maxon

Drive solutions for laboratory automation. Reliable designs with high precision.

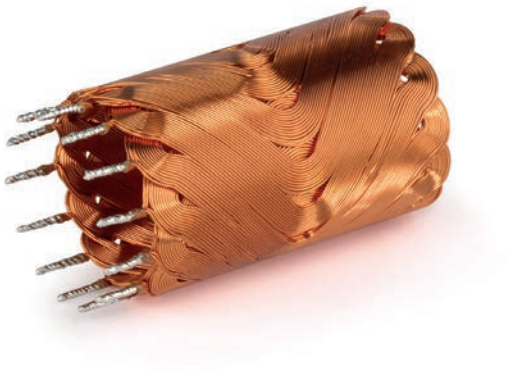
Founded in Switzerland. Available worldwide.

maxon – a strong global brand

maxon, with headquarters in Sachseln/Central Switzerland, has production sites in Switzerland, Germany, Hungary, South Korea, USA, France, Netherlands, Great Britain and China as well as sales companies in more than 30 countries. Our machines and product lines are developed in-house to guarantee cost-effective manufacturing of our products and enabling us to create custom solutions to fit your specific application needs.

Precision Drive Systems

maxon develops and builds precision drive systems. Our brushless and brushed DC motors with ironless windings are among the best in the world. Flat motors with iron cores complete our modular product portfolio. maxon's modular system includes planetary and spur gearheads, spindle drives, as well as encoders and control electronics.



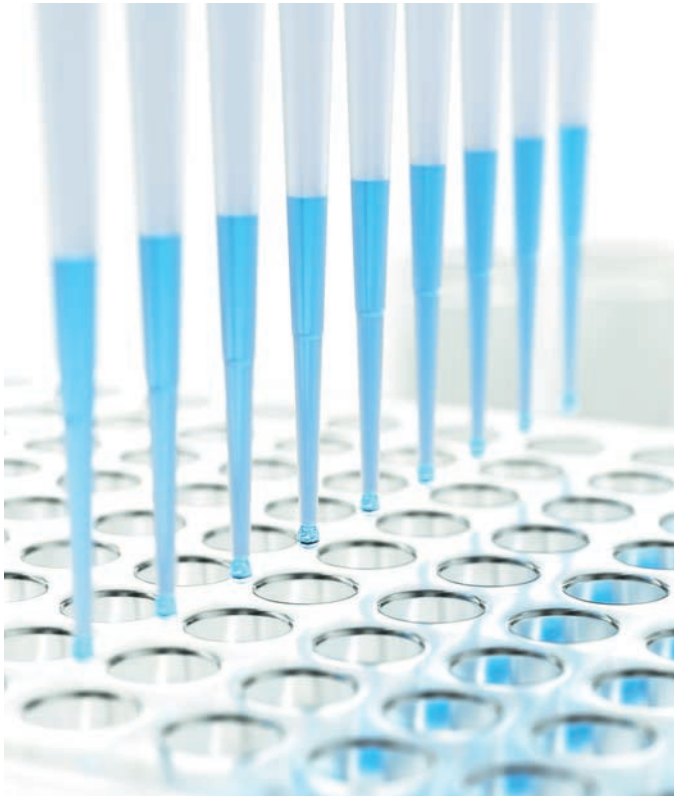
There is no drive challenge that can’t be solved.

Benefit from our expertise in control solutions for state-of-the-art drive technology in devices, machinery, and systems. With our products, complex challenges like highly dynamic multi-axis positioning or synchronization can be solved in a cost-effective and efficient manner.

In addition to standard products, we also offer the development of custom motor and gearbox solutions as well as consulting and engineering services. Cost-optimized solutions and application specific custom functions offer competitive advantages to our customers.

With our high degree of technical competence, comprehensive application experience, and our focus on drive technology, we guarantee outstanding expert advice. We are looking forward to working with you.

Automated liquid handling



The goal of any scientific experiment is to be reproducible.

Automation solutions are essential as laboratory procedures become increasingly complex. There is a higher demand for improved efficiency while still maintaining accuracy and consistency. The goal of any scientific experiment is to be reproducible, so that if you repeat it, you will always get the same result, regardless of when and where it is done. In practice, however, this is rarely the case.

A 2016 survey published in Nature found that more than 70% of scientists could not reproduce other scientists' experiments and more than half could not reproduce their own experiments, highlighting the challenges of obtaining reproducible results. Steps must be taken to ensure the reproducibility of experiments so that reliable and accurate scientific conclusions can be drawn.

