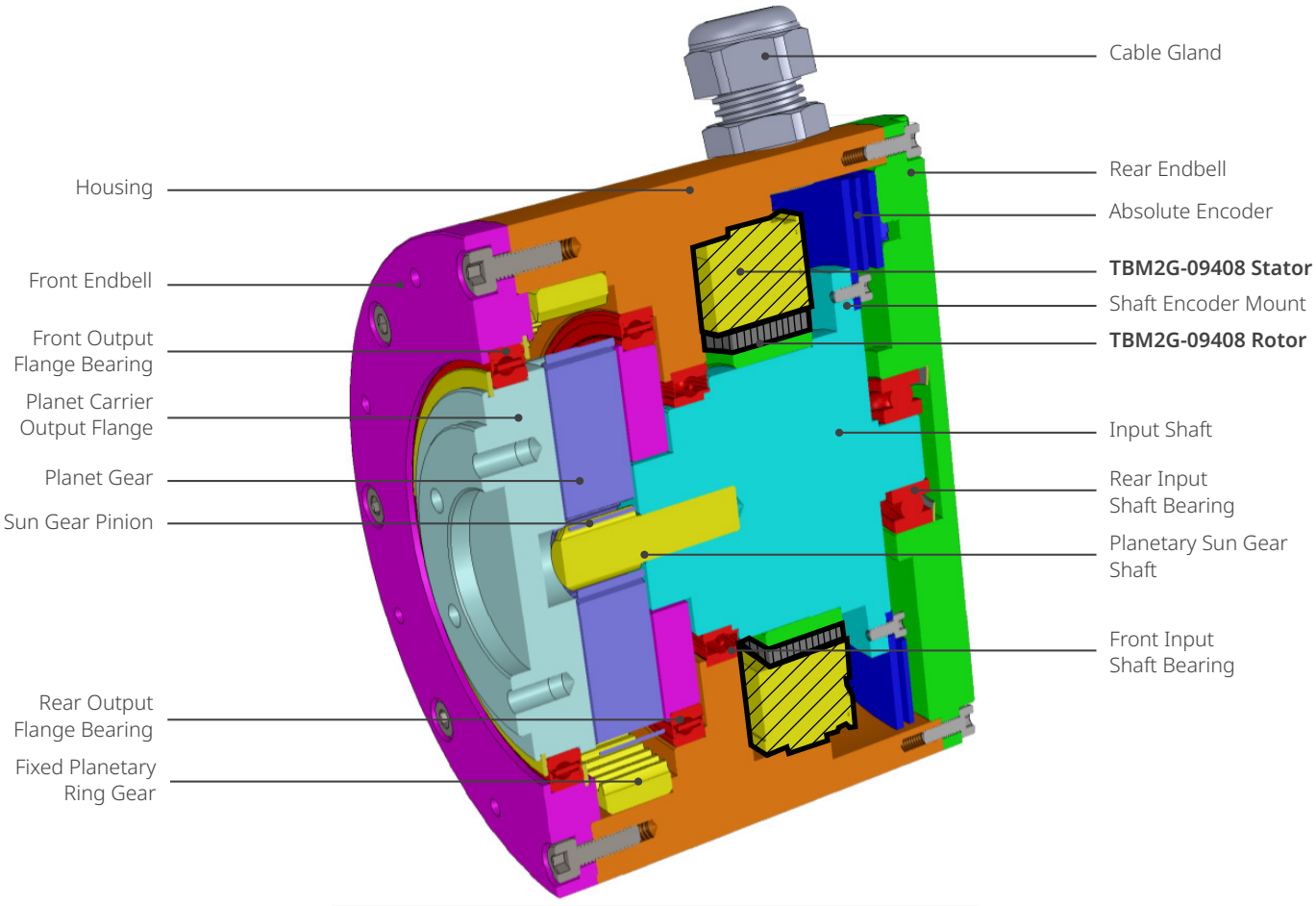
KOLLMORGEN
A REGAL REXNORD BRAND

TECH SHEET

Embedding TBM2G Frameless Motors into Compact Rotary Actuators

An electric rotary actuator produces rotary motion to drive a load. In its simplest form, a direct drive motor is coupled directly to the load. Often, rotary actuators also incorporate a gearbox to increase torque while reducing speed. Appropriate gearing may range from a simple spur or planetary gearset to high-precision gearing with low or zero backlash.

Rotary actuators can be designed to provide continuous motion or to provide controlled motion between specific angular positions (servo or stepper motion). This tech sheet focuses on the most compact and precise actuator designs, which are based on frameless servo motor technology.



Rotary actuator assembly incorporating TBM2G frameless servo motor from Kollmorgen

Why frameless?

Frameless servo motors are designed to be embedded directly into the machine, using the machine's own bearings to support the rotor. Since there is no separate housing and mounting system, frameless motors enable the most compact machine footprint. When mechanical transmission is required, frameless motors also work with a variety of compact gearing systems.

