

# Robotics Drives - Products and Services

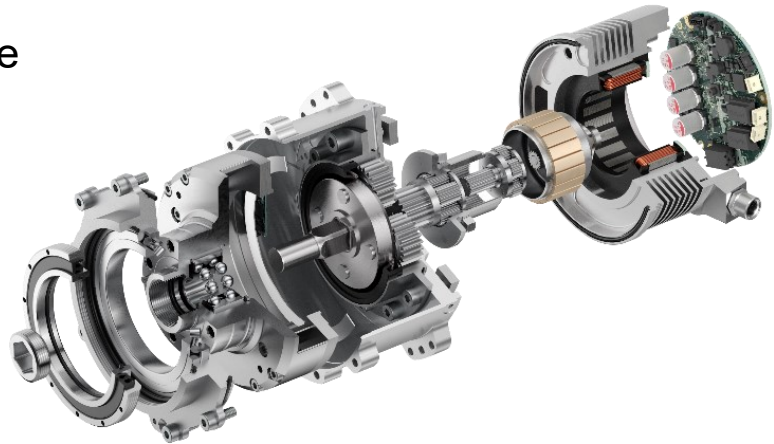
## Your Partner for Robotics Excellence

At **maxon**, we pride ourselves as a globally acclaimed leader in designing and manufacturing high-performance drive systems.

Our expertise lies in delivering torque-dense, integrated and compact actuation solutions, meticulously optimized for the robotics market. Our commitment to technological excellence ensures that our products are not just robust but also cost-effective, aligning with the evolving needs of the industry.

What sets our drive systems apart is our complete vertical integration. This intrinsic control over every aspect of design and production empowers us with unique capabilities:

- Integrated, compact robotic drive systems with a focus on torque density and lightweight construction.
- Customization at scale: Understanding that no two robotic applications are the same, we offer unparalleled customization. Our agile production can adapt to your specific needs, ensuring that the final product aligns perfectly with your application.
- A non-negotiable focus on a high production quality, consistent performance, and robust, lifetime-tested systems.
- Attractive cost efficiency: Leveraging streamlined processes, deep vertical integration, and advanced technologies, we offer competitive pricing and a low total cost of ownership - without compromising quality.



## Robotic Drive Systems



### High Efficiency Joint

**HEJ 48-90-140**

This is a highly compact, integrated and efficient robotic drive system that contains all subsystems to provide a full motion solution, such as electronics, motor, gearing and sensing. This drive is fully enclosed, ingress- and impact-rated, and designed for continuous operation and active thermal cooling if necessary. It offers high robustness and a long operating lifetime. Controlled via *EtherCAT*, it can implement various internal control and gain topologies, rendering it suitable for all robotics applications.

- 13 rad/s | 140 Nm | 30 V – 60 V | IP67 Ingress Protected
- Efficiency up to 86% | Ideal for Battery-Powered Systems
- Integrated Absolute Joint Encoder and Cross-Roller Bearing
- 90 mm x 110 mm (Len x Dia) | 1.96 kg | Smaller Versions under Development
- Autonomous Mobile Robots | Humanoids | Exoskeletons | Mobile Manipulation

### High Precision Joint Portfolio

**DT and RJ Series**

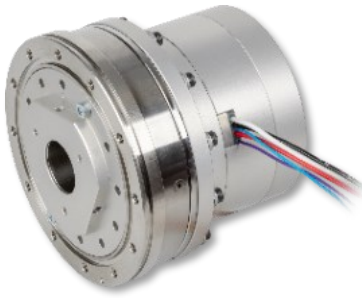
Our HPJs are composed of a set of actuators that are highly customizable and lightweight, featuring high-resolution absolute joint encoders for precise control, engineered without joint backlash, and designed to offer high dynamics and exceptional torque density.

