

User Manual: NexBot Robotics 833-013 Washer And Spacer Set (Stainless Steel)

SKU: NXB-GEN-833-013 | 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 de-energize, lock out, and tag out (LOTO) all power sources to the robotic system before installing or servicing any hardware. Unexpected motion can cause severe injury or death.

WARNING: Wear appropriate Personal Protective Equipment (PPE), including impact-resistant safety glasses and protective gloves, when handling and installing hardware to prevent cuts and eye injuries.

CAUTION: Do not substitute hardware from the NXB-GEN-833-013 set with unapproved parts. Using incorrect materials or dimensions can compromise mechanical integrity and lead to equipment failure.

CAUTION: Always use a calibrated torque wrench. Applying incorrect torque can lead to fastener failure, stripped threads, or damage to expensive robotic components.

NOTICE: The Stainless Steel 304 material provides general corrosion resistance. For use in environments with aggressive chemicals, verify material compatibility to prevent premature degradation.

2. Product Overview

The NexBot Robotics 833-013 Washer and Spacer Set provides the essential hardware required for precise mechanical assembly and maintenance of NexBot robotic systems. This set is engineered to meet exacting dimensional tolerances, ensuring proper fit and function when shimming joints, mounting end-of-arm tooling, or securing components where exact spacing is critical to performance. Each piece is manufactured from high-grade Stainless Steel 304, offering excellent corrosion resistance and durability in demanding industrial environments. The primary benefit of this set is the ability to eliminate undesirable mechanical play and backlash in robot joints, which directly contributes to improved positioning accuracy and repeatability. By using these precision-ground components, technicians can restore or enhance the robot's original performance specifications after service. The set includes a curated assortment of commonly used thicknesses and diameters, providing versatility for various applications across multiple robot series. With a thickness tolerance of just $\pm 0.01\text{mm}$, these components provide the accuracy needed for fine-tuning kinematic chains. Typical applications include adjusting the preload on joint bearings, aligning motor and gearbox interfaces, and spacing out mounting fixtures or sensors. Proper use of these washers and spacers during installation or repair is crucial for preventing premature wear on more costly mechanical components. The set is organized for convenience, allowing maintenance teams to quickly find the right component for the job without sourcing individual parts. All components are deburred and finished to prevent surface marring of adjacent parts during assembly.

3. Getting Started

1. Kit Contents Verification

Upon receipt, verify the package is labeled as NexBot Robotics 833-013 Washer And Spacer Set. Open the kit and visually inspect the contents to ensure a complete and undamaged assortment of hardware is present. This verification ensures you have the correct, factory-certified components for your task.

2. Understanding Component Function

This set contains both washers and spacers. Washers are primarily used to distribute the load of a fastener across a wider surface area, preventing damage and loosening. Spacers are used to create a precise, fixed distance between two parts, which is often critical for the alignment of sensors, gears, or structural members.

3. Material Characteristics

All components in this set are manufactured from Stainless Steel 304. This austenitic stainless steel is chosen for its excellent combination of strength, corrosion resistance, and fabricability, making it suitable for reliable performance in most industrial automation environments.

4. Proper Storage

Store the hardware set in a clean, dry location, ideally in its original compartmentalized case. This prevents loss of small parts and protects them from contamination by dust, moisture, or workshop debris that could compromise the integrity of a mechanical joint during assembly.

4. Operation

Ensuring Proper Load Distribution

When tightening a bolt or screw, a washer's function is to evenly distribute the clamping force. This is crucial when fastening components with large clearance holes or when mating a steel fastener to a softer material like aluminum, preventing the fastener from marring or deforming the surface.

Achieving Precise Spacing and Shimming

Spacers are used to establish an exact gap between components. They are critical for aligning drive shafts, positioning sensors at a focal point, or providing clearance for moving parts. Washers can also be used as thin shims to make fine adjustments to alignment or to take up slack in a joint.

Tip: When using multiple washers for shimming, use the fewest number of pieces possible to achieve the target thickness. A single, thicker component is mechanically more stable than a large stack of very thin ones.

Maintaining Clamping Force in Dynamic Systems

In robotic applications, constant motion and vibration work to loosen threaded fasteners. A properly selected and installed washer helps maintain the preload (clamping force) on the fastener, significantly reducing the likelihood of critical components becoming loose over time.

Preventing Galling of Stainless Steel Threads

Stainless steel on stainless steel fasteners can be susceptible to galling (cold welding) under pressure. While the washer itself does not prevent this, it is a critical part of the joint. Always follow the robot's service manual regarding the use of anti-seize lubricants on fastener threads to ensure they can be properly torqued and later removed.

5. Maintenance Schedule

Interval	Task	Notes
Quarterly	Visually inspect externally accessible hardware assemblies that use components from this set. Look for any signs of loosening, unusual wear, or corrosion.	This inspection can be integrated with routine system cleaning schedules.
Annually	As part of the annual preventative maintenance schedule, perform a torque audit on all critical fasteners, such as those on end-of-arm tooling and motor mounts.	Always refer to the robot's service manual for the correct torque specifications and tightening sequences.
During Major Service	When a robot joint or module is disassembled for service, discard the old washers and replace them with new ones from the NXB-GEN-833-013 set.	Never reuse washers from critical, high-load joints as they may have been permanently deformed and will not provide correct load distribution.

Interval	Task	Notes
As Needed	Clean hardware assemblies if they become contaminated with process fluids, metal shavings, or other debris. Use approved solvents and ensure the area is dry before returning the system to service.	Contaminants can accelerate corrosion and hide potential mechanical issues.
Ongoing	Maintain an adequate stock of the NXB-GEN-833-013 set. Reorder when your supply is depleted to ensure certified parts are always available for unplanned repairs and scheduled maintenance.	Using non-certified hardware can void the system warranty and compromise safety.

6. Troubleshooting

Symptom	Possible Cause	Solution
A newly installed component is loose or misaligned.	Incorrect fastener torque, an omitted washer/spacer, or an improper tightening sequence.	Power down the system (LOTO). Loosen the fasteners, verify the correct hardware stack-up against the technical drawing, and re-tighten the fasteners to the specified torque in the correct sequence.
Unusual vibration or noise originates from a specific joint.	A fastener has loosened, allowing for relative motion between parts.	Immediately stop the system. Inspect the suspect joint and check the torque on all associated fasteners. Replace any damaged hardware before re-torquing.
Visible rust or corrosion around a fastener.	Galvanic corrosion due to incompatible materials, or exposure of the Stainless Steel 304 to a highly corrosive substance.	Identify the root cause of the corrosion. Replace all affected hardware (fastener, washer, etc.) with specified components and apply protective coatings if required by the service manual.
A washer appears bent or crushed after installation.	Extreme over-torquing of the fastener or installation on an uneven/burred surface.	Remove the fastener and discard the damaged washer. Inspect and prepare the mating surface to be flat and clean. Reassemble with a new washer and tighten to the correct torque value.
A bolt head or nut has damaged the surface of a component.	A washer was omitted from the assembly, or the washer used was too small.	Disassemble the connection. If the damage is cosmetic, install the correct washer. If the damage is structural, the component may need to be replaced. Always use washers

Symptom	Possible Cause	Solution
		as specified in the assembly drawings.
Cannot achieve the correct spacing between two components.	The wrong spacer was selected from the kit, or it was installed in the wrong location.	Consult the engineering diagram to identify the exact spacer required for the application. Disassemble and install the correct part.

7. Technical Specifications

Parameter	Value	Unit
Weight	0.5	kg
Material	Stainless Steel 304	
Country of Origin	JP	