Drives for optimized precise liquid handling

maxon delivers robust drive solutions used in electronic pipettes and laboratory tools for accurate and repeatable delivery of samples and reagents in the fields of molecular biology, analytical chemistry and medicine.

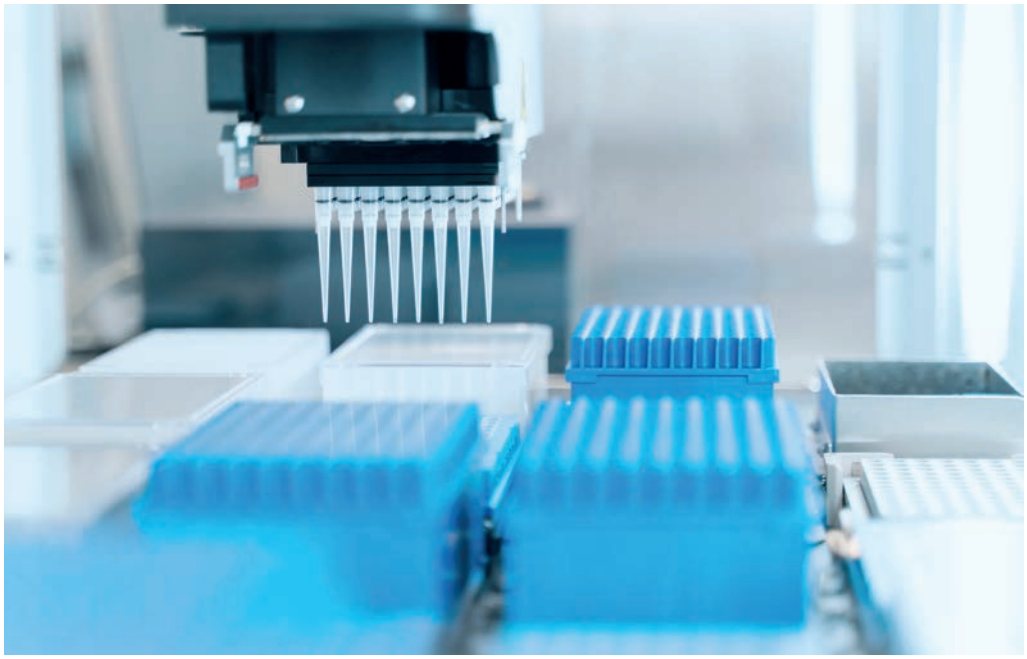
Our efficient and powerful drives help make your products smaller and faster for extended periods. maxon quality drives can be found in many liquid handling applications because of their high reliability, precision, and power density. Performing at a high speed and with accurate position control, they are widely used for many operations such as X, Y axis movement or Z axis for dispensing. In applications where high throughput and precise handling is needed, maxon offers the perfect solution.

- → High continuous torque
- → High power density
- → Fast and dynamic
- → Cogging free motors

