

# EC frameless DT

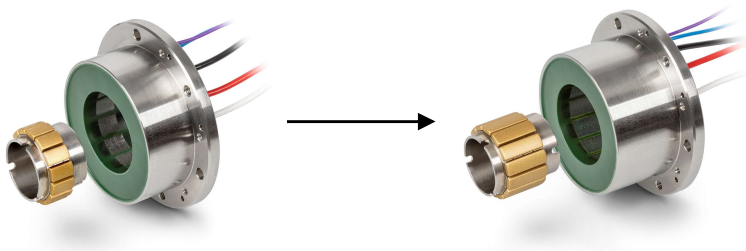
Compact. Dynamic. Maximum torque density.



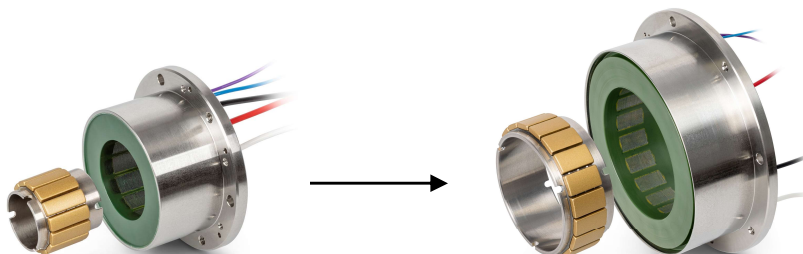
# Why using a compact, high torque frameless motor?

- ✓ Very versatile, integrate as you want
- ✓ Minimize the required space
- ✓ Direct drive for robustness and reduced maintenance
- ✓ Integration into rigorous environment (chemicals, washdowns, high temp, radiations, vacuum,...)
- ✓ The Inner Rotor technology allows great thermal dissipation and low inertia (no gap: coils dissipating directly into the housing)
- ✓ The ratio of compact length and big diameter allows the best possible torque & power density.

**2x the magnetic circuit length => 2 times the torque**



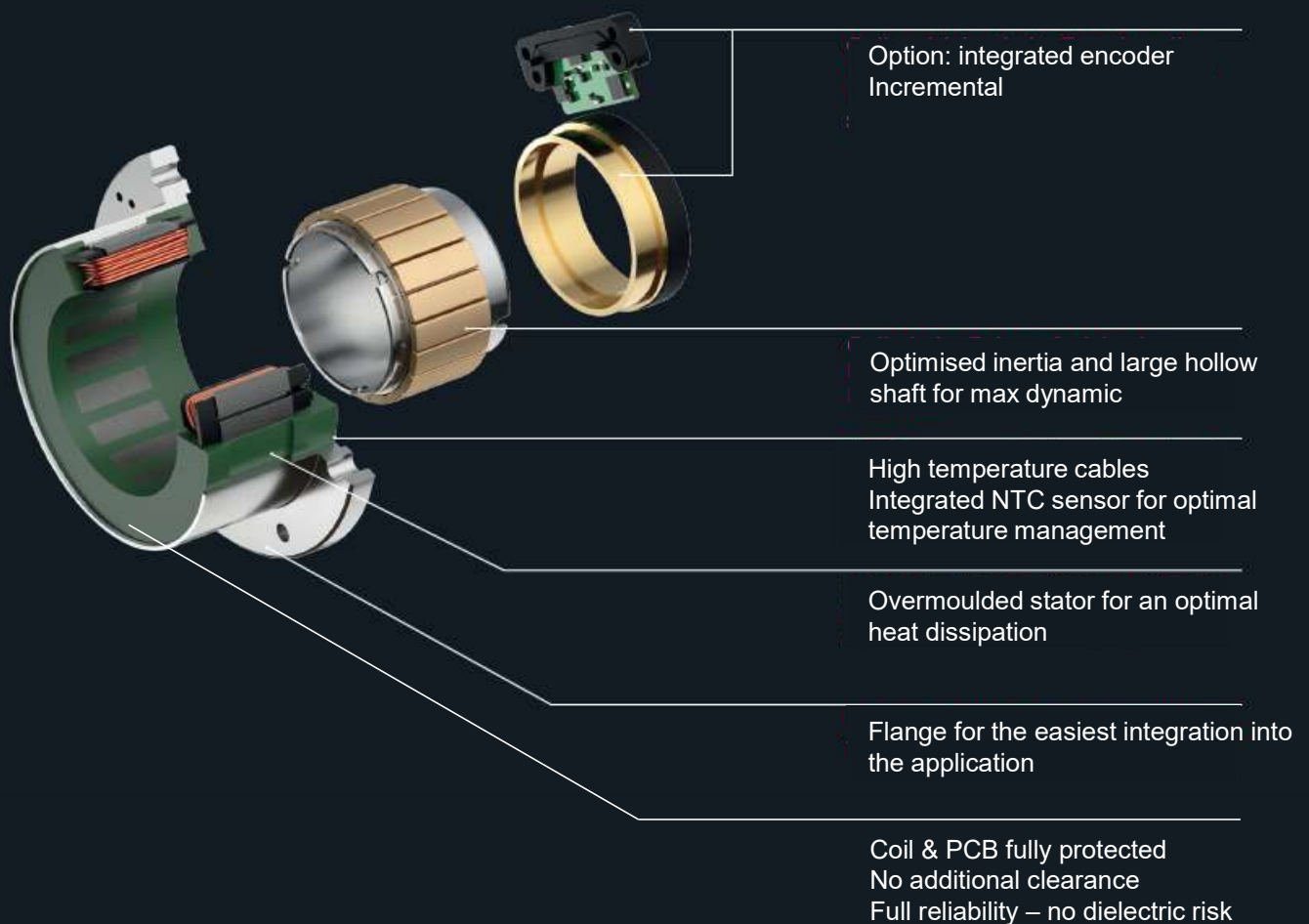
**2x the magnetic circuit diameter =>  $2^2$  times the torque**



