User Manual: NexBot Robotics CYC123-017 Cycloidal Gearbox

SKU: NXB-GBX-CYC123-017 | Version: 1.0 | Brand: NexBot Robotics

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1. Safety Information

READ ALL SAFETY INSTRUCTIONS BEFORE OPERATION. Failure to follow safety procedures may result in serious injury or equipment damage.

DANGER: High-torque output can cause severe crushing or entanglement injuries. Keep all body parts, clothing, and tools clear of the operating envelope. Ensure all guards are in place before operation.

WARNING: Unexpected motion can occur during setup, programming, or maintenance. Always follow proper lock-out/tag-out (LOTO) procedures for the connected servo motor and drive before servicing the gearbox.

WARNING: The gearbox housing can reach high temperatures during operation, posing a burn risk. Allow the unit to cool completely before touching or performing maintenance.

CAUTION: The NexBot Robotics CYC123-017 weighs 17.5 kg. Use proper lifting techniques or mechanical assistance to prevent back injury during handling and installation.

NOTICE: Use only NexBot-specified lubricants. Using incorrect grease can lead to premature wear, overheating, and will void the product warranty.

2. Product Overview

The NexBot Robotics CYC123-017 is a high-precision cycloidal gearbox engineered for the rigorous demands of modern industrial automation. This component is specifically designed to provide high torque output and exceptional positional accuracy in a compact form factor, making it an ideal solution for the primary axes of articulated robots. Its core function is to translate the high-speed, low-torque rotation from a servo motor into low-speed, high-torque motion with superior control. The key to the CYC123-017's performance lies in its sophisticated cycloidal disc and eccentric roller mechanism. This design ensures that multiple teeth share the load simultaneously, resulting in high shock load capacity and exceptional durability compared to traditional planetary or harmonic gear systems. It achieves a high reduction ratio of 121:1, enabling fine motion control and stability under heavy loads. With a peak torque rating of 1200 Nm, this gearbox provides the power necessary for rapid acceleration and deceleration cycles common in material handling, welding, and machine tending applications. Precision is paramount in robotics, and the CYC123-017 excels with a guaranteed backlash of less than 1 arcminute. This minimal lost motion is critical for applications requiring high repeatability, such as intricate assembly, dispensing, or inspection tasks. The unit's high torsional stiffness further minimizes deflection under load, contributing to the overall dynamic performance and accuracy of the robot arm. The housing is constructed from a lightweight, high-strength aluminum alloy and is sealed to an IP65 rating, protecting the internal components from dust and low-pressure water jets. This ensures reliable operation in typical industrial environments. As a direct-fit replacement part, the gearbox is designed for straightforward installation, though professional alignment and adherence to lubrication schedules are essential for maximizing its operational lifespan.

3. Getting Started

1. Product Overview

The NexBot Robotics CYC123-017 is a high-precision cycloidal gearbox designed for zero-backlash, high-torque applications. Its compact design and robust 42CrMo4 Steel internals make it ideal for demanding robotic and automation tasks requiring precise motion control.

2. Unpacking and Inspection

Upon receipt, carefully remove the CYC123-017 from its packaging. Inspect the anodized aluminum housing for any signs of damage incurred during transit. Verify that the input and output shafts are covered and that the model number on the nameplate matches your order.

3. System Integration

This gearbox is designed to be integrated between a servo motor and a mechanical load. Ensure the selected motor's power and speed characteristics are compatible. The control system must be programmed to respect the gearbox's peak torque limit of 1200 Nm to prevent damage.

4. Operation

Normal Operating Parameters

Operate the gearbox within its specified continuous and peak torque ranges. The housing temperature should not exceed 80°C during continuous operation. The IP65 rating ensures protection against dust ingress and low-pressure water jets, but the unit should not be submerged.

> **Tip:** For applications with high duty cycles, consider external cooling fans directed at the gearbox housing to maintain optimal operating temperatures and extend lubricant life.

Break-In Procedure

For the first 20 hours of operation, it is recommended to run the gearbox at no more than 50% of its rated continuous torque and speed. This allows the internal components to properly seat, ensuring a longer operational life and optimal performance.

Torque Management

The peak torque of 1200 Nm is intended for emergency stops or brief accelerations only. Configure the servo drive's torque limit parameter to prevent sustained operation above the continuous torque rating, which can cause accelerated wear and overheating.

Emergency Stop (E-Stop) Behavior

The gearbox is mechanically robust and designed to withstand the forces of an emergency stop. However, frequent and aggressive E-stops can contribute to cumulative fatigue. The system's E-stop routine should be designed to decelerate when possible, rather than causing an instantaneous mechanical stop.

> **Tip:** Log the number of E-stop events in your control system to help inform the preventative maintenance schedule.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the gearbox housing and seals for any signs of grease leakage or physical damage.	Pay close attention to the input and output shaft seals.
Quarterly	Listen for any changes in operational noise, such as grinding or whining, which could indicate bearing wear.	Use a mechanic's stethoscope or vibration sensor for more accurate analysis.
Every 1,000 Hours	Check the torque of all external mounting bolts (motor-to-gearbox and gearbox-to-frame) and re-torque if necessary.	Vibration can cause fasteners to loosen over time.

Interval	Task	Notes
Every 5,000 Hours	Regrease the gearbox. Purge the old grease by injecting new, specified grease until clean grease emerges from the outlet port.	Refer to the service manual for specified grease type and volume.
Every 10,000 Hours	Take a grease sample for analysis. This can provide early warning of internal wear or contamination.	This is highly recommended for mission-critical applications.
Every 20,000 Hours	Schedule a factory service for complete inspection and replacement of wear items like bearings and seals.	Contact NexBot Robotics support to schedule authorized service.

6. Troubleshooting

Symptom	Possible Cause	Solution
Excessive operational noise or vibration	Misalignment between motor and gearbox, worn internal bearings, or loose mounting bolts.	Power down and LOTO. Check alignment with a dial indicator. Verify torque on all mounting bolts. If noise persists, schedule for service.
Increased backlash or positional error	Normal wear of internal cycloidal components, loose output flange bolts, or a failing bearing.	Check and re-torque output flange bolts. If backlash is internal, the gearbox has reached its service life and requires replacement or factory refurbishment.
Gearbox is overheating	Exceeding the duty cycle, insufficient or incorrect lubrication, or high ambient temperature.	Reduce the operational load or duty cycle. Verify the correct grease is being used. Improve airflow around the unit.
Grease leaking from seals	Failed input or output shaft seal due to age, contamination, or over-pressurization during regreasing.	The gearbox must be removed from service to have the seals professionally replaced. Do not operate with leaking seals.
Output shaft is seized or will not rotate	Catastrophic internal failure of a bearing or gear component, or seizure of the connected load.	Immediately disconnect power. Decouple the load from the gearbox output. Decouple the motor from the gearbox input. Attempt to rotate each component individually to isolate the failure.
Motor draws excessive current	Mechanical binding within the gearbox, excessive external load, or severe misalignment.	Stop operation immediately. Verify the applied load is within specification. Check motor-gearbox alignment. If the problem continues with no load,

Symptom	Possible Cause	Solution
		the gearbox may have an internal issue.

7. Technical Specifications

Parameter	Value	Unit
Weight	17.5	kg
Material	Anodized Aluminum Alloy Housing, 42CrMo4 Steel Internals	
IP Rating	IP65	
Country of Origin	IT	
Dimensions	210 x 210 x 135 mm	
Torque	1200 Nm Peak	