New Multi-Axis Motion Controller

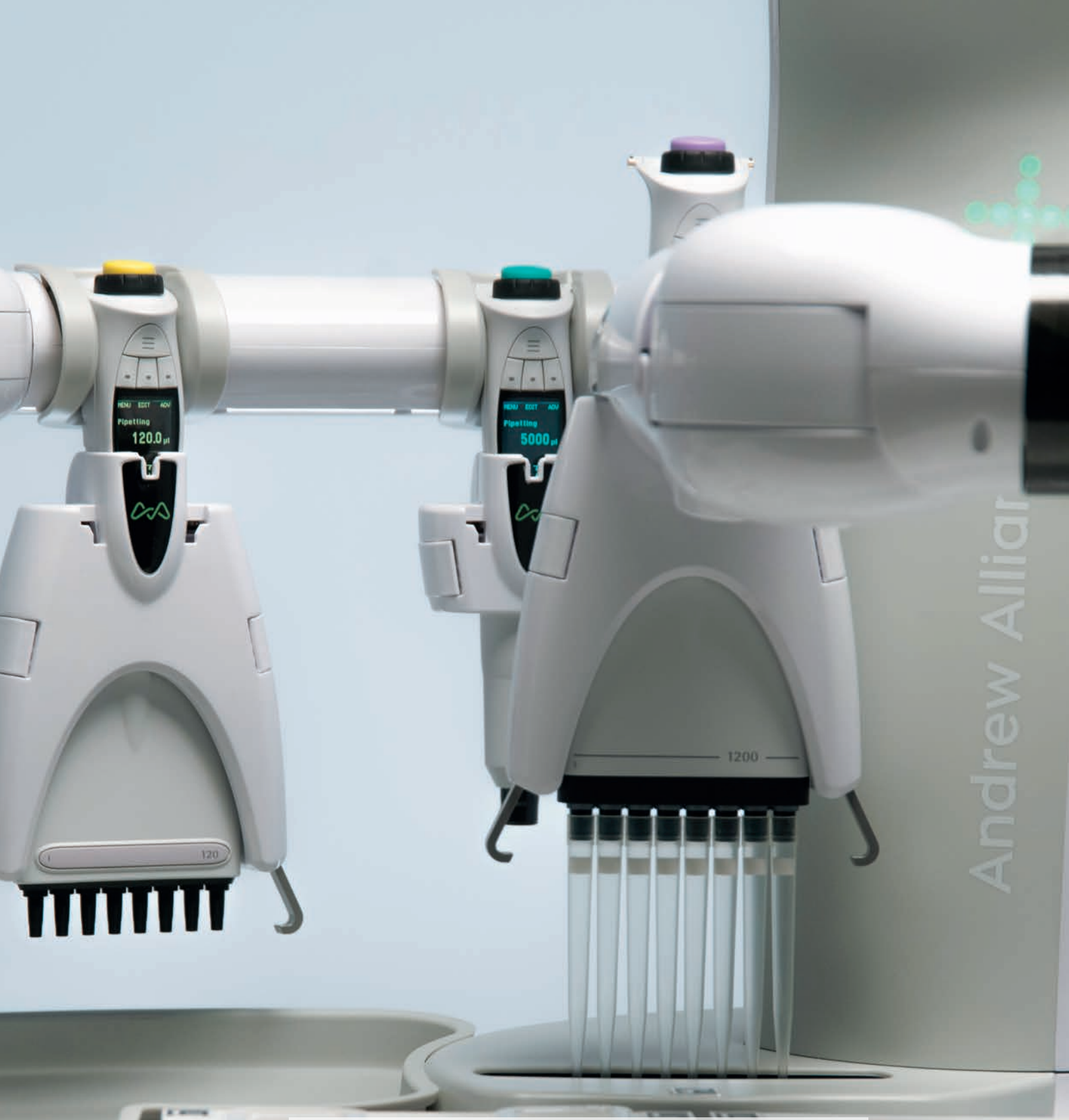
Getting as many samples as possible processed by having a high sample throughput in the laboratory is more important than ever. With the maxon zub MiniMACS6 you can increase your liquid handling throughput by having up to 6 axes operating synchronously. The maxon Motion Control Team will program the controller to your specific needs, optimized for your application, and help to implement it in your system.

Synchronous multi-axis kinematic control for high throughput.



Fast reliable multi-axis controller: MiniMACS6-AMP-4/50/10

- → 6 DC brushed / 4 EC brushless 400 W synchronized axis
- → Integrated 4x high power amplifiers
- → Highly dynamic
- → Modular and customizable
- → Cost efficient
- → Motion control library included
- → CANopen / optional EtherCAT
- → Kinematic



Andrew Alliance found that when working with a trusted supplier, they were able to find and select the right components for their Andrew+ laboratory automation robot. The EC 45 flat motors provided the speeds, torques, and precision needed for the wide variety of operations the robot was designed to perform. Reliability and long life were also critical requirements delivered in the company's motor selection. When operating in such a critical industry as laboratory automation, both design expertise and the right technology are important.

Pipetting at a glance

The lab automation market continually grows as more tabletop systems become available, yet providing features beyond basic pipetting can be a challenge. After years of market feedback, Andrew Alliance took on this challenge, which resulted in their Andrew+ liquid handling robot. Through an expanding range of accessories, the unit has been designed to do more than just automate pipetting like so many competitive systems do.

This liquid-handling robot's base unit weighs only 35 pounds for easy benchtop use and can be redeployed to different parts of a laboratory or different departments to be used for a wide variety of tasks. The robot works from an integrated tool rack. The robot grabs and secures the proper tool for the operation and then performs the allotted function. Andrew+ is a modular system that can be adapted to many tasks and applications, including sample prep for QC, analytical chemistry, serial delusion, plasma prep, DNA extraction, concentration normalization, and so much more. Through the use of single and multichannel electronic pipettes, the system ensures liquid handling performance while delivering maximum flexibility to the user. In addition, the unit can perform a wide range of complex experimental steps, such as column grabbing, depending on the application.

