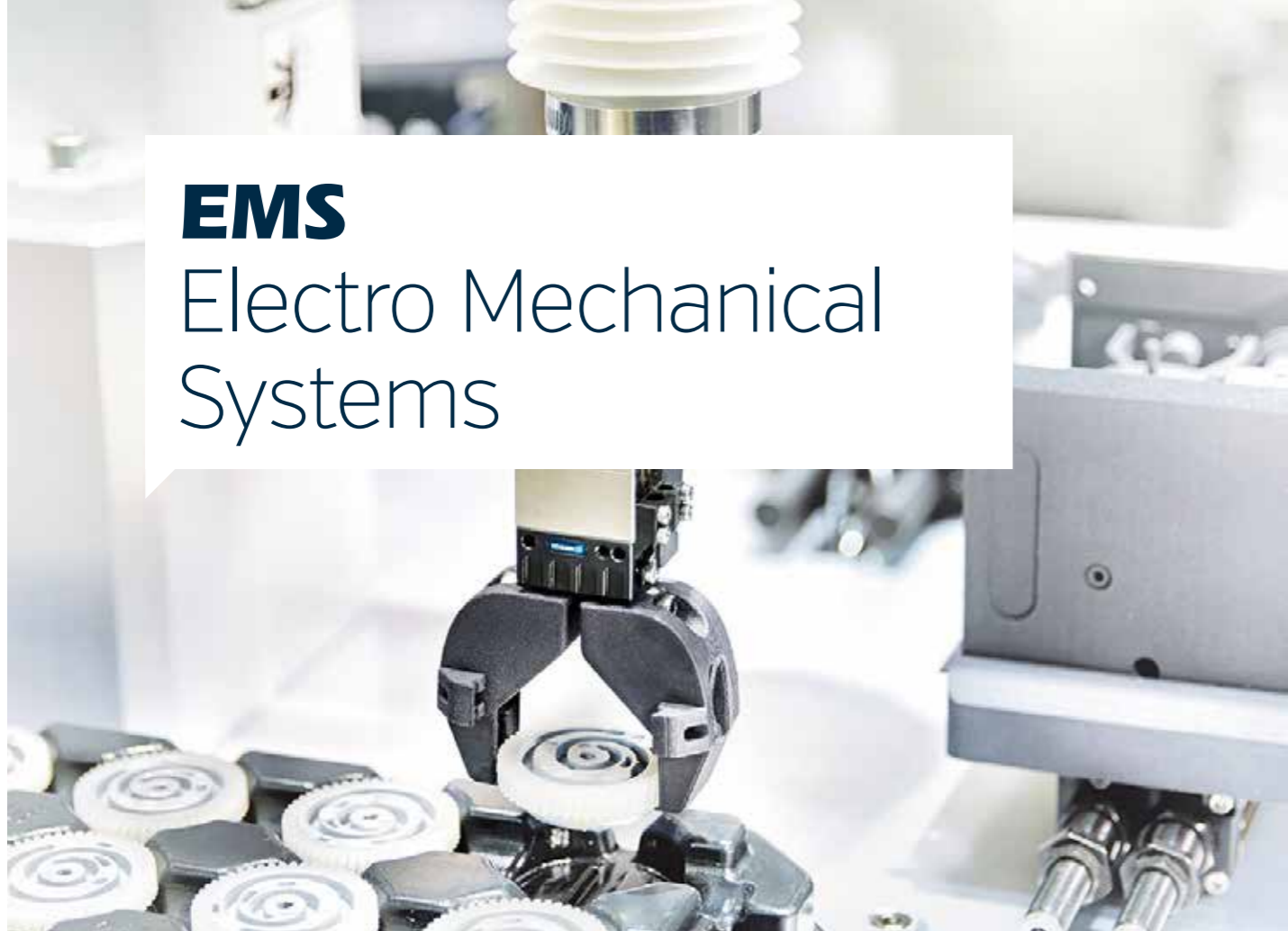
▲ Precision Drive Systems

EMS

Electro Mechanical Systems

EMS

Electro Mechanical Systems



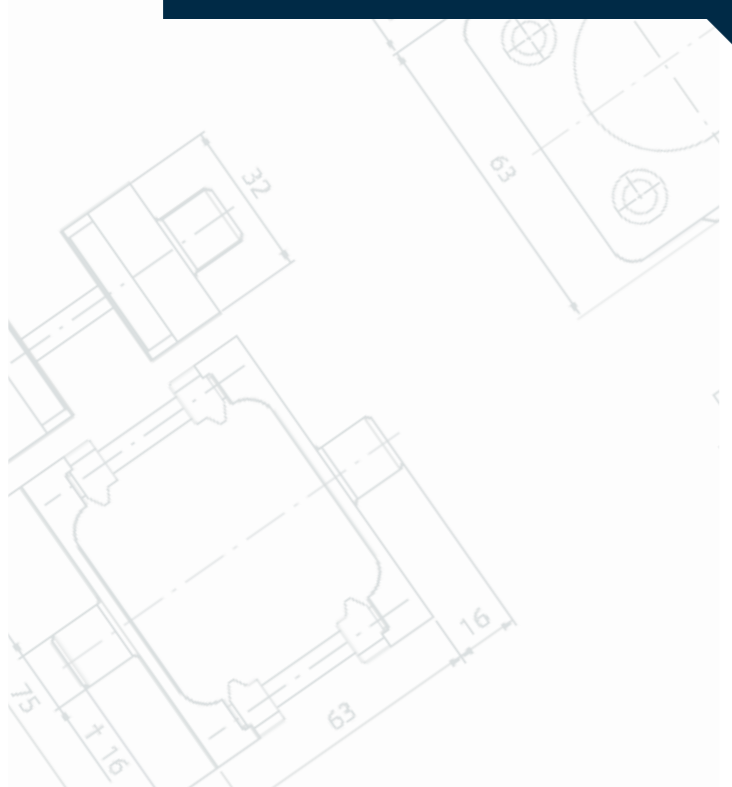
02 AN EXTENSIVE PORTFOLIO OF PRECISION DRIVE SYSTEMS ALONGSIDE FIRST CLASS DESIGN AND MANUFACTURING FACILITIES ENSURE EMS ARE YOUR PREFERRED PARTNER FOR DEMANDING APPLICATIONS

