

# User Manual: NexBot Drives CYC123-006 Cycloidal Gearbox

SKU: NXB-GBX-CYC123-006 | Version: 1.0 | Brand: NexBot Robotics

## Table of Contents

1. Safety Information
2. Product Overview
3. Getting Started
4. Operation
5. Maintenance
6. Troubleshooting
7. Technical Specifications

## 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 (550 Nm) rotating parts can cause immediate entanglement, crushing, or amputation. Keep all body parts, clothing, and tools clear of the gearbox output during operation. Lockout/Tagout all energy sources before servicing.

**WARNING:** The gearbox surface temperature can exceed 80°C (176°F) during heavy operation. Allow the unit to cool completely before touching or performing maintenance to prevent severe burns.

**WARNING:** Incorrect lifting of the 12.5 kg unit can cause serious personal injury or damage to the gearbox. Always use certified lifting equipment and follow safe lifting practices.

**CAUTION:** Do not operate the gearbox if unusual noise or vibration occurs. Continued operation may lead to catastrophic failure and collateral equipment damage. Power down and investigate the cause immediately.

**NOTICE:** The use of non-specified lubricants or additives will void the product warranty. Only use lubricants approved by NexBot Robotics for the CYC123-006 model.

## 2. Product Overview

The NexBot Drives CYC123-006 is a high-performance cycloidal gearbox engineered for critical positioning and high-torque applications in industrial robotics. This component provides the core rotational power transmission for major robot axes, ensuring high accuracy and reliability under continuous, heavy-duty operation. The design of the CYC123-006 is centered around its eccentric rolling contact mechanism, which minimizes internal component wear and provides exceptional shock load resistance, far exceeding that of traditional planetary gear systems. A key benefit of this design is its extremely low backlash, consistently maintained at less than 1 arc-minute. This characteristic is critical for applications requiring high repeatability, such as arc welding, precision assembly, and machine tending, as it eliminates positioning errors during direction changes. Featuring a high reduction ratio of 121:1 in a compact housing, this gearbox allows for the use of smaller, high-speed input motors while delivering significant output torque. It is rated for a continuous torque of 550 Nm, with a peak capacity to handle intermittent loads up to 850 Nm during rapid acceleration or deceleration cycles. The unit's high torsional stiffness prevents 'wind-up' under load, resulting in faster settling times and more precise path following for the robot arm. Typical applications for the CYC123-006 include the primary J1, J2, and J3 axes of large articulated robots used in automotive manufacturing, palletizing, and heavy material handling. The unit is delivered sealed and pre-lubricated for its operational lifespan, simplifying installation and minimizing maintenance requirements. Its robust, hardened steel alloy construction ensures long-term performance in challenging industrial environments.

## 3. Getting Started

### 1. Product Identification

The NexBot Drives CYC123-006 is a high-precision cycloidal gearbox. Key information, including the SKU NXB-GBX-CYC123-006, serial number, and reduction ratio, is located on the metallic nameplate affixed to the main housing. Always reference this information when ordering parts or requesting technical support.

### 2. Scope of Supply

Each unit is shipped fully assembled and pre-lubricated from our facility in Sweden (SE). The standard package includes the gearbox unit, a breather plug (for specific mounting orientations), and input shaft key stock. Mounting hardware is typically supplied by the motor or machine integrator.

### 3. Principle of Operation

The CYC123-006 utilizes an eccentric bearing that drives cycloidal discs with a unique rolling motion. This design provides a high contact ratio, resulting in zero backlash, exceptional shock load resistance, and high torsional stiffness, making it ideal for robotic positioning tasks.

## 4. Operation

### Rated Load and Duty Cycle

The gearbox is engineered for continuous duty at its rated output torque of 550 Nm. Exceeding this rating for prolonged periods will reduce the operational lifespan. Intermittent peak torque and emergency-stop torque values are higher but should only be encountered for brief durations.

### Thermal Management

Proper heat dissipation is crucial for performance and longevity. Ensure there is adequate airflow around the gearbox housing and that the ambient operating temperature remains within the specified range. Do not allow dust or debris to accumulate on the housing, as this will act as an insulator.