# Maxon EC Frameless DT

## Dynamic Torque

- ✓ Top Torque density
- ✓ Short length with large hollow shaft
- ✓ Excellent heat dissipation
- ✓ Best efficiency
- ✓ Minimal cogging



# Performances overview

## EC frameless DT

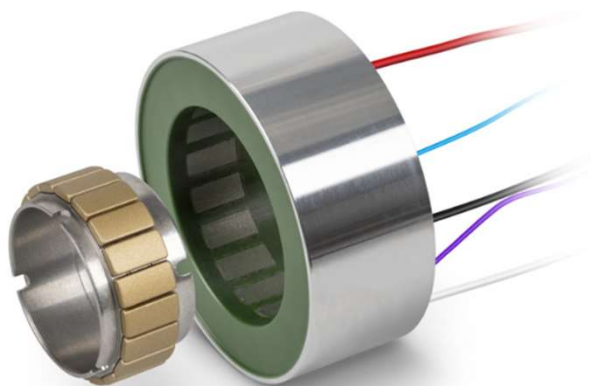
Low voltage family

A revolutionary level of torque density.  
Reinvent your drive system.



| Type  | DT38    |      | DT50    |      | DT65      |      | DT85    |      |
|---|---------|------|---------|------|-----------|------|---------|------|
|   | S       | M    | S       | M    | S         | M    | M       | L    |
| <b>Outer / Inner ø</b>  | 42/17mm |      | 54/28mm |      | 70/35.5mm |      | 90/47mm |      |
| <b>Continuous torque (Nm)</b><br>With heat sink                             | 0.13    | 0.22 | 0.38    | 0.55 | 0.91      | 1.40 | 2.11    | 3.42 |
| <b>Peak torque (Nm)</b><br>30% linearity deviation of torque constant       | 0.36    | 0.81 | 1.40    | 2.12 | 2.63      | 3.61 | 5.37    | 9.63 |
| <b>Max speed (krpm)</b>   | 15      | 15   | 7       | 5    | 5         | 5    | 4       | 3    |
| <b>Typ. Cogging torque (mNm)*</b>   | 0.5     | 1.5  | 2.6     | 4.6  | 16        | 35   | 40      | 61   |
| <b>Mass for integration (g)</b><br>without cables & without mounting flange | 64      | 97   | 116     | 156  | 219       | 332  | 517     | 765  |
| <b>Torque density (Nm/kg)</b><br>without mounting flange                    | 2.0     | 2.3  | 3.3     | 3.5  | 3.5       | 4.4  | 4.1     | 4.5  |

\*cogging torque depends on the assembly. Tighter value possible on demand.