EMS has a huge range of small to medium sized DC motors utilising a range of technologies, including DC, BLDC, Stepper, Linear and Piezo motors. Sizes start from the incredibly small 2mm diameter motor and planetary gearhead, up to 80mm and 250 Watts.

A range of spur and planetary gearheads, encoders and drive electronics make them suitable for applications such as medical devices, aerospace, defence, factory automation, valve actuation and instrumentation.

In addition, EMS provide a comprehensive range of proprietary electric linear actuators and telescopic columns for a wide range of applications in healthcare, medical, factory automation and building automation. Active in the UK market for over 30 years EMS have vast experience in specifying and supplying actuation systems for every application.

Bespoke rotary and linear drive systems can be designed and manufactured to meet your exact specification at our UK facility located in Poole, Dorset.



04 **BESPOKE SYSTEMS**
EMS Custom Design and Manufacture



08 **FAULHABER GROUP**
Small Brushed and Brushless Motors, Gearheads and Controls



12 **PIEZOMOTOR**
Linear and rotary motors built on the successful Piezo LEGS® technology



14 **KAG**
Kählig Antriebstechnik DC Brushed and Brushless motors and gearheads



16 **NIDEC MOTOR & ACTUATORS**
Cost effective DC motors with high torque gearheads



18 **NIDEC SERVO**
Stepper motors and DC gearmotors designed in Japan



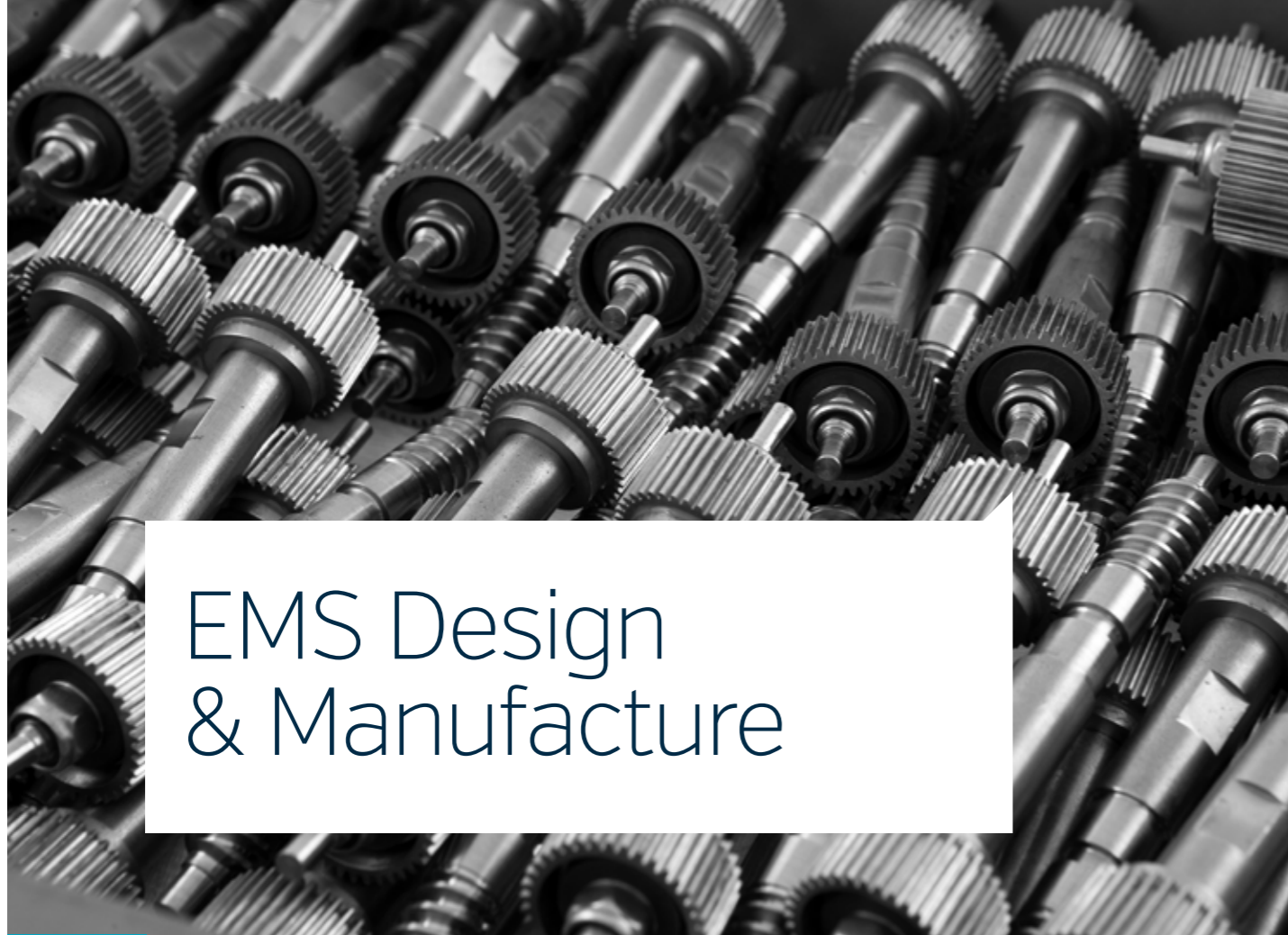
20 **LINEAR ACTUATORS**
Linear actuation systems from SKF and Mingardi