Choosing the right motor

Andrew Alliance chose three EC 45 flat motors designed and manufactured by maxon for the robot arm actuation—one each for the shoulder, elbow, and wrist. According to Antoine Jordan, Global Operations Director, "The size and footprint were really important to keep the robot both compact and lightweight."

The company has used maxon products in the past, giving it plenty of prior experience with the motor technology before incorporating them into this new design. Impressed by the motors' stability and maxon's broad line of products compatible with a wide number of applications allowed for complete design flexibility on the project. Andrew Alliance also felt they could trust using a minimally customized version of the motors for their application if necessary.

Once the decision on which motors to use was finalized, the design parameters were tightened so that the end result would allow them to produce a highly accurate, precision system. Because accuracy is so important in an automated lab robot, the design included an integrated absolute encoder used for the system's closed loop operation. This helped to provide and maintain the precision necessary for the final application. The robot required this extremely accurate operation for both key operations—to make precise movements while picking up the various instruments or tools, as well as performing the operation required once the tool was in the robot's grip.

"The size and footprint were really important to keep the robot both compact and lightweight."

Deciding to incorporate the EC 45 brushless DC flat motors was one of the critical decisions made for the application (see Figure 1). Besides the precision necessary for operation, the motors needed to be very quick to respond throughout the entire move sequence. Dependent upon where the robotic arm is located at any one moment, greater torques were required, particularly for cantilevered operations. Sensors integrate with the system controls to make sure that the homing of the arm is performed without touching any other system components.

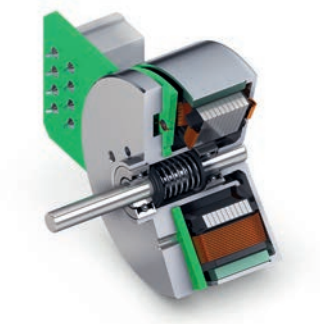


Figure 1: Three EC 45 brushless DC flat motors are used on the Andrew+, one for each of the robot's joints.

Blood analysis machines

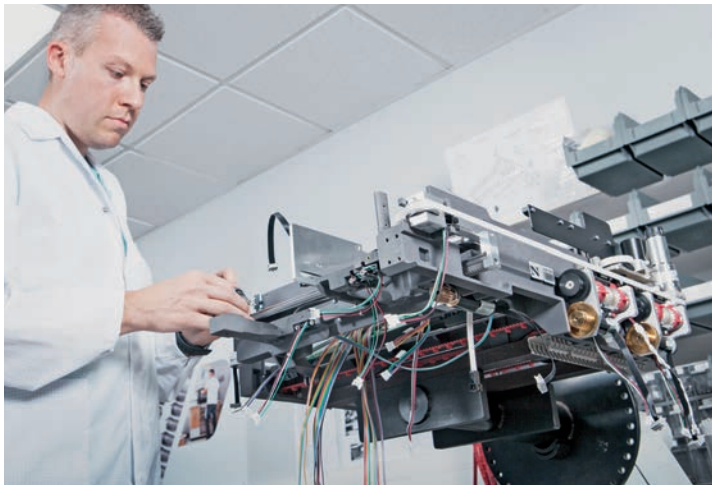
High-tech machines analyze human blood samples, detect coagulation disorders, and thus help to save lives. The maxon sales company in France not only supplies the appropriate drives – it builds entire conveyor modules.

Stago is a French company that specializes in analysis instruments for hemostasis diagnostics. Around 20,000 devices from Stago are in use around the world – including the StarMax. This fully automated analysis system is equipped with a three-axis robot and offers space for 215 samples and 1,000 test containers. The machine works autonomously, checks the results, compares them, and monitors the processes. This saves the biologists and technicians a lot of time. Therefore, the device is particularly suitable for laboratories with a large sample volume.

> “ maxon contributed their specialized know-how and gave us valuable tips.

Jean-François Gelin
Project manager at Stago

The analysis system STAR Max
©Stago



Production facility
maxon France

Precision on three axes

StarMax was introduced to the market in late 2014. Stago developed its first analysis device with an XYZ-axis robot as early as 1991. Even back then, maxon's sales company in France, was on board. Therefore, the drive specialist was contacted again during the first development phase of StarMax, to clarify the most important questions:

How can precise movement be achieved on all three axes?
How can the reagents be pipetted fully automatically?