- 5 Nm – 484 Nm | 0.9 rad/s – 17.8 rad/s
- Hollow Shaft | Integrated Joint Output Bearing | Motor Encoder
- Configurations: Electronics | Sensors | Brakes | Safety<sup>1</sup>
- 70 mm – 146 mm (Dia) | 0.9 kg – 5.3 kg
- Lightweight Manipulation | Medical & Surgical Robots | Industrial Robots | Collaborative Robots



### HPJ – DT Series

Available in Different Gear Ratios | Deep System Integrations Possible | Large Hollow Shaft | Highly Dynamic | Includes: Motor, 2x Encoder, Gear, Output Bearing



System	Peak Joint Torque, Repetitive	Peak Joint Velocity	Mass	Outer Dia	Length
DT38S-WGA14	12 Nm – 19 Nm	8.9 rad/s – 17.8 rad/s	0.9 kg	74 mm	73 mm
DT38M-WGU14	23 Nm – 36 Nm	6.8 rad/s – 13.6 rad/s	0.9 kg	74 mm	*83 mm
DT50S-WGA20	39 Nm – 64 Nm	3.4 rad/s – 11.1 rad/s	1.5 kg	94 mm	78 mm
DT50M-WGU20	73 Nm – 120 Nm	2.3 rad/s – 7.2 rad/s	1.8 kg	94 mm	86 mm
DT65S-WGA25	69 Nm – 123 Nm	2.4 rad/s – 7.6 rad/s	2.6 kg	114 mm	90 mm
DT65M-WGU25	127 Nm – 229 Nm	1.3 rad/s – 4.3 rad/s	3.4 kg	114 mm	100 mm
DT85M-WGA32	151 Nm – 261 Nm	1.7 rad/s – 5.3 rad/s	5.0 kg	146 mm	107 mm
DT85L-WGU32	281 Nm – 484 Nm	0.9 rad/s – 3.0 rad/s	*5.3 kg	146 mm	*120 mm

\* Preliminary Data

### HPJ – RJ Series

Available in Different Gear Ratios | Options: Controller, Torque Sensor, Brake | Hollow Shaft



System	Peak Joint Torque, Repetitive	Peak Joint Velocity	Mass	Outer Dia	Length
RJ 45	5 Nm – 13 Nm	2.5 rad/s – 7.1 rad/s	1.3 kg	70 mm	104 mm
RJ 60	25 Nm – 65 Nm	3.0 rad/s – 7.2 rad/s	1.8 kg	80 mm	115 mm
RJ 90	39 Nm – 122 Nm	1.7 rad/s – 5.1 rad/s	3.0 kg	110 mm	113 mm
RJ 90 "L"	83 Nm – 260 Nm	1.0 rad/s – 3.2 rad/s	3.4 kg	110 mm	125 mm
RJ 110	175 Nm – 350 Nm	3.4 rad/s – 6.9 rad/s	3.7 kg	110 mm	70 mm

## Frameless Dynamic Torque Motors

### EC frameless DT Portfolio

Our frameless motor portfolio has been specifically designed for robotics applications. The system offers unmatched torque density and dynamics, with best-in-class efficiency – key parameters for every robotics product. It can be flexibly integrated into customer designs thanks to well-designed tolerance chains, and provides the possibility to pair the motor with a well-tailored encoder system. We provide different mounting flanges, or the possibility to pot the motor directly into customer parts. Heat transfer and thermal protection is excellent, thanks to the potting and integrated winding temperature sensor. This allows to safely push the system to its limits.

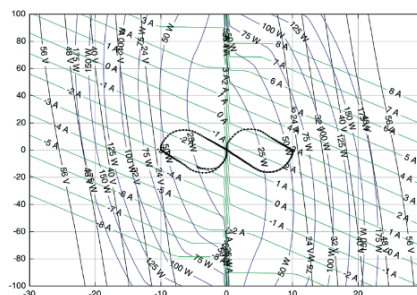


	DT38S	DT38M	DT50S	DT50M	DT65S	DT65M	DT85M	DT85L
OD (mm)	42	42	54	54	70	70	90	90
Rotor ID (mm)	17	17	28	28	35.5	35.5	47	47
M <sub>Sat</sub> (Nm) 30% linearity deviation	0.5	1.0	1.5	2.2	2.6	4.9	5.6	9.8
Terminal Resistance, Phase-Phase (Ω)	0.26	0.37	0.58	0.76	0.33	0.47	0.16	0.22
Torque Constant, FOC, Amplitude (mNm/A)	16.5	32.2	60.4	92.6	88.1	157	126	219
Mass Stator+Rotor, Without Flange (g)	71	104	123	163	226	339	526	774

## Robotics Simulations & Services

By providing a comprehensive system simulation toolchains and robotics-centric models, we will find the right actuation solution for modern robotics systems.