22 **APPLICATIONS**
Example applications



24 **CONTACT**
Contact us today to discuss your application with one of our engineers



EMS Design & Manufacture

04

DECADES OF EXPERIENCE, POWERFUL DESIGN TOOLS AND CLOSE COMMUNICATION WITH THE CUSTOMER ALLOW EMS' FREE DESIGN SERVICE TO DELIVER BOTH VALUE ADDED AND COMPLETE BESPOKE DRIVE SYSTEMS FOR THE MOST DEMANDING APPLICATIONS

EMS' centre of excellence for design and manufacture forms a strategic part of the portfolio of products and services offered by EMS.

Our 3000m² design and manufacturing facility in Poole, Dorset allows us to reconfigure standard motors to meet customer requirements but also to develop bespoke rotary and linear drive systems to meet your exact needs. In-house design and manufacture of all components and gears affords us full control of the supply chain and first class quality control.

Our unique capability allows us to add value and optimise proprietary motors in ways such as adding pinions, mounting flanges, shaft extensions and wiring looms etc. However, where appropriate, we will develop complete bespoke drive systems often resulting in a better technical and commercial solution.

The team at our centre of excellence for design and manufacture have over 30 years of experience in gearbox design and are dedicated to working closely with



DRIVE SYSTEMS TO MATCH CUSTOMER SPECIFICATION



your engineers. A qualified sales engineer will manage your project, but to ensure best communication and understanding, direct contact between our design teams is positively encouraged. EMS now supplies bespoke drive systems to industries including: automotive, medical, metrology, aerospace, instrumentation, mobility aids, petrochemical, defence and health & safety.

Using Solidworks 3D solid modelling and specialist 2D design tools we are able to rapidly develop and exchange design concepts long before metal is cut. FMEA analysis often forms part of the design process and in conjunction with advanced CAD/CAM software we can optimise

our designs for maximum manufacturing efficiency and cost effectiveness from the outset.

When it comes to initial prototyping, in-house 3D printing allows fast integration and visualisation of a design concept, accelerating the initial evaluation process greatly reducing time to market. As we manufacture most important components in house you can be sure when you receive an off machine prototype it will be extremely close to the final product, giving you a chance to thoroughly qualify in application before committing to production volumes.

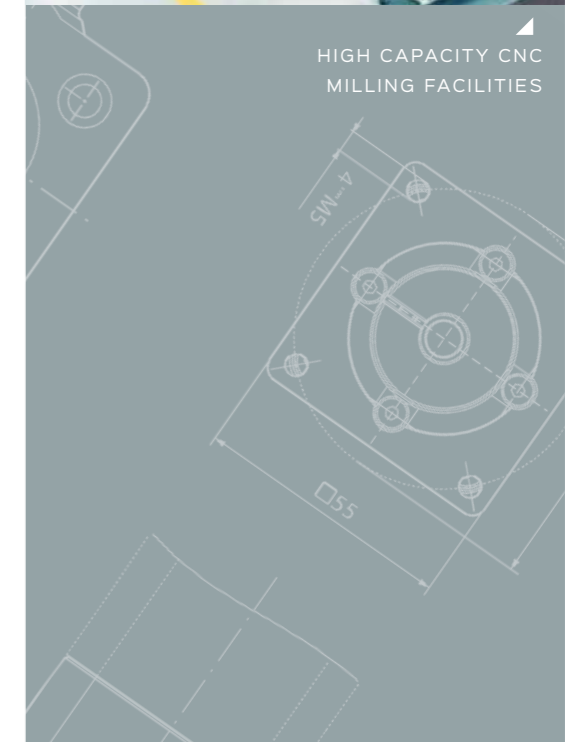


- // DEDICATED BESPOKE DESIGN TEAM
- // FULL 3D MODELLING CAPABILITY
- // RAPID PROTOTYPING
- // COMPREHENSIVE IN HOUSE TEST FACILITIES
- // ISO 9001:2008

05



HIGH CAPACITY CNC MILLING FACILITIES





EMS Design & Manufacture

06

WITH OVER 3000M² AT OUR POOLE FACILITY DEDICATED TO THE MANUFACTURE, ASSEMBLY AND TEST OF CUSTOMER SPECIFIC BESPOKE DRIVE SYSTEMS WE CAN MEET THE MOST DEMANDING QUALITY AND SUPPLY REQUIREMENTS TO SUPPORT YOUR BUSINESS

Quality is designed in at the concept stage of any project and our continued capital investment programme ensures that this is reflected in the finished product. Comprehensive quality control and a dedicated inspection area with Mitutoyo CNC CMM and Faro laser scanner demonstrate our commitment and determination to offer the highest quality possible in line with our ISO9001:2008 accreditation.

Once production begins our extensive manufacturing facilities ensure volume of supply while maintaining the highest quality. Over 200,000 bespoke products leave our production facility every year supplying an incredibly diverse customer base who all have one thing in common, a requirement for first class drive systems.



PRECISION COMPONENTS MANUFACTURED IN HOUSE



CNC machine tools form an important part of our manufacturing process as it gives us the throughput and repeatability we need to meet our own stringent quality standards. We are always adding to our capability, but currently have seven CNC lathes and 18 CNC mills, some with 5th axis capability for the most challenging machining operations.

