User Manual: NexBot Robotics 712-004 Shaft Seal 60x80x8 mm

SKU: NXB-GEN-712-004 | 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: Always perform full Lockout/Tagout (LOTO) procedures before attempting to inspect or replace this component. Stored energy can cause unexpected movement.

WARNING: Use appropriate Personal Protective Equipment (PPE), including safety glasses and chemical-resistant gloves. Pressurized lubricants can be ejected during failure.

WARNING: Improper installation can lead to premature failure, loss of lubricant, and subsequent catastrophic damage to bearings and gears. Follow the installation guide precisely.

CAUTION: Use only lubricants specified for the robotic system. Incompatible fluids can cause the Nitrile Butadiene Rubber (NBR) material to swell, shrink, or degrade, leading to seal failure.

NOTICE: Store new seals flat in their original packaging in a cool, dark, and dry environment away from ozone sources like electric motors to prevent material degradation.

2. Product Overview

The NexBot Robotics 712-004 Shaft Seal is a critical component designed to maintain the operational integrity of robot joints by preventing lubricant leakage and protecting internal mechanisms from contamination. This precision-engineered seal is manufactured to exact specifications, ensuring a perfect fit and reliable performance in demanding industrial automation environments. Its primary function is to create a secure barrier between the robot's lubricated gearbox and the external environment, which is essential for maximizing uptime and extending the service life of the robotic arm. Key Features & Benefits: The seal features a durable housing constructed from high-grade Nitrile Butadiene Rubber (NBR), a material selected for its excellent resistance to oils, greases, and hydraulic fluids commonly used in robotics. This material choice ensures consistent performance across a wide operating temperature range of -30°C to 100°C, accommodating various factory conditions from cold storage to high-heat manufacturing processes. An integrated garter spring made of carbon steel provides constant radial force, maintaining a tight and consistent seal against the rotating shaft even under conditions of vibration and minor shaft runout. This design significantly reduces the risk of premature wear on gears by ensuring they remain properly lubricated. With precise dimensions of 60 mm inner diameter, 80 mm outer diameter, and an 8 mm width, the 712-004 seal is engineered for specific joint applications within the NexBot Robotics ecosystem. The dual-lip design offers enhanced protection; the primary lip retains the lubricant, while a secondary, non-spring-loaded dust lip acts as an excluder, preventing dust, debris, and moisture from entering the joint assembly. This dual-action protection is vital in applications such as CNC machine tending, welding, and material handling, where airborne particulates are common. Installation & Maintenance: As a standard wear part, this shaft seal is designed for straightforward replacement during scheduled maintenance intervals. Proper installation is crucial for its effectiveness. The seal should be pressed evenly into its housing, ensuring it is square to the bore and shaft. Using an appropriate installation tool prevents damage to the flexible sealing lip. Regular inspection for signs of wear, hardening, or damage is recommended to prevent joint failure and unplanned downtime. Replacing this seal as part of a preventative maintenance program helps ensure consistent robot performance, accuracy, and reliability over its entire operational lifespan. This component is specified for use in several joints across various NexBot robot series, including the R-50 and C-10 models.

3. Getting Started

1. Product Identification

Before use, verify that the component is the correct NexBot Robotics 712-004 Shaft Seal. The SKU NXB-GEN-712-004 and dimensions (60x80x8 mm) should be clearly marked on the packaging. Using an incorrect seal will result in improper fit and system failure.

2. Storage and Handling

This seal is made from Nitrile Butadiene Rubber (NBR) and should be handled with care. Avoid contact with sharp objects that could nick the sealing lip. Store seals in a climate-controlled area to preserve material integrity prior to installation.

3. Material Compatibility

The NBR material offers excellent resistance to most petroleum-based oils and greases commonly used in industrial robotics. However, it is not recommended for

use with glycol-based brake fluids, aromatic hydrocarbons, or ketones. Always confirm lubricant compatibility before installation.

4. Operation

Primary Function: Lubricant Retention

The 712-004 Shaft Seal is designed to prevent the leakage of essential lubricants from the robot's gearbox or joint assembly. A flexible inner lip, energized by a carbon steel garter spring, maintains constant pressure against the rotating shaft, creating a dynamic barrier.