"In the end, maxon used their vast experience to adapt their standard products to match our requirements," says Jean-Francois Gelin, Project Manager Innovation and R&D at Stago.

The cooperation has now become so close that maxon assembles the complete conveyor system for the pipette racks in its own production facility in Lyon and ships it to Stago for final assembly. Various types of the A-max DC motor by maxon are used for the movements of the rack. The diameters vary between 16 and 26 millimeter. The DC motors are highly dynamic and easy to control. maxon also assembles matching planetary gearheads to generate the required torques.

maxon is not only a drive specialist, but also an expert in the field of mechatronics and automation.

> "Our company slogan – Precision Drive Systems – reflects that,

says Alain Pontille, Managing Director at maxon France.

"We work very closely with our customers and jointly create solutions that make their products an economic success."

maxon – your systems engineering partner

As an established supplier of motors, gears, sensors, and controllers, maxon has a broad product portfolio and expertise in the drive sector. However, maxon has also developed and produced complete mechatronic systems for customers in various fields of application.

From the motor, gearhead, and sensor to the master-level controller and the complete mechatronic drive system, maxon offers everything from a single source and develops the right drive solution for the product in close cooperation with the customer.

In addition to individual components, the range also includes customer-specific software development, complete mechatronic drive systems, through to intelligent drive solutions and maintenance as well as service.

By getting involved at an early stage, maxon can contribute its know-how during the customer's development process and thus work out the best possible solution with the customer.

Be it an entire pipetting cassette, an XYZ axis drive system for instruments or a customer-specific motor, maxon can help optimize your product and incorporate its know-how to give you a competitive advantage.

1 2 3 4

Drive

- DC and BLDC motors from 0.5 W up to 1000 W (0.2 – 1000 mNm)
- Gearheads and screw drives up to 150 Nm
- Encoders and sensors
- Compact drives
- Brakes, batteries, and battery management

Motor & Motion Control

- Act as slave or master for a customer controller
- Position and velocity synchronization of 1 to 32 axes (incl. kinematics) Cycle time max 1 ms
- EtherCAT, CANopen, Encoder and I/O's
- Configurable with maxon GUI / AposSC incl. motion controll library

Mechatronic system

- Custom Integration of drive and motion control into customer application
- Improvement of the mechatronic drive system through many years of experience in design
- Production of mechatronic subsystems from small to high volume

IoT & Cloud Services

- Consultancy and system architecture
- 1st installation support and after sales
- IoT & cloud services (on request)

maxon as your solution partner for drive systems

Interested in a close collaboration for your next product design?
Contact us at: **labautomation@maxongroup.com**

Point-of-care diagnostics

Compact reliable drive solutions.

Point-Of-Care Testing (POCT) is becoming more important than ever. A rapid analysis and an early diagnosis of diseases will result in better monitoring and treatment of the patient.

One of the main challenges for the POCT is "ease-of-use". POC devices are generally operated by nurses and patients who do not have the knowledge or training of laboratory staff. The devices need to be very simple and easy to use so that they cannot be misused. Maintenance functions must be eliminated or automated. Accuracy is also critical because diagnostic tests must be sufficiently accurate to make clinical decisions. As with any diagnostic test, it is important that the right test is performed on the right patient by a properly trained person with an accurately calibrated device.

Accordingly, the devices for this application become smaller and smaller, but still have the same reliability and be precise. maxon offers the ideal solution for POCT applications with the small ECX and DCX motors with a diameter of 6 to 16 mm and the new EPOS4 micro controller family.

Compact and efficient drives and controllers:
ECX SPEED 8 and EPOS4 Micro

- → Extreme power density up to 360 W (>50 W/cm^2 peak)
- → Single and multi-axis solutions
- → For brushed and brushless motors up to 120 W
- → Comprehensive feedback options
- → CANopen and EtherCAT versions

Drives for molecular biology

Highly reliable precise micro motors and controllers.