Gear cutting has been part of EMS' DNA since we began manufacturing and we now have a dedicated gear cutting centre featuring over 40 Swiss Mikron gear hobbing machines. Here we can produce spur, helical and worm gear in a range of materials to our exact specification ensuring any drive systems we develop

operates at the highest efficiency possible.

Once the components are finished and all quality checks passed the kits move to our 800m² assembly shop. Here we undertake the final assembly of the mechanisms, using our CNC servo press as well as skilled operatives with years of experience handling and assembling precision mechanical systems.



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- // DEDICATED GEAR CUTTING CENTRE
- // EXTENSIVE CNC MILLING AND TURNING CAPABILITY
- // HIGHLY SKILLED ASSEMBLY TEAM
- // CNC SERVO PRESS WITH SPC

OVER 40 MIKRON GEAR HOBGING MACHINES ON SITE




FAULHABER

Faulhaber Group

08

FOUNDED IN THE LATE 1940S FAULHABER IS ACTIVE IN THE RESEARCH AND DEVELOPMENT, MANUFACTURE AND DISTRIBUTION OF HIGH-QUALITY DRIVE SYSTEMS, INCLUDING HIGH-PERFORMANCE DC MICROMOTORS, BASED ON THE SYSTEM FAULHABER® TECHNOLOGY

FAULHABER focus on the development of high- precision miniature and micro drive technologies. Headquartered in Schönaich near Stuttgart, Germany, FAULHABER also maintains development and production locations in Switzerland, Romania and Hungary. The cornerstone and quality seal of FAULHABER drive technology is the self-supporting, coreless rotor winding developed by Dr. Fritz Faulhaber Sr.

Today, FAULHABER offers the most extensive portfolio of miniature and micro drive systems available from a single source worldwide. The division focuses on developing complete drive systems to fit the needs of its customers' innovative applications. On the basis of its technological diversity, it designs drive solutions that are unique with respect to their precision and reliability in the smallest of spaces.

From the world's smallest brushless DC Motor and planetary gearhead, to implantable motor solutions sustaining life, to drive systems helping to explore the farthest regions of space, FAULHABER

HIGH POWER 4-POLE
BRUSHLESS MOTORS

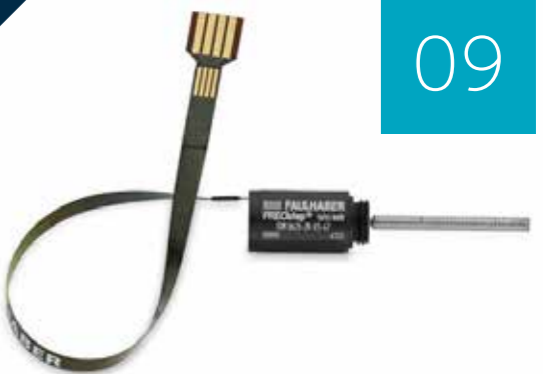


is there providing its customers with unparalleled experience and expertise for the next generation of life changing applications.

The "System FAULHABER®" rotor coil concept is simple yet revolutionary: a lightweight ironless copper coil rotates around a stationary permanent magnet instead of rotating a heavy iron armature wound with copper wire. Dr. Fritz Faulhaber's invention launched a new era in drive technology and the FAULHABER System continues to provide solutions for the ever more complex world of miniature drives. This advanced winding technology alongside the use of rare earth magnets allows a range of extremely high

power density brushed motors from 6mm up to 38mm diameter ideal for applications where class leading power to weight ratios are required.

When an application demands extended motor life in addition to the other features synonymous with the FAULHABER brand the comprehensive range of brushless dc motors fit the brief. With expected life in excess of 10,000 hours and a choice of two or four pole configurations to suit both high speed and high torque DC replacement applications the range has something to suit most requirements. Optional integrated drive electronics deliver an unrivalled package.



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- // DC BRUSHED AND BRUSHLESS MOTORS
- // GEARMOTORS
- // MINIATURE LINEAR ACTUATORS
- // MICRO MECHANICAL SYSTEMS
- // DRIVE ELECTRONICS
- // PRECISION ENCODERS
- // CUSTOM SOLUTIONS



FAULHABER

Faulhaber Group

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ADVANCED MOTION CONTROL SYSTEMS USED IN CONJUNCTION WITH AN EVER EXPANDING PORTFOLIO OF PRECISION GEARHEADS, HIGH RESOLUTION ENCODERS AND LINEAR COMPONENTS ALLOW A DYNAMIC, MODULAR APPROACH TO EVEN HIGHLY COMPLEX, DEMANDING APPLICATIONS

A range of Swiss made precision stepper motors in diameters from 6mm to 22mm complement the portfolio. Exceptional performance in even hostile environments make the FAULHABER Precistep stepper motors ideal for the most demanding of positioning applications. Optional lead screws allow extremely small linear actuation systems to be delivered.

The unique Quickshaft Linear DC Servomotor is another FAULHABER innovation. This motor series is available in three sizes starting from just 12.5 x 47mm and a weight of merely 56g. The largest Quickshaft can produce a peak force of up to 28N at full power with standard stroke lengths up to 220mm. Ideal for high dynamic applications these motors can achieve linear speeds in excess of 2m/s.

To complement the motor ranges above FAULHABER offer a wide range of optional gearheads which can be selected to suit your application. Spur gearheads offer low noise and high reduction ratios while for the most demanding applications high performance planetary gearheads

NEXT GENERATION MOTION CONTROLLERS



feature extremely high torque capability for a given diameter. A range of zero-backlash gearheads are ideal for applications where rotary precision and repeatability are paramount.

The requirements for a servo system are increasingly demanding so FAULHABER's encoder range offer class leading precision. The range includes two and three channel incremental magnetic and optical encoders with standard quadrature resolution from 16 to up to 10,000 lines or single turn absolute encoders with a resolution up to 4096 lines in diameters from just 6mm.