**Tip:** In high-temperature environments or high-cycle applications, consider auxiliary cooling fans directed at the gearbox to maintain optimal operating temperatures.

### Positional Accuracy

The zero-backlash nature of the cycloidal design ensures high positional accuracy and repeatability. To maintain this performance, ensure the robot controller's servo tuning is optimized for the gearbox's high stiffness. Poor tuning can introduce oscillations that affect performance.

### Shock Load Handling

The CYC123-006 is designed to withstand shock loads up to 500% of its rated torque, making it highly robust for applications involving unexpected impacts or emergency stops. However, frequent exposure to such loads may accelerate wear and should be minimized through proper motion planning.

## 5. Maintenance Schedule

Interval	Task	Notes
Daily	Perform a visual inspection of the gearbox. Check for any signs of lubricant leakage around the input and output shaft seals and housing seams.	A slight weeping at the seal is acceptable, but any active dripping requires immediate attention.
Weekly	Listen to the gearbox during a typical operational cycle. Note any changes in acoustic profile, such as new whining, grinding, or clicking sounds.	Use a mechanic's stethoscope for more detailed auditory inspection.
Quarterly	Check the torque of all external mounting bolts (gearbox-to-robot and motor-to-gearbox). Re-torque to specification if necessary.	Vibration can cause fasteners to loosen over time. Use of thread-locker is recommended.
Annually	Clean the exterior surfaces of the gearbox housing to remove any build-up of dirt, grease, or	Use a mild degreaser and cloth. Do not use a high-pressure washer, as the

Interval	Task	Notes
	debris. This ensures optimal thermal dissipation.	IP65 rating does not protect against high-pressure jets.
Every 8,000 Operating Hours	For units with a sampling port, draw a small sample of lubricant for laboratory analysis. This can provide early warnings of internal wear or contamination.	Contact NexBot for an approved fluid analysis laboratory and interpretation guide.
Every 20,000 Operating Hours	The unit is considered lubricated-for-life under normal conditions. For severe duty applications, consult NexBot's service department about a full lubricant flush and replacement or factory refurbishment.	This is a major service task and should only be performed by trained personnel.

## 6. Troubleshooting

Symptom	Possible Cause	Solution
Gearbox is overheating (>90°C housing temperature)	Continuous operation above rated torque, incorrect lubricant, high ambient temperature, or blocked ventilation.	Reduce the operational load to within the 550 Nm rating. Verify correct lubricant is being used. Ensure adequate airflow around the unit.
Visible lubricant leak from shaft seal	Worn or damaged seal, scored shaft surface, or excessive internal pressure from a clogged breather.	Replace the damaged seal. Inspect the shaft for damage. Clean or replace the breather plug if it is clogged.
Loud grinding or clicking noise during operation	Advanced wear on internal components (bearings, cycloidal discs) or a foreign object in the geartrain.	Immediately remove the gearbox from service to prevent catastrophic failure. Contact NexBot for repair or replacement; do not attempt to disassemble.
Increased backlash or 'play' at the output	The unit has reached the end of its operational life due to fatigue wear of the core components.	The gearbox must be replaced. Increased backlash will severely impact positional accuracy and can lead to total failure.
High-frequency vibration felt on the housing	Misalignment between the motor and gearbox, worn input bearing, or an imbalanced load.	Power down and perform a full motor-to-gearbox alignment check. If the problem persists with the motor uncoupled, the issue is internal to the gearbox.
Output shaft is seized and will not rotate	Catastrophic internal failure, such as a	Do not attempt to force rotation. This can cause further damage to connected equipment. The

Symptom	Possible Cause	Solution
	collapsed bearing or fractured cycloidal disc.	unit is non-functional and must be replaced.

## 7. Technical Specifications

Parameter	Value	Unit
Weight	12.5	kg
Material	Hardened Steel Alloy	
IP Rating	IP65	
Country of Origin	SE	
Dimensions	210 x 210 x 145 mm	
Torque	550 Nm	