Integrating frameless motors with other motion components

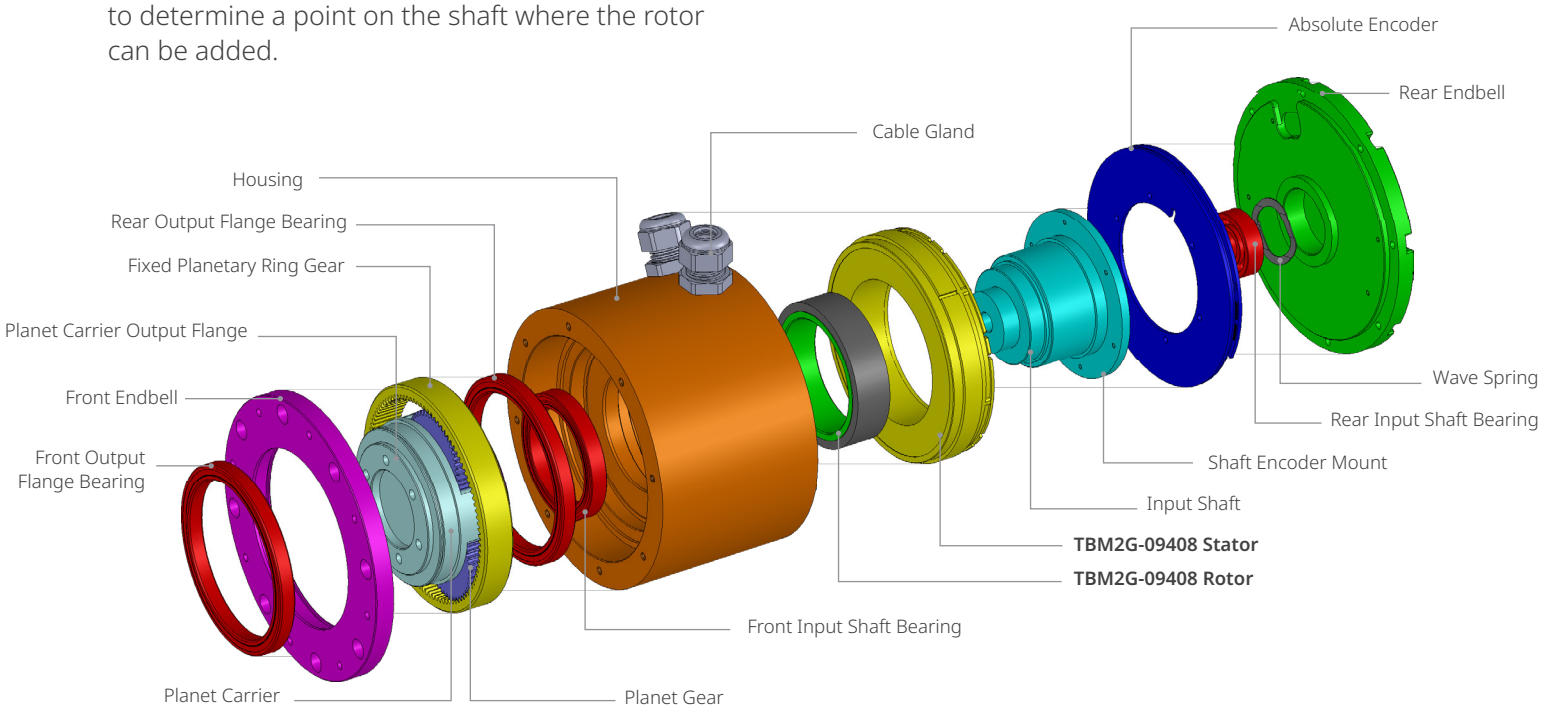
A complete motion system based on frameless servo motor technology incorporates additional components, depending on the machine's functional requirements and design constraints.

- **Feedback device (required).** An encoder (absolute or incremental, depending on the application) or a resolver reports rotor position to the servo drive to enable closed-loop velocity and position control. Hall tracks on an encoder or optional Hall effect sensors built into the TBM2G motor provide information the servo drive needs to properly commutate the power delivered to the motor.
- **Thermal sensor.** TBM2G servo motors are available with multiple standard sensor options to monitor winding temperature if necessary.
- **Gearing.** Frameless motors may be used with compact, zero-backlash harmonic (strain wave) gearing as well as with cycloidal, spur and planetary gears.
- **Brakes.** Electromagnetic or mechanical brakes may be required to provide holding torque and protect people and components while the motor is in an unpowered state. TBM2G performance is unaffected in close proximity to brake elements.
- **The machine's own shaft and bearings.** TBM2G frameless motor sets include a stator and a rotor coupled directly to the machine axis's own rotating shaft, supported by its own bearings. There's no need to change the machine's overall design — only to determine a point on the shaft where the rotor can be added.

Additional design considerations

Kollmorgen can help you navigate several design choices to maximize application performance — for example:

- **Housing design.** Since the frameless stator is embedded directly into the machine, make sure the supporting material can adequately dissipate heat. Steel is a good thermal conductor, and aluminum is better. A minimum wall thickness of 4–6 mm is typically required.
- **Thermal sensing.** During prototyping, you may want to use a linear thermistor device to gauge how hot the motor runs while the axis is performing at its required torque/speed load point.
- **Design for manufacturability.** A thorough understanding of the application's assembly process helps ensure an efficient and safe manufacturing workflow to reduce cost and complexity while likely improving machine serviceability.
- **Outside resources.** If you need additional expertise or support to design and assemble your solution with confidence, we can help connect you with the right resources.



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