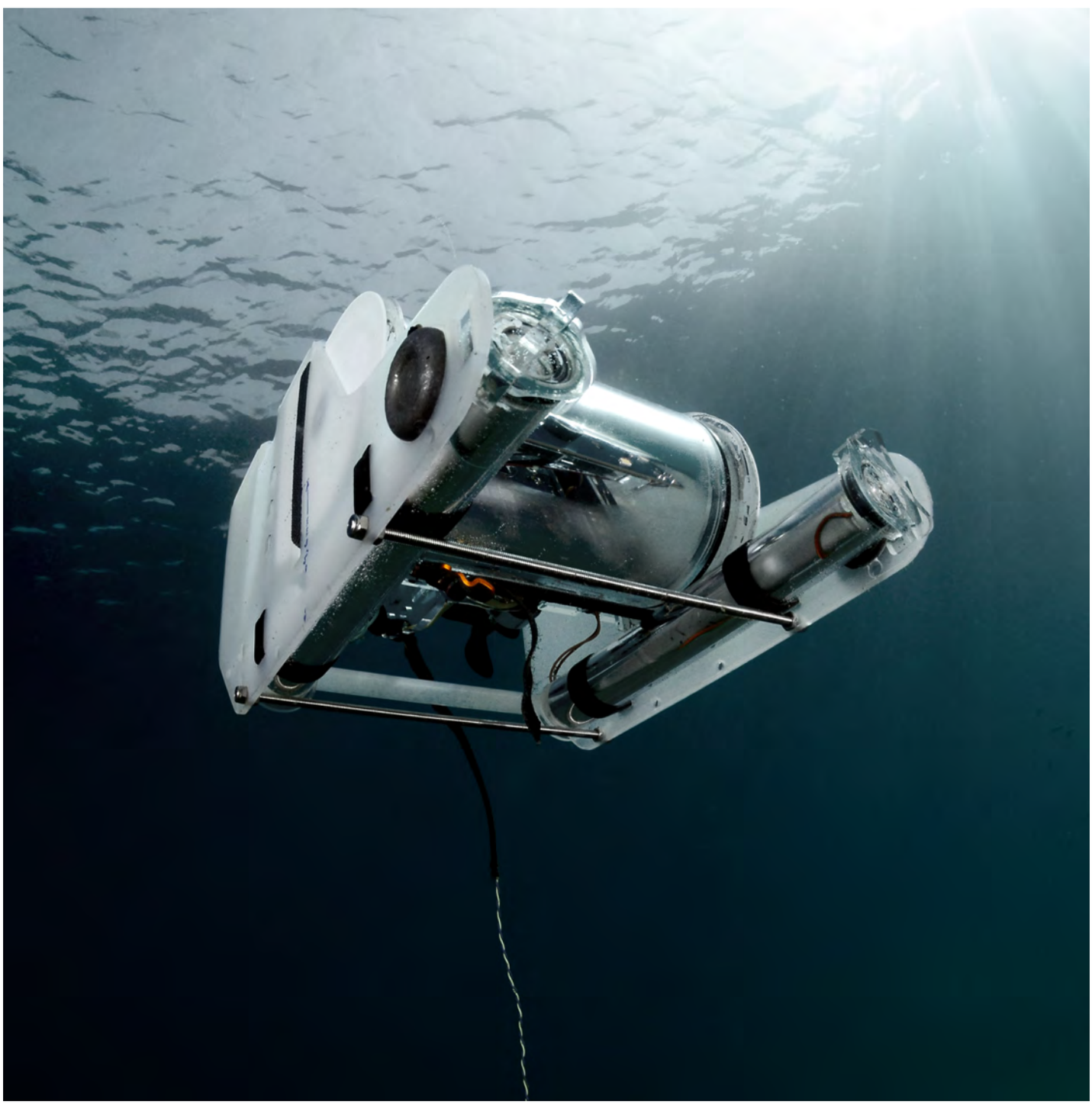
maxon

Drive technology for aquatic systems. Compact, lightweight and highly efficient.



