

# TECH UPDATE



PRE-RELEASE VERSION V.02

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# GENESIS

## REFLEX TORQUE AMPLIFIER

POWERING THE  
FUTURE OF MOTION



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### REFLEX TORQUE AMPLIFIER REFERENCE DESIGN TECHNOLOGY UPDATE

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The Genesis REFLEX Torque Amplifier is a revolutionary gearbox design that provides the torque of a conventional metal gearbox, has no backlash, and can be injection molded out of engineering plastics.

This incredibly unique gearbox delivers a powerful, lightweight and cost-effective solution for creating affordable robotic systems to both the industrial and consumer markets.

By combining the REFLEX Torque Amplifier with a LiveDrive™ motor, we now have the capability to create a robot made of injection molded plastics, with a lower parts count, and matching, or even improving the performance of a metal robot.

The REFLEX Torque Amplifier. An injection moldable gearbox to unlock the cost-effective, high-performance robotics market.

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### GENESIS ROBOTICS AND MOTION TECHNOLOGIES

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# REFLEX

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## TECH UPDATE: REFLEX TORQUE AMPLIFIER PRE-RELEASE VERSION V.02

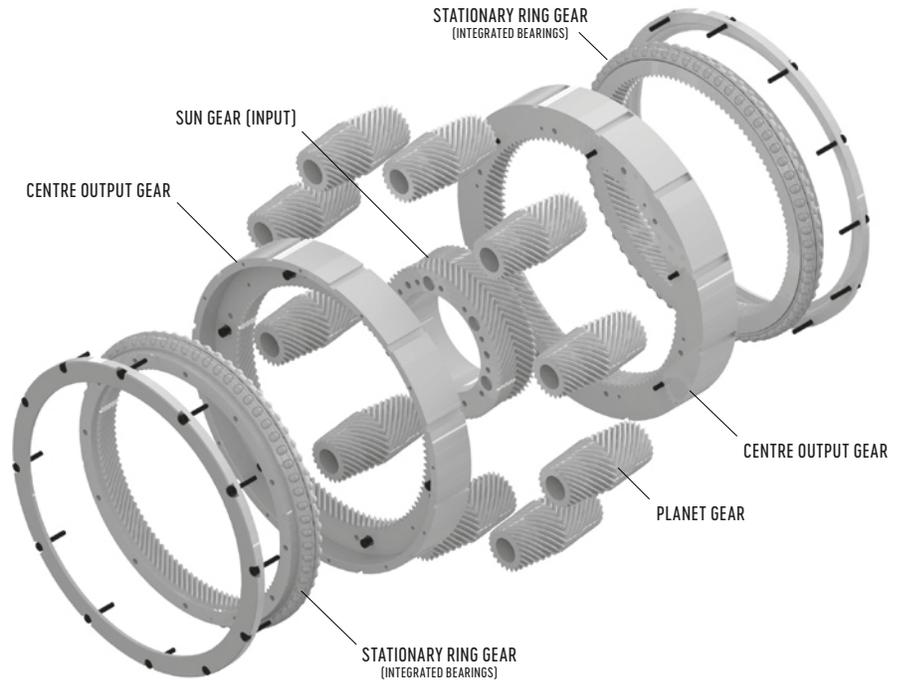
The key to the REFLEX's design is how it directs a symmetric force transfer from a pair of stationary ring gears on both sides, to a central output gear ring. The symmetric construction eliminates torsional deflection of the planet gears as well as the need for a planet carrier and corresponding planet-gear bearings.

By eliminating the bearings, the planet gears can be hollow, reducing weight and introducing a slight compressibility in the radial direction. The combination of tapered gear teeth and preloaded gears eliminates all backlash. Any expansion due to heat is compensated for by the slight flexing in the radial direction of the planets, allowing them to operate smoothly through all temperature conditions.

The unique central output eliminates scissor points, facilitating human-like arm motion, enhancing safety, and enabling the construction of robots to be stiffer and more efficient in their motion.

The REFLEX has 4 times the number of teeth engaged compared to a conventional gearbox. This allows a plastic REFLEX Torque Amplifier to achieve similar torque-to-weight as a conventional gearbox made from steel.

The REFLEX Torque Amplifier offers scalable torque, size, and gear ratios making it adaptable to a wide variety of applications.



SIZE	UNITS	VALUE
OUTER DIAMETER	mm	160
WIDTH	mm	53.5
WEIGHT	kg	0.76
GEAR RATIO	—	~30:1

PERFORMANCE <sup>(1)</sup>	UNITS	VALUE
MAXIMUM TORQUE	N·m	230
PEAK TORQUE	N·m	87
RATED TORQUE	N·m	44

### CONFIGURATIONS

SIZE	SCALABLE DIAMETER AND LENGTH
GEAR RATIO	4 :1 TO 400 :1
MATERIAL	PEEK. OTHER PLASTICS POSSIBLE.
LUBRICATION	UNLUBRICATED. MULTI-LUBRICANT COMPATIBLE.

(1) SIMULATED PERFORMANCE. PERFORMANCE AND RELIABILITY TESTING IS CURRENTLY UNDERWAY.