> **Tip:** A slight 'wetting' at the seal-shaft interface is normal and necessary for lubrication of the sealing lip itself.

Secondary Function: Contaminant Exclusion

In addition to retaining lubricant, the seal acts as a barrier to prevent external contaminants such as dust, moisture, and chemical particulates from entering the sensitive internal mechanisms. This protection is critical for extending the life of bearings and gears.

Operating Temperature Range

The NBR material is engineered to perform reliably within the standard operating temperature range of NexBot Robotics equipment. Exceeding these thermal limits can cause the rubber to harden and lose its flexibility, compromising sealing performance.

> **Tip:** Monitor gearbox temperatures during heavy-duty cycles to ensure they remain within the system's specified limits.

Service Life Expectancy

The service life of the 712-004 seal is dependent on operating conditions, including shaft speed, temperature, lubricant type, and exposure to contaminants. Regular inspection is the most effective way to determine the appropriate replacement interval for your specific application.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Perform a visual inspection of the seal area for signs of active lubricant leakage or heavy accumulation of wet grime.	A clean joint is easier to inspect. Wipe down the area as needed.
Quarterly	During scheduled preventative maintenance, thoroughly clean and inspect the seal exterior. Check for minor weeping and any signs of physical damage or degradation to the exposed seal material.	Note any changes in condition in the maintenance log.
Annually	Conduct a comprehensive assessment of the seal's condition.	This is a wear item; proactive replacement

Interval	Task	Notes
	Based on operating hours and visual inspection, schedule a replacement during the next major service interval to prevent unplanned downtime.	is recommended over reactive.
As Needed	Replace the seal immediately if a steady drip or significant lubricant leakage is observed.	Operating with a failed seal will lead to more costly component failures.
Per Lubricant Change	When changing the gearbox or joint lubricant, inspect the condition of the drained fluid for contaminants that may indicate a failing seal.	Metallic particles or excessive sludge can be early indicators of internal contamination.

6. Troubleshooting

Symptom	Possible Cause	Solution
Visible lubricant leakage or dripping from the seal area.	The sealing lip is worn, cut, or hardened from age/heat. The seal may also have been damaged during installation.	Replace the NexBot Robotics 712-004 seal. Carefully inspect the shaft for scoring before installing the new part.
The seal has become dislodged from the housing bore.	Excessive internal gearbox pressure, or the seal was not fully or squarely seated during installation.	Investigate the cause of over-pressurization (e.g., blocked breather). Install a new seal using the correct press-fit procedure.
Premature seal failure or rapid wear.	Incompatible lubricant, excessive operating temperature, or a rough/scored shaft surface is abrading the seal lip.	Verify lubricant is correct for NBR seals. Check system temperature. Polish or repair the shaft surface before installing a new seal.
A deep groove is worn into the shaft where the seal lip contacts it.	This is a result of long-term normal operation, often accelerated by abrasive contaminants.	If possible, install the new seal slightly deeper or shallower in the bore to allow the lip to run on a fresh, unworn section of the shaft. If not possible, the shaft may require repair or replacement.
Squealing or high-pitched noise from the seal area.	The seal is running dry due to lack of lubrication at the sealing lip.	Verify the system lubricant level is correct. The seal may have been installed without pre-lubrication; it may need to be replaced if it has been damaged by running dry.
The new seal is difficult to install or fits too tightly.	Incorrect part, burrs in the housing bore, or lack	Confirm the part is NXB-GEN-712-004. Deburr the housing bore entrance with a fine file or emery cloth. Apply

Symptom	Possible Cause	Solution
	of lubrication on the seal's outer diameter.	a thin film of oil to the seal OD before pressing.
Seal leaks immediately after installation.	The seal was installed backward (spring side out), the sealing lip was cut on a sharp edge, or the garter spring was dislodged during installation.	Remove the seal and replace it with a new one, paying close attention to orientation and ensuring all sharp edges are masked or deburred.

7. Technical Specifications

Parameter	Value	Unit
Weight	0.05	kg
Material	Nitrile Butadiene Rubber (NBR), Carbon Steel Spring	
Country of Origin	CH	
Dimensions	60 x 80 x 8 mm (ID x OD x Width)	