FAULHABER Motion Controllers are easy to

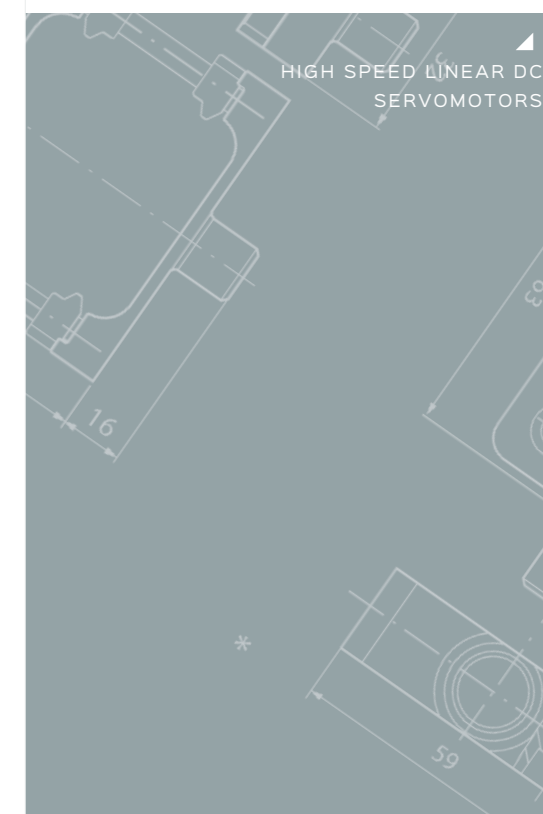
use single axis positioning controllers tailor made for the control of FAULHABER DC, Brushless, and linear motors. For high resolution dynamic positioning applications, or high precision speed control applications they are available with serial, CANopen or EtherCAT interfaces and can be configured with the free and easy to use Motion Manager software.

Finally, a range of accessories including brakes, connectors and controller adaptors can be specified to further tailor your drive systems to the precise requirements of your application.

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HIGH SPEED LINEAR DC SERVMOTORS





 PiezoMotor

Piezomotor

THE PIEZO LEGS FAMILY WITH FORCES UP TO 450N



12

LINEAR AND ROTARY MOTORS BUILT ON THE SUCCESSFUL PIEZO LEGS® TECHNOLOGY. WITH THE HIGHEST PRECISION ON THE MARKET, THESE MOTORS DELIVER TOP PERFORMANCE ACROSS THE LINE FEATURING SUB-MICRON OR NANORADIAN RESOLUTION PLUS HIGH DRIVING FORCE DESPITE THEIR COMPACT SIZE

The Swedish company PiezoMotor are the leading force behind many ground-breaking micro motor technologies including the Piezo LEGS®.

Piezo technology is simple and reliable, using very few parts and only elementary motion. Using Piezo motors negates the need for many supplementary components simplifying your design and extending lifetime. The astonishing power and precision of the small Piezo motors offers unique advantages when compared to traditional DC motors of the same size.

Piezo LEGS® is in essence a walking machine constructed in one solid piece. It's about the size of an ant but nearly 1000 times stronger. The construction consists of four legs with each leg being able to elongate and bend when electrically activated. By electrically pairing the legs and observing the transition and sequence of movement, two legs remain constantly in contact with the secondary interface resulting in propulsion of this part.

Piezo LEGS® is available in different constructions so that a linear or rotary movement can be achieved.

As the motor relies on friction and the legs remain in contact with the interface at all times high torque can be achieved without the need for a supplementary gearhead and as a consequence no unwanted backlash is introduced into the system. The result is a motor that delivers a step resolution of 1 Nanometre in the linear format and 25 Nanorads in the rotary format.

In addition, the friction element ensures that the motor remains self-locking with no power applied making them ideal for handheld battery powered devices.

PiezoMotor is a world-leading developer and manufacturer of groundbreaking micro motors based on piezoelectric materials.

Simple, extremely precise and very small, the motors replace traditional technology and enable motorization where it was not possible before.

The motors' performance include sub-nanometer positioning as well as high force in a small package. The motors can operate in vacuum and can be made completely non-magnetic.

In Uppsala, Sweden, PiezoMotor has its own in-house high-volume manufacturing facility, R&D centre and headquarters.

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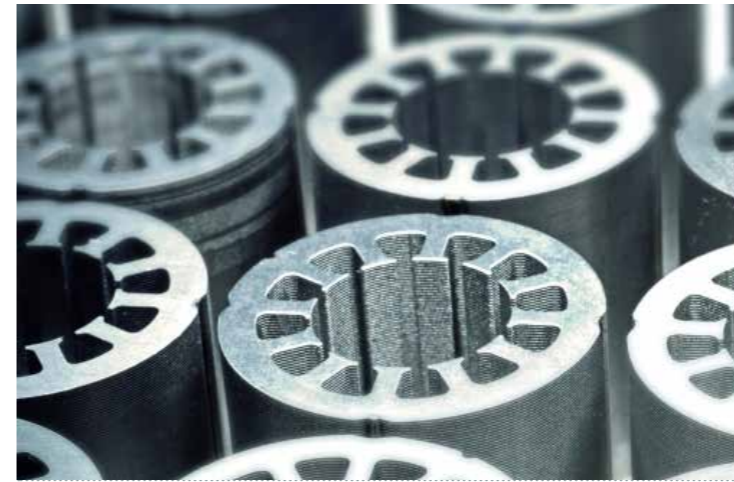
LR17 SERIES MOTOR OFFERS 30MM AND A 15-BIT ENCODER IN A 17MM DIA. BODY