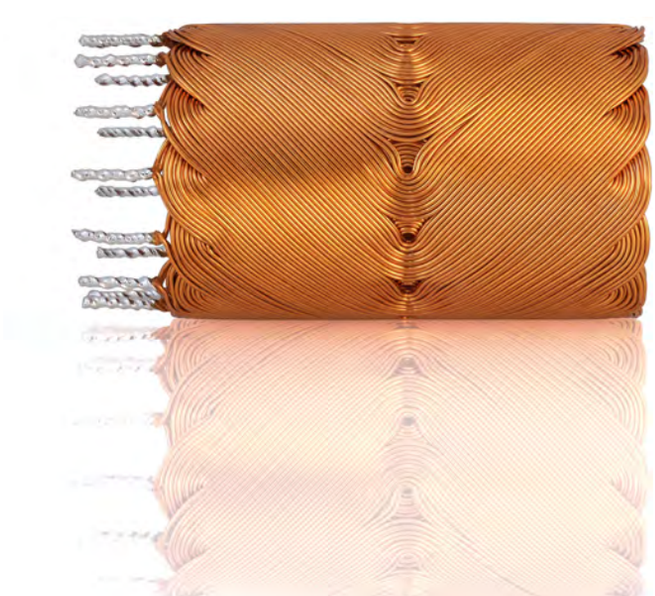
Founded in Switzerland.
Available worldwide.

maxon – a strong global brand

maxon, with headquarters in Sachseln/Central Switzerland, has production sites in Switzerland, Germany, Hungary, South Korea, USA, France, Netherlands 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.



Drives for unchartered worlds

Dive in with maxon aquatic solutions

From the ocean floor to Mars – our drives are used wherever extreme environmental conditions prevail. It is above all in underwater conditions that our drives can really show what they can do.

Sophisticated robotic vehicles on cables or autonomously controlled, travel under water in search of scientific data, mineral resources or sunken wrecks. The technology used here is required to withstand aggressive saltwater and enormous ambient pressure.

The advantages of maxon aquatic solutions

- → Max. immersion depth of 6000 meters
- → High quality and reliability
- → Low weight
- → Compact and robust design
- → High efficiency
- → Optimum thrust/weight ratio
- → Saltwater-resistant materials
- → Low noise
- → Oil filling

aquaticsolutions.maxongroup.com

Powerful performance comes in small packages. Efficiencies of over 90 %.

maxon DC motor

Ironless winding

Brushed DC motors with ironless rotor, in sizes of Ø6 – 65 mm, with up to 250 W power.

Main characteristics

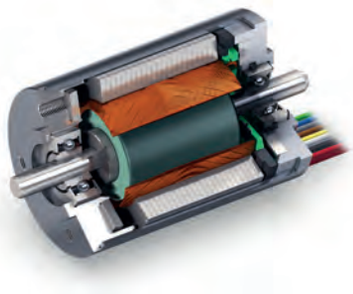
- No magnetic cogging torque
- Withstands high overload for short periods
- Low electromagnetic interference

Product programs

DCX and RE motors provide excellent performance and robust design.

DC-max and A-max motors combine cost-effectiveness with excellent motor performance.

DCX and DC-max motors can be configured online and are ready for shipment within 11 working days.



maxon EC motor

Ironless winding

Brushless DC motors are electronically commutated. They are available in sizes of Ø4 – 60 mm, with up to 480 W power.

Main characteristics

- Excellent control properties
- High overload capacity
- Very long service life
- Speeds of up to 120 000 rpm
- Autoclavable up to 2000 x

Product programs

ECX and EC motors provide optimum performance with high speeds.

EC-4pole motors offer high torques combined with high power density.

EC-max motors offer an excellent price/performance ratio.

ECX motors can be configured online and are ready for shipment within 11 working days.

maxon EC motor

Iron core winding

Brushless DC external- and internal-rotor motors are electronically commutated. They are available in sizes of Ø9.2 – 90 mm, with up to 600 W power.