**maxon**

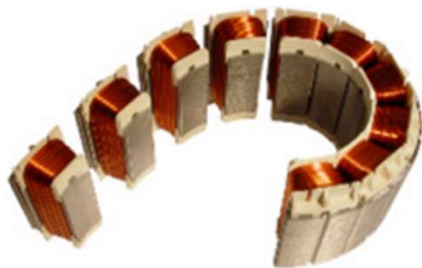
# Advantages of the frameless DT motors

## The best magnetic design

- ✓ **Dynamic Torque** = Best mechanical time constant + Top torque density
- ✓ **Best efficiency** on the market to keep the temperature low
- ✓ **Low inertia** with smallest mechanical time constant for top battery life and **high dynamic**
- ✓ **Minimal cogging** for maximum precision
- ✓ Inner rotor for optimal thermal dissipation and **high peak torque**
- ✓ High range of operability: **-40 to + 100°C** ambient and winding up to 155°C

## Easy to integrate

- ✓ **Large hollow shaft** to accomodate encoders, cables, shafts and tools
- ✓ Low voltage DC, ideal for embedded applications
- ✓ Full potting for maximum protection
- ✓ Easy testing thanks to the **additional mouting flange**
- ✓ Easy integration with off-the-shelf strain wave gears
- ✓ Fully validated and **ready to scale** in production



Single tooth winding  
Best filling factor



# Best in class for different markets

The versatility of the frameless allows limitless integrations



## Robotics

Humanoids, Quadrupeds and Cobots require high peak torque to support heavy loads and high efficiency for long work with reduced battery consumption.

## Aerospace & Spacial

Actuators, valves, generators, gimbals - in air or in space. When each gram counts, top-performance, robustness and customization are key.



## Industrial automation

Collaborative robots, SCARA, wafer handling robots, AGV... require top performances and precision.

The top quality ensures a long and flawless operation.

## Medical

For surgical robot and exoskeletons, high precision, efficiency, and reliability are critical to perform demanding applications.



And much more...

**maxon**



# **Assemble it yourself.**

## **Easy & Reliable.**

### **No compromise on quality.**

The extra mounting sleeve ensures perfect stability in high volumes.

The flange simplifies the assembly/disassembly.

Installation manual available under «download» into our online shop.

### **Customization is a standard.**

For small and large quantity

- ✓ Special mounting flange or mounting sleeve  
→ maxon can replace the mounting flange by your housing
- ✓ Different nominal voltage
- ✓ Cables type/length, connector, temperature sensor...
- ✓ Special design on request



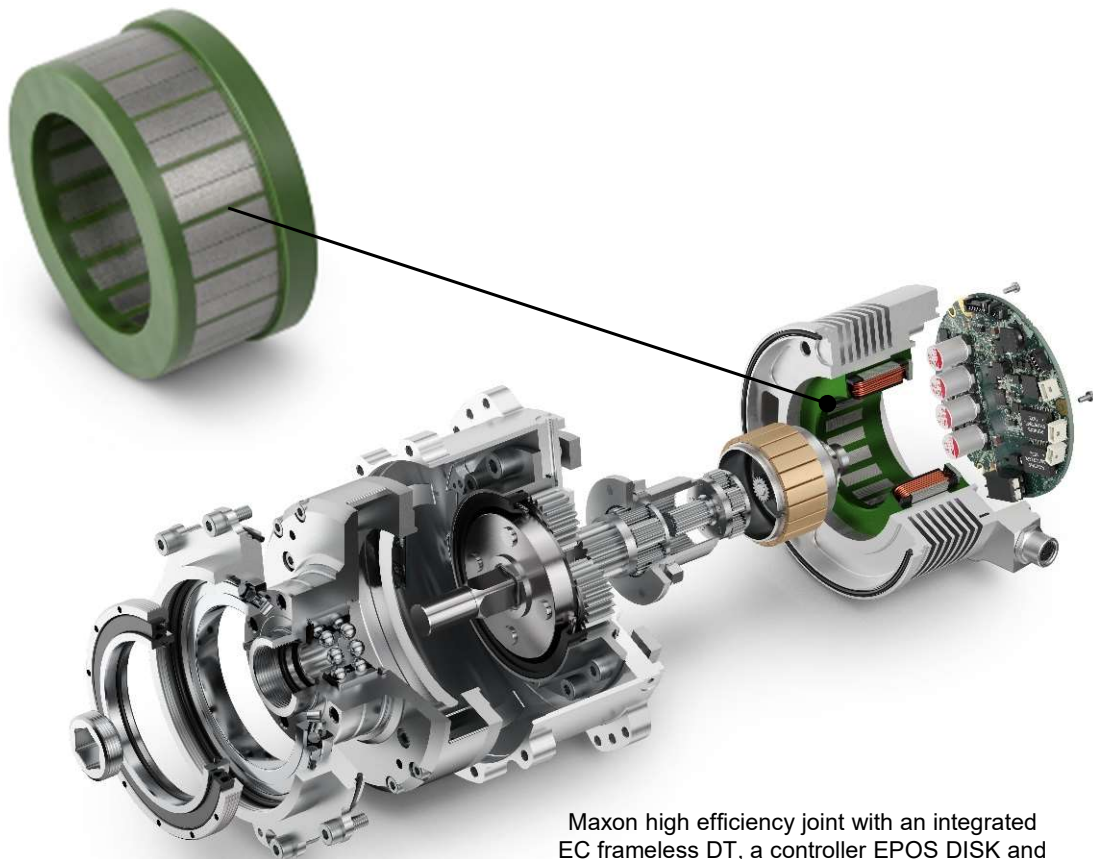
# **We integrate it for you. We can change the game.**