Kählig Antriebstechnik

PRECISION COMPONENTS
ENSURE HIGH PERFORMANCE



14

KAG FOCUS ON DEVELOPING AND PRODUCING A RANGE OF SMALL AND POWERFUL DC DRIVES FOR INDUSTRIAL APPLICATIONS

FACTORY CUSTOMISATION OPTIONS ALLOW TAILORED MOTORS FOR PARTICULARLY DEMANDING ENVIRONMENTS LIKE THOSE SEEN ON AGRICULTURAL MACHINES

With their headquarters in Hannover, KAG produce brushed and brushless DC drives in the range 2.5 to 340 Watt output power. The company focuses on developing and producing small and powerful drives for use in a wide range of application areas including medical technology, domestic services, fluid mechanics, the automotive industry, office communications, automatic machines and mechanical engineering.

Utilising traditional DC motor technology, but designed to give up to 3000 hours life at nominal rating, the Kählig DC range satisfies many applications. To meet higher torque applications there is a comprehensive range of spur and planetary gearheads available.

Applications demanding longer lifetime can be fulfilled with their comprehensive range of brushless EC motors offering up to 20,000 hours service.

Options include tachogenerators and optical encoders to give feedback for speed and positional control. To further enhance their products and develop new higher performance motors, KAG have recently opened a new laboratory equipped with a 3-D X-ray imaging system, an electron scanning microscope, environmental test chambers and a 3-D laser sintering system. The latter allows rapid prototyping of new components.

KAG drives are specially designed for rough operation in agricultural applications. The DC motors are designed for and fitted with corresponding gearing and have optimal levels of protection so that they can be used freely in

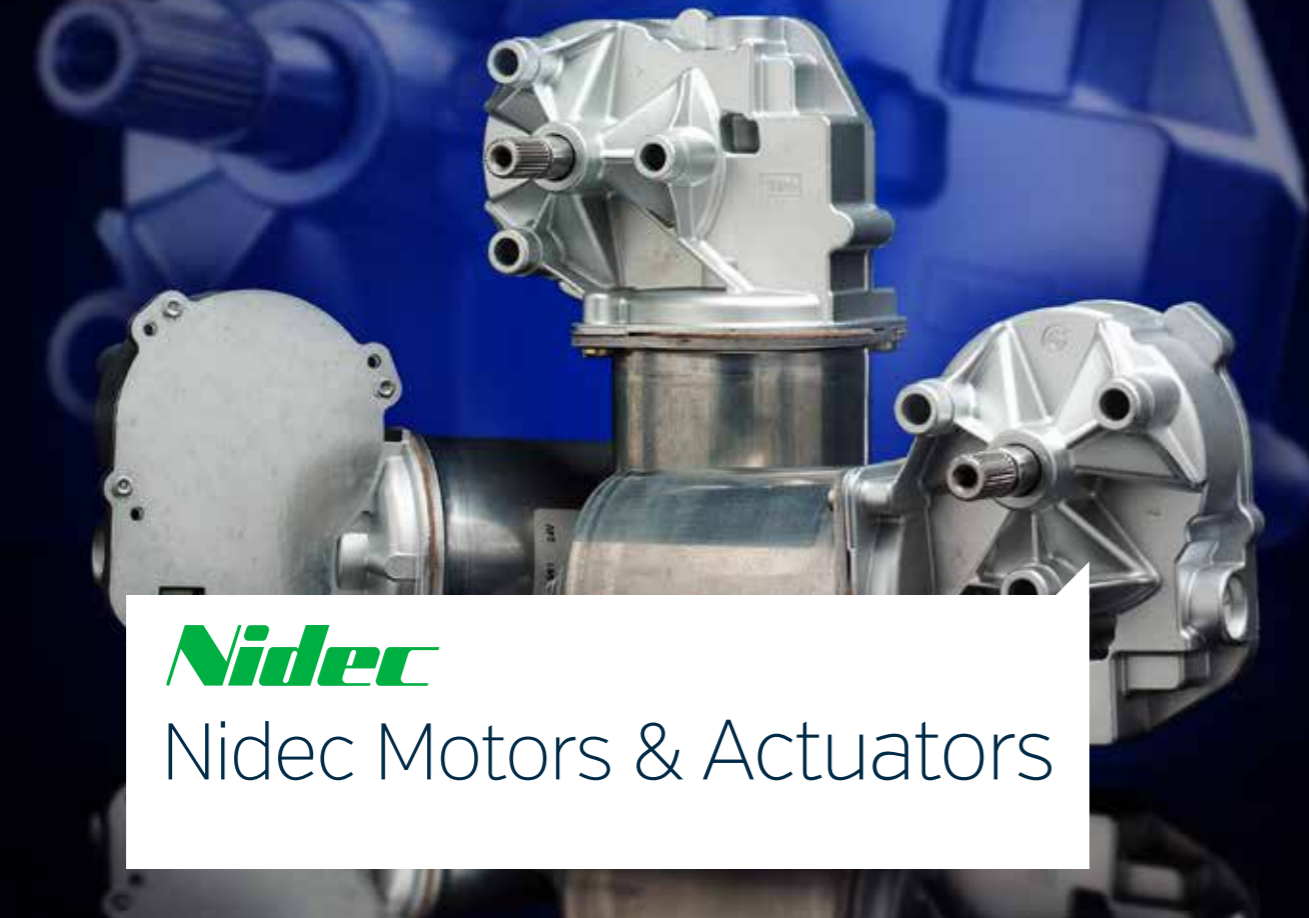
all agricultural conditions and can also be cleaned with water. The necessary vibration resistance for agricultural operation is assured through a testing programme in their laboratory. Special surface treatments ensure protection from aggressive substances such as manure and hydraulic oil. Customers also have the option to specify the colour of the surface treatment, if required.