Main characteristics

- Flat design
- High torque
- Very long service life
- Excellent price-performance ratios

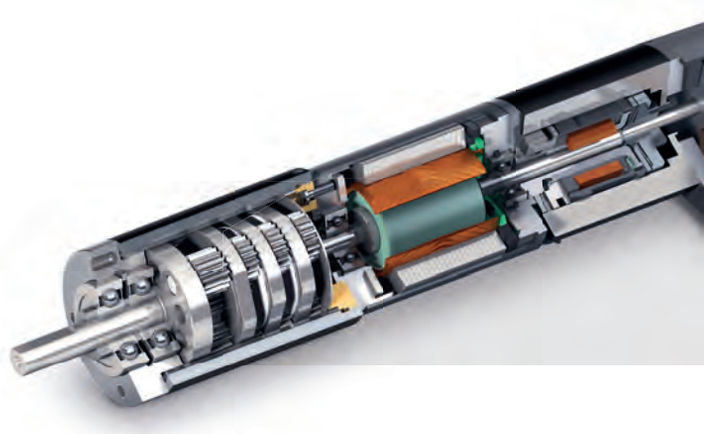
Product programs

EC-flat motors provide very high torques and are available with integrated electronics.

EC-i motors are characterized by high torques and excellent dynamics.

View the entire range of products online

shop.maxongroup.com



maxon gear

Precision planetary and spur gearheads as well as customer-specific special gears. Compact spindle drives with steel or ceramic spindles.

Product programs

GP and GPX planetary gearhead

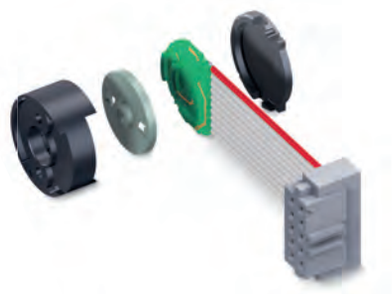
- For transmission of high torques
- High power
- High reduction ratio
- Autoclavable, with shaft seal
- Can be configured online (GPX only)

GS spur gearhead

- Economically priced
- For low torques
- High efficiency

GP S spindle drive

- Steel or ceramic spindle
- Metric spindle, ball screw and trapezoidal screw



maxon sensor

High-resolution encoders and digital encoders.

- Relative or absolute position signal, suitable for positioning tasks
- Direction detection
- Speed information from number of pulses per time unit

Product programs

Magnetic encoder

- Minimal space requirement
- Resistant against dirt
- Interpolated

Optical encoder

- High counts per turn
- Very high accuracy

Inductive encoder

- Robust against magnetic fields and dirt
- Integrated into EC flat motors

DC-tacho, resolver

maxon control

4-Q servo controllers and position controllers for controlling quick-response brushed and brushless DC motors up to 1 kW continuous power. Available as OEM module for installation on a motherboard or ready for connection with housing.

Product programs

ESCON
Compact and powerful servo controller. Commanded by an analog set value.

EPOS4
Position controllers with CANopen, EtherCAT, RS232 oder USB.

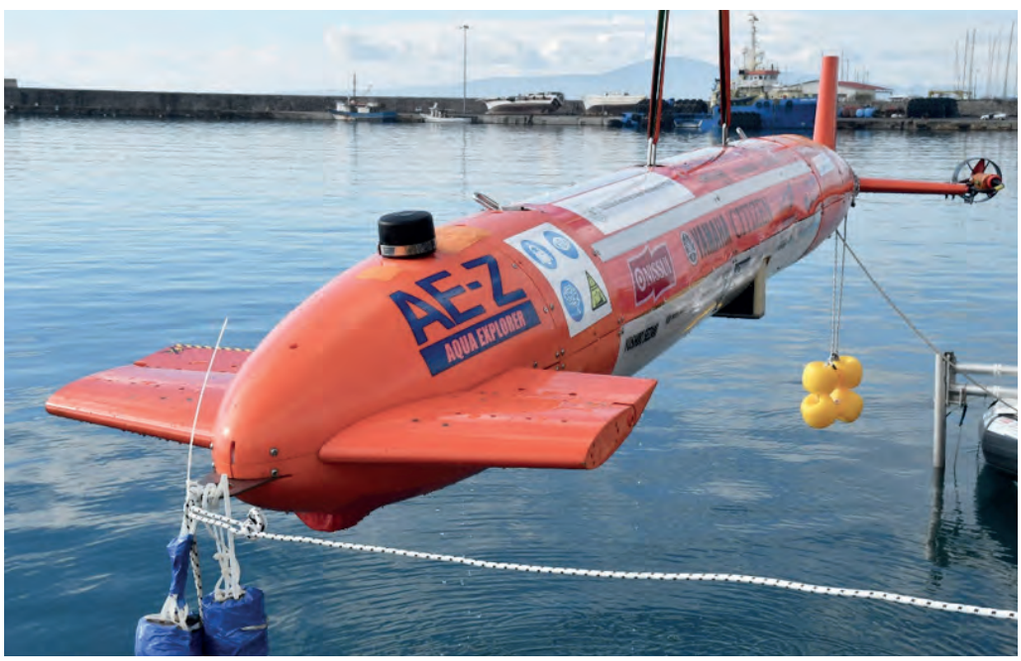
MAXPOS
Highly dynamic positioning controller with EtherCAT.