- Actuator Simulation Models (*Isaac*, *Gazebo* etc.)
- Requirements Exploration and Validation | Trade-Offs
- Systems Engineering | Risk Assessments and Safety
- Sizing and Modelling of Complex Robotics Kinematics
- Testing and Verification of Full Systems
- Custom Firmware and Control Topologies



## Systems Design & Manufacturing

Thanks to our ability to create highly integrated robotic drive systems, and our passion for optimal customer solutions, we also provide systems design and manufacturing services for more complex robotic sub-assemblies. This allows our customers to focus fully on robotics, while we enable them to scale quickly with high-performance, well-optimized and vertically integrated systems.



## What Drives You?

We are always curious and passionate about your challenges and want to enable you to quickly scale your robotics solution with the *right* actuation systems.

You can always reach us directly at:

[robotics@maxongroup.com](mailto:robotics@maxongroup.com)

Further details and related products can also be found online:

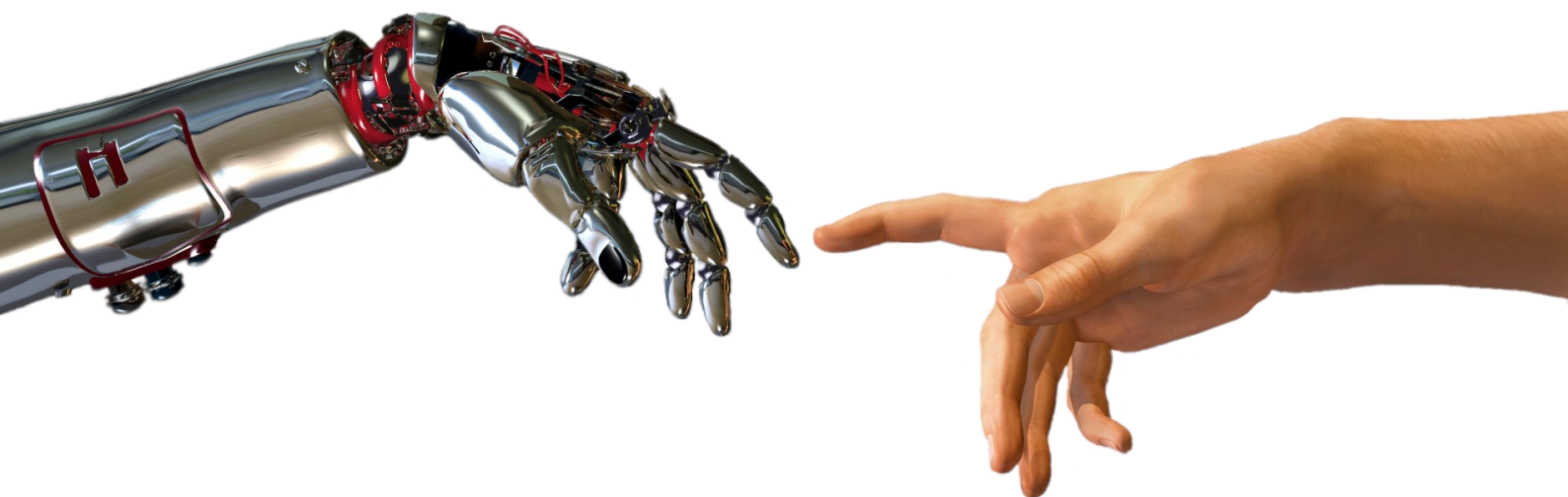
[robotics.maxongroup.com](https://robotics.maxongroup.com)

### CUSTOMER STORY: ANYBOTICS & MAXON

*In 2020, ANYbotics and maxon entered into a close, long-term collaboration and are thus strengthening Switzerland as a prime location for robotics. One of the decisions made by the two partners is that maxon, as global drive specialist, will handle the future development and production of the actuators for ANYmal. ANYmal is an autonomous, four-legged robot that is capable of inspecting and monitoring industrial systems and is destined to also take on dangerous maintenance tasks in the future. The robot can cope with difficult infrastructures such as stairs and inclines, and is used in a wide variety of industries.*



**PS:** Our broad actuation system portfolio is also well-suited for many other robotics applications. Our small-sized motors, gears, encoders and flexible electronics have been empowering robots, small joints and numerous end-effectors ever since the dawn of robotics – a journey that **we** will continue to accelerate.



# maxon