## **Quality first.**

maxon takes the responsibility of the product for you.  
Ensure the reliability and scalability of your mechatronic system.  
maxon can fully integrate the Dynamic Torque motor and related accessories into a custom mechatronic system.

## **We also design gears & electronics.**

Our long experience into gear, control and encoder manufacturing allows us to select, design and combine all components for your Mechatronic drive system.  
Our tight integration can push the limits.



Maxon high efficiency joint with an integrated EC frameless DT, a controller EPOS DISK and a custom planetary gearhead



# Control with high precision

## High resolution. Robust. No calibration.

### TSX MAG – Pre-assembled - Hollow Shaft encoder

- Magnetic Incremental Encoder – 2 channels
- Radial or axial plug with available cables for maxon controllers

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#### TSX MAG

|                   |   |
|-------------------|---|
| <b>Resolution</b> | 1792 (TSX 38) or 2'560 cpt  |
| <b>Advantages</b> | Rotor assembly from any side.<br>No calibration.<br>Commutation signal integrated.<br>Very robust.<br>Easily combinable with maxon controllers. |

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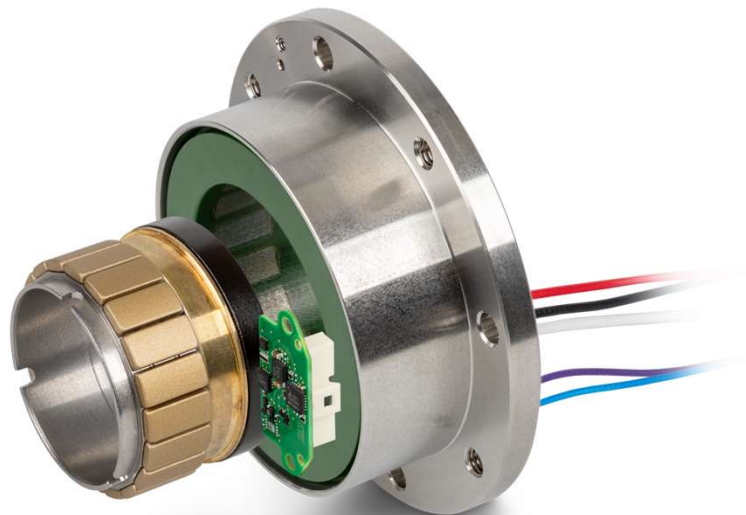
maxon EC frameless DT50 Rotor  
with TSX 50 MAG Encoder

### High resolution optical encoder

The TSX RIO absolute with a resolution of up to 19 bit (noise free) can be integrated by maxon into a complete actuator.



### Other sensors on demand.



# Drive and synchronize several axes

**Compact**  
**Efficient**  
**Easy-to-use**

**Synchronize** several axes with our programmable multi-axis master controllers.

We can support you to program it or program it for you.



## **Motion Control**

Optimized positioning control with the EPOS family  
Smooth control.