Master controller available at www.zub.ch

maxon modular system

The motors, gearheads, encoders, brakes and controllers from maxon are perfectly matched to each other and can be combined to meet specific requirements.

Seafloor mapping
Drives for a global ocean discovery competition



We know more about the surface of Mars than we know about the ocean floor.

This global ocean discovery competition aims to change that. It's challenging teams to push the boundaries of ocean technologies by creating solutions that advance the autonomy, scale, speed, depths and resolution of ocean exploration. A total of 32 teams representing 22 countries entered this contest to use autonomous underwater vehicles (AUVs) and compete for speed and accuracy in 3D bathymetric mapping of large areas of the ocean floor at 4,000-meter depths and photographing designated targets.
Team Kuroshio (Japan) is integrating technologies owned by Japanese universities, institutes and companies for a unique collaborative approach centred around AUVs. They decided to use maxon thrusters for their vehicle.

maxon thruster MT70 – Drive solution for manned and unmanned submersible vehicles, e.g. ROVs (Remote Operated Vehicles) and AUVs (Autonomous Unmanned Vehicles)

- → Oil-filled underwater drive system
- → Compact and robust design
- → High efficiency
- → Optimal thrust/weight ratio

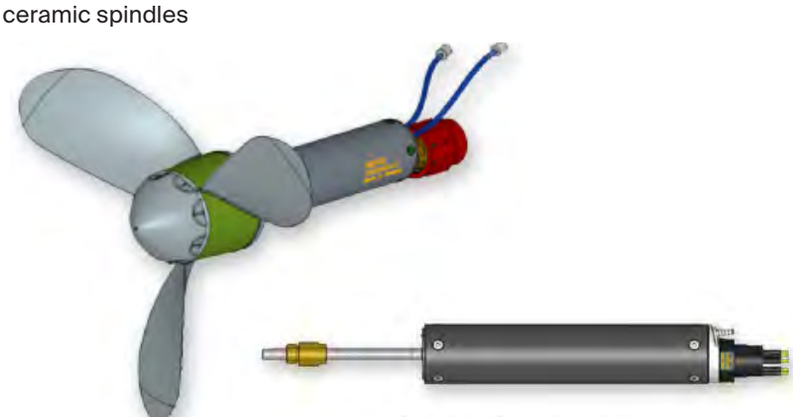
Seafloor mapping
Drives for a global ocean discovery competition

Team CFIS is a one-man team from the U.K. and a great example of how much an individual can accomplish through sheer passion and determination.

Team CFIS is using a different approach to map the sea floor – the most common way of sea floor mapping in the world is to use sound (Sonar), but the team leader is trying a new technique using light (Lidar). The team leader: " Competitions are a wonderful way to stimulate investment, research and public interest. Winning the competition would be the icing on top of the cake but all Finalists get a platform to demonstrate their cutting-edge technologies to an interested global audience."

Customized maxon underwater actuator MA30S with ceramic spindles
customized MT40 with a new designed propeller

- → Compact design
- → Low weight
- → Oil-filled underwater drive system
- → Customized
- → Corrosion-resistant
- → Durable
- → Robust



Seafloor scanning
Underwater drives for vertical alignment

When oil companies want to find out whether drilling at depth is worth the cost, they often rely on Controlled Source Electro Magnetic (CSEM) technology. This technology exploits the differences in the electrical resistance of different bottom layers to provide clues about the location and size of oil fields. The CSEM technology uses a very strong power source to generate an electro-magnetic field, as well as several receivers to record the fields. These tripod receivers are placed on the sandy bottom and pick up electromagnetic signals that have been changed by the layers through which they passed.