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RAPID PROTOTYPING FACILITIES OFFER FAST RESPONSE TO PROTOTYPE REQUESTS

- // DC BRUSHED AND BRUSHLESS MOTORS
- // UP TO 340W
- // PLANETARY AND WORM DRIVE GEARHEADS
- // ADVANCED PROTOTYPING CAPABILITY
- // USER SPECIFIC DRIVE SOLUTIONS



Nidec

Nidec Motors & Actuators

16

WITH THEIR ROOTS IN THE AUTOMOTIVE INDUSTRY, NIDEC MOTORS & ACTUATORS OFFER HIGH VOLUME EUROPEAN MANUFACTURED GEARED DC MOTORS THAT OFFER AN UNRIVALED BALANCE OF PERFORMANCE, QUALITY AND COST EFFECTIVENESS IN THEIR MARKETPLACE

The Nidec Motors and Actuators portfolio comprises DC motors, geared motors and linear actuators. This reliable yet cost effective range is available in 12 and 24 volts DC and delivers high torque performance ideally suited for use in health care products such as patient hoists, bath lifters and operating tables. Their versatility extends to many industrial applications including door openers for pedestrian and vehicular access, domestic garage door openers, food processing, labelling and conveying systems.

All the Nidec Motors & Actuators products are derived from products supplied in the automotive sector and benefit from the same robust product design, extensive testing and superior quality and performance associated with that marketplace.

FULLY AUTOMATED FACILITY AT GERMAN PLANT



The latest additions to the DC motor range, the DCK31 and DCK35 series, are manufactured at Nidec's dedicated production facility in Germany. With continuous torque ratings up to 8Nm from a 1.2kg motor the DCK35 range offers serious performance with the cost effectiveness of a volume produced motor. A fully-automated production line ensures consistently high quality, and in-process controls guarantee that every motor leaves the line 100% tested.

The GMPS series of DC linear actuators offer extremely cost effective linear motion and these actuators provide the ideal solution where cost effective, high performance linear actuation is required.

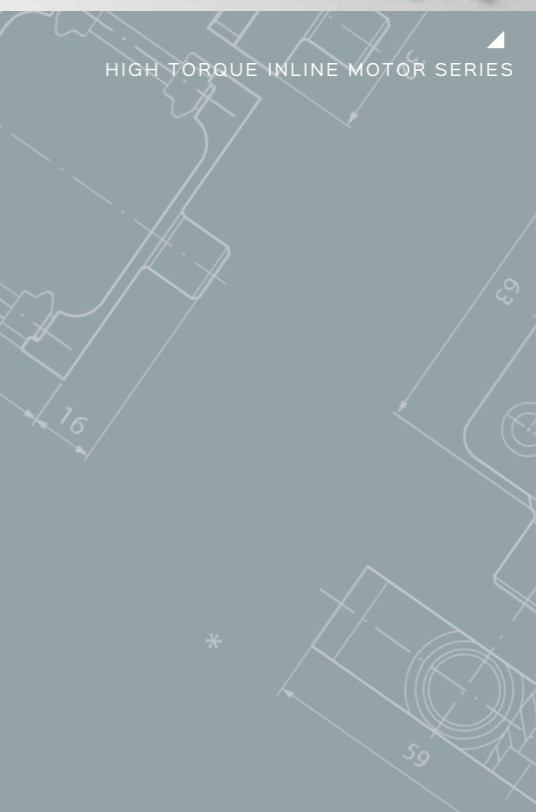
If the application space envelope calls for an inline solution the GMPI series offers a range of 44mm diameter high torque DC motor and spur gearhead combinations. With continuous torques up to 10Nm at 30rpm these motors also pack a surprising punch.

If your application requires feedback many of the motors from Nidec Motors & Actuators feature integrated hall sensors which give you a simple and robust way to monitor the rotor.

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HIGH TORQUE INLINE MOTOR SERIES





SERVO

Nidec Servo

18

MANUFACTURING OVER 3 MILLION MOTORS AND FANS EVERY MONTH NIDEC SERVO ARE A GLOBAL LEADER IN SUPPLYING STEPPER MOTORS, DC MOTORS AND FANS FOR VOLUME OEM APPLICATIONS WHERE PERFORMANCE MATTERS

Established as a manufacturer of small motors in Japan over 40 years ago and more recently joining the Nidec Corporation family of companies, Nidec Servo offer a comprehensive range of low cost stepper motors, brushed DC motors and fans & blowers to suit applications ranging from office automation to medical devices.

The range includes 2 and 3 phase hybrid stepper motors offering very quiet running and long life which as a consequence are already used extensively by many of the world's key OEMs. These motors offer high torque and low noise compared to similar sized motors and are available in six basic frame sizes ranging from 20mm square, up to 86mm and in a range of stack lengths to offer a choice of performance levels.

COST EFFECTIVE GEARED DC MOTOR SERIES



Typical step angles are 0.6 to 15 degrees and each motor can be supplied with a gearhead from the factor if required. High performance drivers, also manufactured by Nidec Servo, are available enabling the optimisation of the motor performance and noise level to suit your application.

In addition Nidec Servo has a range of low cost iron-core 12/24V DC motors with output powers up to 26W. This diverse range of motors is available from just 29mm diameter and can provide an extremely cost effective solution for applications in the mid to high volumes. To complement the motors a comprehensive range of robust gearboxes delivering torques up to 6Nm are

available. With proven reliability a gearmotor from Nidec Servo's range is the ideal choice when the reputation of your product matters.