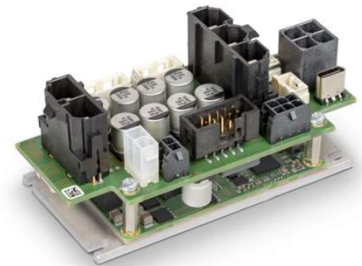
High precision for highly dynamic motion.

CANopen or EtherCAT interface

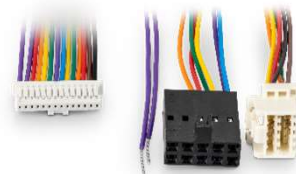


## **Current and speed control**

ESCON



**Connecting cables** available for easy testing



**Customized versions on demand**

# Achieve the highest torque with top precision

## **maxon strain wave gear**

Compact high reduction ratio  
Zero backlash for high precision  
Best efficiency on the market  
Enhanced backdrivability  
High torsional rigidity



## **maxon planetary gear**

Large range of validated gears

- Standard
- Ceramic (extended life)
- Low noise
- High-power
- High speed
- Reduced backlash



## **Typical Customizations**

- ✓ Shaft & Flange shape
- ✓ Bearing type
- ✓ Lubricant
- ✓ IP protection
- ✓ Ratio

# More than just a frameless motor

Develop a complete system with maxon  
Boost the time to market of your mechatronics project

## Customer Application

- maxon is supporting its customers to shorten their time-to-market



- System and sub-systems that maxon's customer needs to produce his product or service



- Combinations of standard components
- Application specific Firmware
- Standardized modules



Motors

Sensors

Control (speed & motion)