The special thing about this measuring method is that the company uses a vertical transmitter and receiver to find resources under the bottom.

To this end, the Norwegian company Petro-Marker has developed new receivers that enable a vertical alignment of the antennas at the center of the tripods with high precision. This is where the underwater drives from maxon come in. They are installed at the lower end of the receiver antenna to align it vertically as needed.

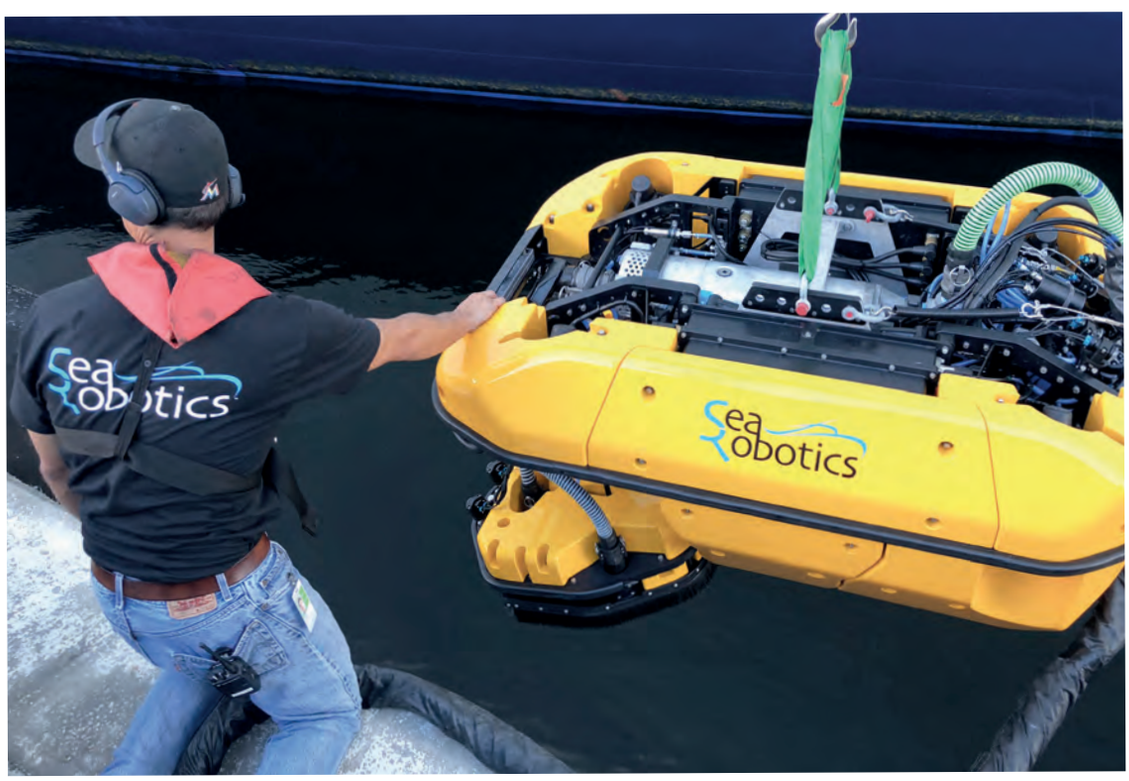
The maxon drive solution excels thanks to its compact design and low weight. The centerpiece of the oil-filled underwater drive system is a motor-gearhead combination, comprising a brushless DC motor (BLDC) and planetary gearhead.

- Compact design
- Low weight
- Oil-filled underwater drive system
- Brushless DC motor (BLDC) and planetary gearhead
- Customized

Maritime robotics
Drives for autonomous cleaning systems

This highly automated proactive grooming (or light cleaning) process will revolutionize hull maintenance, allowing ship hulls to remain in a clean state at all times.