A comprehensive range of fans and blowers completes the portfolio offered by Nidec Servo. With a special focus on silent brushless DC round venturi fans and multi blade blowers many applications can be catered for with standard products. Where necessary additional features like lockup detection, output pulses and rotational speed detection sensors can be specified.

- // 2 & 3 PHASE STEPPER MOTORS
- // DC BRUSHED GEARMOTORS
- // 35-86MM FRAME SIZE
- // HIGH TORQUE
- // SILENT OPERATION
- // LOW VIBRATION
- // COST EFFECTIVE

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TWO PHASE HYBRID STEPPING MOTORS


SKF
MINGARDI
 THE REFERENCE FOR WINDOW AUTOMATION

Linear Actuators

20

EXTENSIVE EXPERIENCE AND KNOWLEDGE OF ACTUATION SYSTEMS ENABLE US TO SATISFY THE MOST DEMANDING REQUIREMENTS UTILISING A BROAD PORTFOLIO OF LINEAR ACTUATORS, TELESCOPIC PILLARS, ROTARY ACTUATORS, MATCHED CONTROL UNITS AND ACCESSORIES

SKF provide a comprehensive range of electric linear actuators and telescopic columns for a wide range of applications. We have provided actuation systems to the UK market for over 20 years and have vast experience in specifying and supplying the right product for your application. Operating as sole UK distributor for Magnetic Elektromotoren since 1985 and more recently, following their acquisition by SKF, their Specialist Distributor, we have the benefit of an extensive product range, as well as the experience and product knowledge to assist you in your selection.

The range is comprised of actuators and telescopic columns suitable for use with power supplies ranging from 12/24V DC through to 120/230/380V AC. Thrust forces are available from 200N and reach as high as 30KN for the most robust industrial designs. Stroke lengths up to 1m can be achieved depending on the load and its direction, at speeds up to 174mm/s. As the operating environment for each application can be so different, each actuator has a specific protection rating which determines its suitability in damp or dusty environments.

 CASM HIGH PERFORMANCE
 LINEAR ACTUATOR


To satisfy the more demanding applications, and those in the medical sector where autoclaving is needed, a protection rating of IP66 on the actuators and IP67 (submersible) on the auxiliary operating devices can be achieved. The operating devices consist of a range of ergonomic handheld switches with up to 10 functions, as well as foot switches and discreet desk mounted switches.

Our comprehensive range of smooth and quiet telescopic columns comes in versions comprising 230V/120V AC and 24V DC with direct drive or integrated power supply. Standard columns are available with push and pull forces up to 4000N and in stroke lengths from 200 up

to 700 mm. Constructed with anodised extruded aluminium profiles, they are available in 2 or 3 stages depending on the installation length required.

To extend our actuator portfolio we also have a comprehensive range of aesthetically pleasing in-line AC and DC actuators from MINGARDI. Originally designed to satisfy the building automation industry, these very versatile actuators and chain drives can provide solutions for a range of industrial applications.

- // AC AND DC LINEAR ACTUATORS
- // TELESCOPIC COLUMNS
- // CHAIN DRIVES
- // RACK ACTUATORS
- // CONTROL ELECTRONICS
- // UP TO 30KN FORCE
- // CONDITION MONITORING
- // PROTECTION UP TO IP66

21


 WINDOW AUTOMATION
 SYSTEMS



Applications

22

FROM TINY IMPLANTABLE MEDICAL DEVICES TO POWERFUL INDUSTRIAL SYSTEMS, THE POSSIBLE APPLICATIONS FOR EMS' EXTENSIVE PORTFOLIO OF STANDARD AND BESPOKE DRIVE SYSTEMS ARE ALMOST LIMITLESS

With an unrivalled portfolio of standard products as well as skilled design and high-tech manufacturing facilities EMS can always offer you the best fit for your application, no matter how challenging.

For pipeline inspection systems where high performance needs to be combined with light weight and energy efficiency our skew wound miniature drive systems are second to none. Remote operated vehicles have to operate in some of the toughest environments with no tolerance for failure – our high strength gearboxes ensure the job is a success. Closed loop control is essential for advanced prosthesis where performance and precision go hand in hand and with high resolution, compact encoders we can exceed even the highest expectations.

From laboratory equipment to satellites, our decades of application experience ensure we can help you make the right drive system selection, first time. Make contact with one of our engineers today and see what we can do for you.

PIPELINE INSPECTION SYSTEMS WHERE RELIABILITY MATTERS



MULTI-AXIS ROVS FOR CHALLENGING ENVIRONMENTS



ADVANCED MYOELECTRIC PROSTHETIC DEVICES



HIGH PERFORMANCE MEDICAL DEVICES

- // MEDICAL & LAB EQUIPMENT
- // HEALTHCARE
- // FACTORY AUTOMATION
- // INDUSTRIAL TOOLS & EQUIPMENT
- // AEROSPACE & AVIATION
- // OPTICS & PHOTONICS
- // ENVIRONMENTAL & SAFETY

23





// DC MICROMOTORS

// BRUSHLESS
DC MOTORS

// GEARMOTORS

// LOW PROFILE MOTORS

// STEPPER MOTORS

// PIEZO MOTORS

// DRIVE

ELECTRONICS

// CUSTOM SOLUTIONS

// MECHATRONICS

// PRECISION
BALLSCREWS

// LINEAR ACTUATORS

// TELESCOPIC COLUMNS

EMS

Electro Mechanical Systems

Electro Mechanical Systems Ltd.
Eros House, Calleva Park
Aldermaston, Berkshire RG7 8LN

Tel 0118 9817391

Fax 0118 9817613

info@ems-ltd.com

www.ems-limited.co.uk