Brake

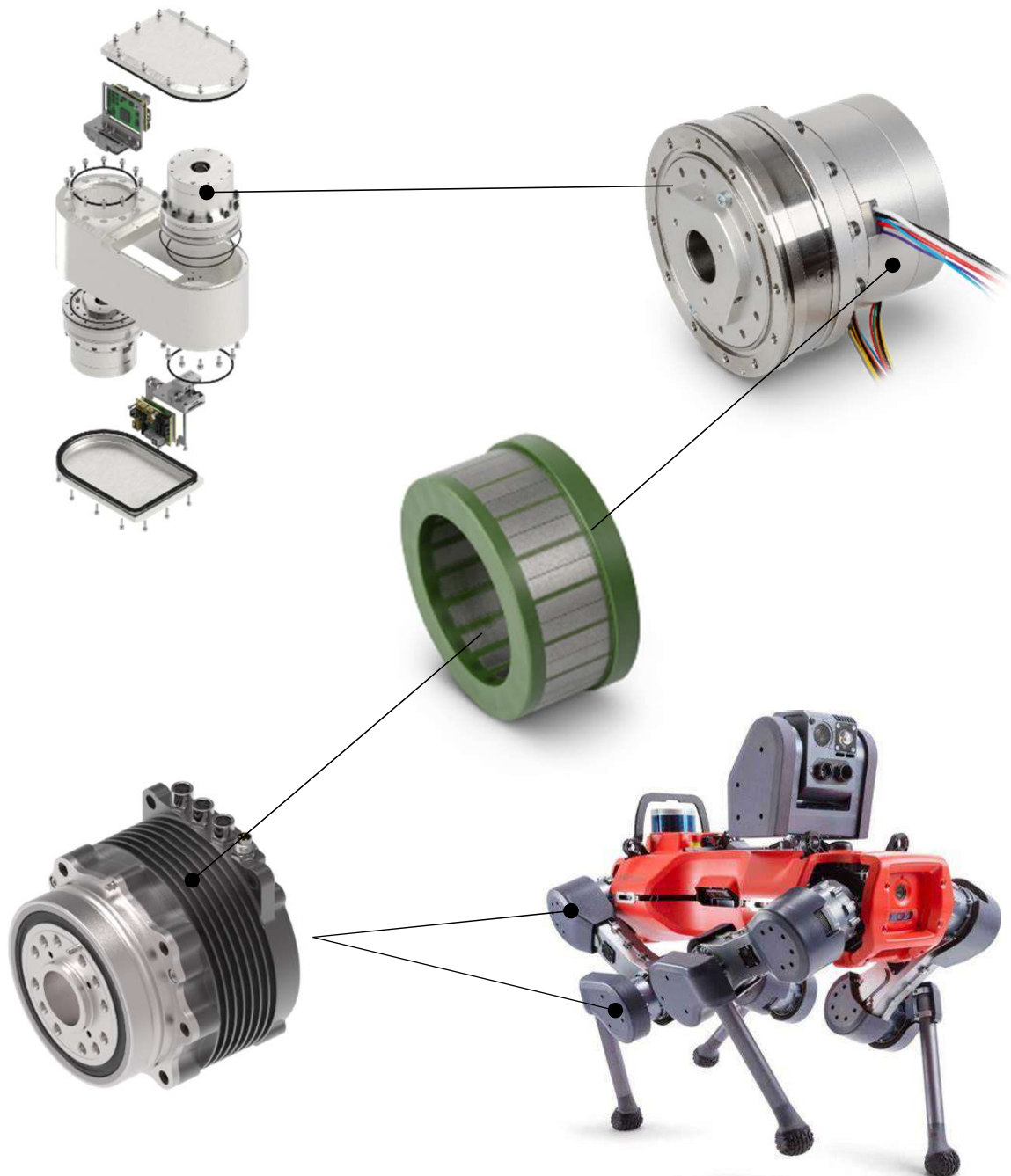
Programmable multi-axis control

**Catalog components (maxon and non-maxon products)**  
High standardization · High degree of maturity · Wide range of applications

# maxon drive systems move the world forward

## Examples of integrations

### Integration concept of maxon High Precision Joint (HPJ)



### Integration concept of maxon High Efficiency Joint (HEJ)

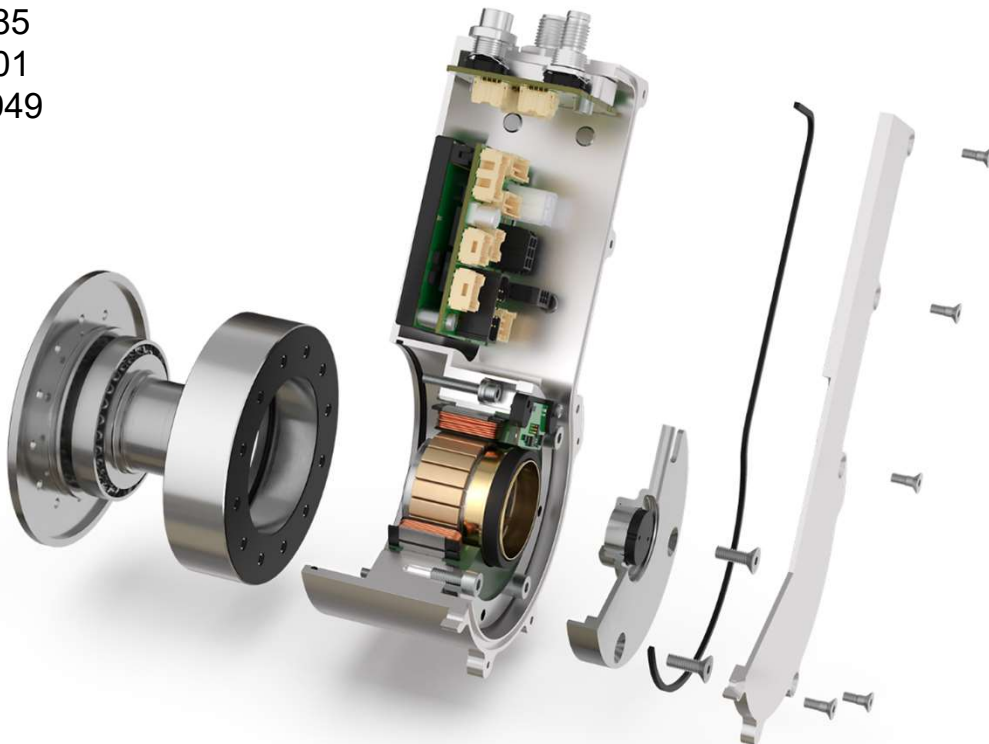


# Work with us.

**Contact your local sales to quickstart your mechatronics project.**

- ✓ Global engineering support
- ✓ Wide portfolio – made In-house: motors, gears, control, sensors...
- ✓ Medical, Aerospace and Automotive certifications
- ✓ Validated products – ready to scale in production
- ✓ Customization for small and large quantity

ISO 9001  
EN 9100  
ISO 13485  
ISO 14001  
IATF 16949



**Contact us.**

<https://www.maxongroup.com/en/contact>