The HullBUG System is a semi-autonomous underwater vehicle designed to crawl on ship hulls or other underwater structures and "proactively groom" the surface. The benefits of improved hull condition are dramatic—the estimated 5% improvement in fuel efficiency achieved through proactive grooming translates into a savings of $15 billion per year for the shipping industry worldwide, as well as reduction in the 1 billion tons of greenhouse gases emitted by the fleet.



Brushless DC-motor EC90 flat to rotate a magnet that attaches the HullBUG to the hull of the ship.

- Compact, flat design
- Robust design
- High torque density
- Good heat dissipation

maxon thrusters
Drives for ROVs and AUVs

During develoment, the focus was on the optimum thrust/ weight ratio.

maxon thrusters are reliable drive solutions for manned and unmanned submersible vehicles such as ROVs (Remote Operated Vehicles) and AUVs (Autonomous Unmanned Vehicles). The thrusters achieve a maximum diving depth of 6000 meters and use powerful EC motors.

In addition, they extend the service life of submersible vehicles. For example, AUVs can cover longer distances with the same battery capacity. During the development of the maxon thrusters, the focus was on an optimum thrust-to-weight ratio. The result is an underwater drive that is compact, lightweight and highly efficient.

Thrusters are underwater drives with a propeller and nozzle. Their geometry is always optimized for a special operating point, or for a special application. There are several important parameters characterizing a thruster:

- Forward thrust optimized propeller
- Highly efficient
- Pressure-compensated
- Compact
- Robust design as standard
- Only saltwater-tested materials
- All metal parts are electrically insulated from one another

maxon thrusters and actuators

Depth rating 6000 meter

Description	Direction	Part-No. Single	Part-No. with MC	Power	Continuous forward bollard thrust
MT20	LH	620098	620105	70 Watt	1.3 kg
MT20	RH	616762	616791	70 Watt	1.3 kg
MT30	LH	533815	605573	175 Watt	3.7 kg
MT30	RH	620036	620086	175 Watt	3.7 kg
MT40	LH	522619	605792	350 Watt	7 kg
MT40	RH	619623	619653	350 Watt	7 kg
MT70	LH	534851	606339	670 Watt	16.8 kg
MT70	RH	619665	619677	670 Watt	16.8 kg

Description	Part-No.	Suitable Thruster
MC30	527833	MT20, MT30
MC70	538605	MT40, MT70