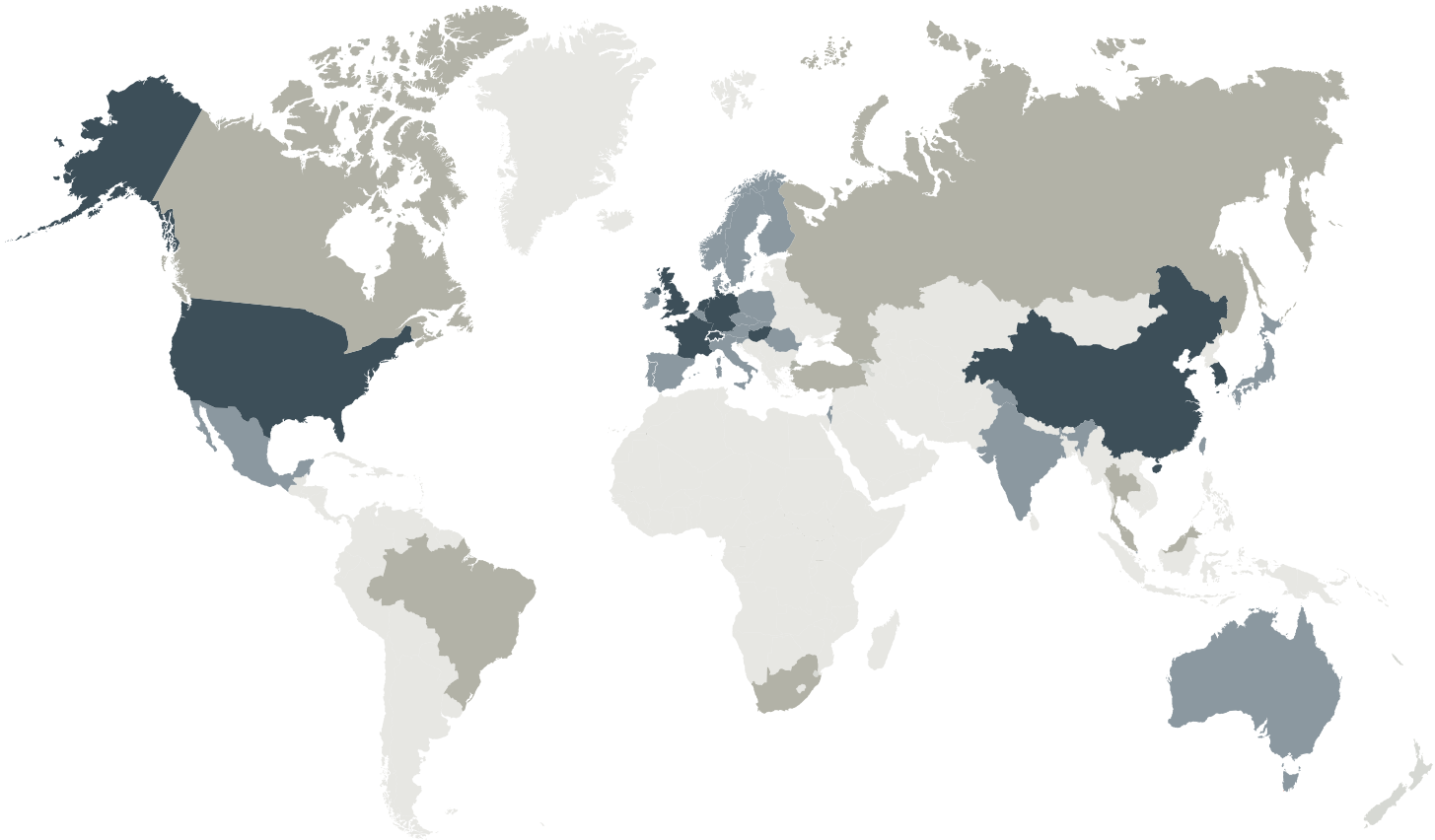
Miniaturized positioning controller
EPOS4 Micro 24/5 combined with
miniaturized powerhouse ECX TORQUE 22.

- → Very high cont. torque up to 80 mNm
- → Available in S, M and XL version
- → Max speeds of 16,000 rpm

Polymerase Chain Reaction (PCR) and DNA sequencing are an integral part of molecular biology, with applications ranging from basic research to disease diagnosis, agricultural testing, and forensic investigation. maxon has recently launched two new products that are ideal for this type of application.

The ECX TORQUE 22 is a dynamic brushless motor. Available with or without Hall sensors. Their iron core and multi-pole rotor design means these DC motors reach a very high torque density while operating at moderate speeds. Their low time constant makes them extremely dynamic. Using these compact products, the PCR run time can be increased, without losing any precision. maxon's reliable and efficient drive systems ensure you can achieve faster results without compromising the findings.

A global network



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Hungary
South Korea
France
Netherlands
USA
China
Great Britain

maxon Sales Companies

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Benelux
Bulgaria
China
Croatia
Czech Republic
Denmark
Finland
France
Germany
Great Britain
Hungary
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Israel
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Japan
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