You can find additional information at
aquaticsolutions.maxongroup.com

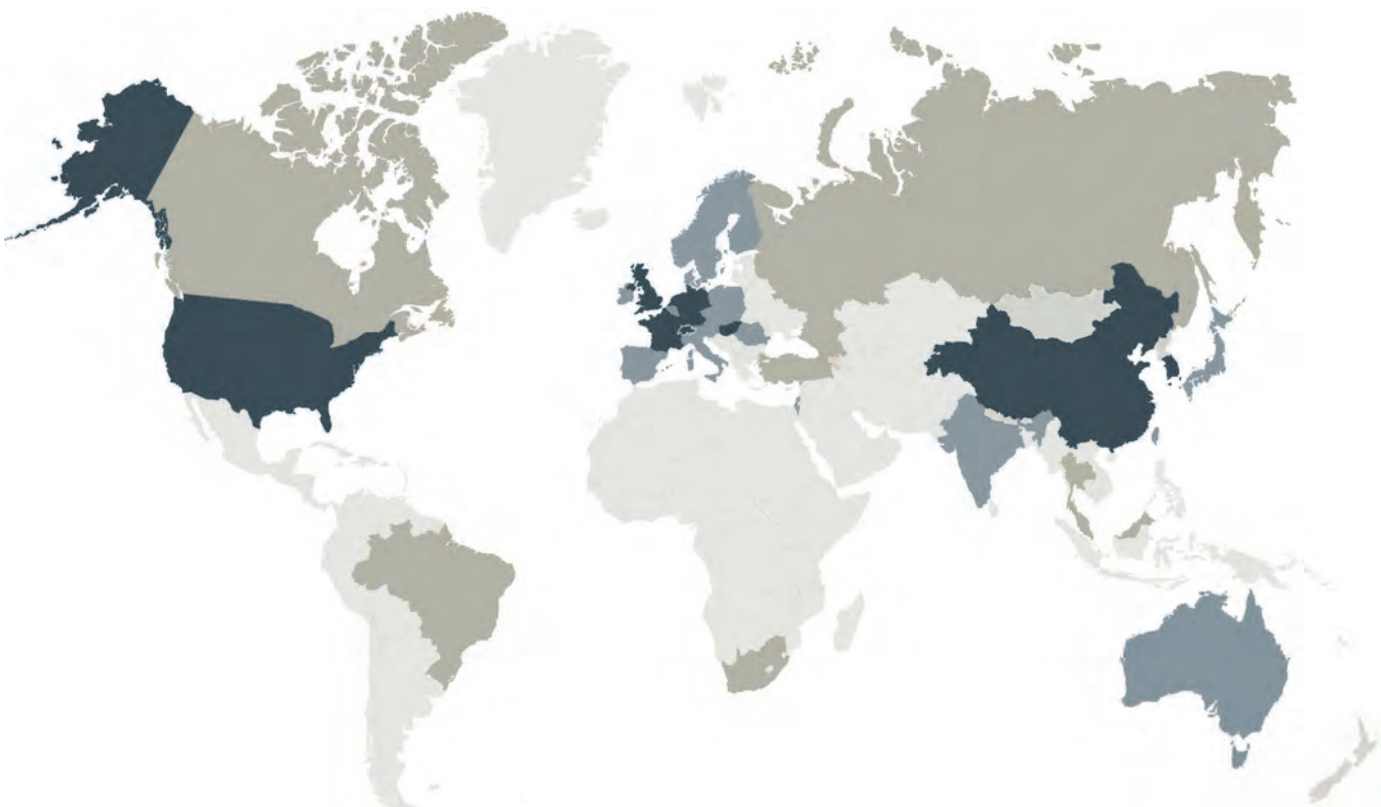
maxon thruster spare parts

Picture	Part-No.	Description	Base product	Direction	Base product No.	Min. quanity
	598575	Maintenance Unit				
	597526	Spring	MC30		527833	10
	529949	Spring	MC 70		538605	10
	527976	Membrane	MC30		527833	10
	583773	Membrane	MC 70		538605	10
	522758	Nipple	MC30		527833	10
	522758	Nipple	MC 70		538605	10
	611883	Propeller	MT20	LH	620098	10
	541620	Propeller	MT20	RH	616762	10
	578026	Propeller	MT30	LH	533815	10
	611943	Propeller	MT30	RH	620036	10
	538465	Propeller	MT40	LH	522619	10
	611955	Propeller	MT40	RH	619623	10
	584159	Propeller	MT70	LH	534851	10
	611962	Propeller	MT70	RH	619665	10
	532679	Nozzle	MT20	LH+RH	620098+616762	10
	587394	Nozzle	MT30	LH+RH	533815+620036	10
	587292	Nozzle	MT40	LH+RH	522619+619623	10
	603761	Nozzle	MT70	LH+RH	534851+619665	10
	533816	Screws for Nozzles (3pcs needed per unit)	MT20	LH+RH	620098+616762	10
	529326	Screws for Nozzles (3pcs needed per unit)	MT30	LH+RH	533815+620036	10
	529327	Screws for Nozzles (5 pcs needed per unit)	MT40	LH+RH	522619+619623	10
	545348	Screws for Nozzles (3pcs needed per unit)	MT70	LH+RH	534851+619665	10
	532860	Front-cap	MT20	LH+RH	620098+616762	10
	584743	Front-cap	MT30	LH+RH	533815+620036	10
	586059	Front-cap	MT40	LH+RH	522619+619623	10
	590481	Front-cap	MT70	LH+RH	534851+619665	10

maxon thruster spare parts

Picture	Part-No.	Description	Base product	Direction	Base product No.	Min. quanity
	532859	Pin for cross-hole	MT20	LH+RH	620098+616762	10
	532134	Pin for cross-hole	MT30	LH+RH	533815+620036	10
	532134	Pin for cross-hole	MT40	LH+RH	522619+619623	10
	535048	Pin for cross-hole	MT70	LH+RH	534851+619665	10
	491432	Tube 1m	All	LH+RH		10

A global network



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France
The Netherlands
USA
China
Great Britain

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