

User Manual: NexBot Robotics 311-005 6-Axis Force/Torque Sensor

SKU: NXB-SNS-311-005 | 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: Isolate all hazardous energy before servicing NexBot Robotics 311-005 6-Axis Force/Torque Sensor; stored electrical or mechanical energy may remain present after shutdown.

WARNING: Operate NXB-SNS-311-005 only within its intended Sensors & Vision > Force/Torque Sensors > 6-Axis Force/Torque Sensors duty profile and published specification limits.

CAUTION: Use only approved tools, mating parts, and installation hardware to prevent premature wear or unsafe operation.

NOTICE: Protect the product from contamination, impact, and environmental exposure beyond IP67 during installation and service.

2. Product Overview

The NexBot Robotics 311-005 is a compact, high-performance 6-axis force/torque sensor designed to provide robots with a sense of touch for complex manufacturing

tasks. This sensor accurately measures forces and torques along all three spatial axes (Fx, Fy, Fz, Tx, Ty, Tz), enabling sophisticated force control strategies. Its robust design and high signal-to-noise ratio make it an ideal solution for applications requiring precision, repeatability, and environmental resistance. Key features include a durable, single-piece transducer machined from high-strength aluminum, providing excellent overload protection and a long operational lifespan. The integrated electronics digitize the signals close to the source, minimizing noise and latency. With an IP67 rating, this sensor is fully protected against dust ingress and can withstand temporary immersion in water, making it suitable for deployment in environments with coolants or washdown procedures. This sensor excels in applications such as automated assembly, where it can detect part misalignment and control insertion force to prevent damage. In material removal processes like grinding or deburring, it allows the robot to maintain constant pressure against a surface, improving finish quality and consistency. Other common uses include product testing, haptic feedback systems, and advanced research. The 311-005 model offers a measurement range of up to 500 N in force and 50 Nm in torque, providing the sensitivity needed for delicate operations while retaining the durability for industrial use. Installation is straightforward, with a standard ISO 9409-1 tool flange pattern for mounting between the robot wrist and the end-of-arm tooling.

3. Getting Started

1. Confirm product identity

Verify the installed item is NexBot Robotics 311-005 6-Axis Force/Torque Sensor with SKU NXB-SNS-311-005. Cross-check the unit against project documentation before applying power or connecting it to the host system.

2. Review operating context

Understand how the product is used within the Sensors & Vision > Force/Torque Sensors > 6-Axis Force/Torque Sensors workflow, including any upstream and downstream dependencies, service intervals, and operator responsibilities.

3. Complete initial startup

Power up the unit under controlled conditions, observe indicator states, and verify the product initializes cleanly with the expected 24VDC operating setup.

4. Operation

Normal operation

Run NexBot Robotics 311-005 6-Axis Force/Torque Sensor within the documented workload, environmental, and service conditions. Track alarms, unusual noise, heat, or vibration so corrective action can be scheduled before unplanned downtime occurs.

Interface and controls

Use the supported electrical and control interfaces to commission, monitor, and troubleshoot the device. Validate all signal mappings and control behavior after maintenance or part replacement, especially where EtherCAT communication is required.

Tip: Capture a baseline of healthy status indicators after commissioning so later diagnostics can be compared quickly.

Load and application limits

Keep the product within the published ratings for speed, force, load, and environmental exposure. Where applicable, confirm mounting, routing, and attached tooling do not compromise access, cooling, or serviceability.

Change management

Whenever hardware, firmware, wiring, or connected tooling changes, repeat the relevant verification and commissioning checks before returning the equipment to production service.

Tip: Update maintenance records immediately after any wiring, parameter, or parts change.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Inspect NexBot Robotics 311-005 6-Axis Force/Torque Sensor for visible wear, damage, contamination, loose hardware, and abnormal status indicators.	Record any abnormalities before the next production cycle begins.
Monthly	Verify mounting integrity, connector condition, and cable routing or strain relief points.	Retorque or reseal hardware only to the documented service specification.
Quarterly	Review diagnostic logs, event history, and operational trends for early signs of degradation.	Escalate recurring warnings before they develop into hard faults.
Annually	Perform a full service inspection covering mechanical condition, electrical connections, and functional verification.	Coordinate annual service with planned downtime to minimize production disruption.

6. Troubleshooting

Symptom	Possible Cause	Solution
Unit does not initialize or remain ready	Incoming supply, controls wiring, or commissioning parameters do not match the documented 24VDC configuration.	Verify power quality, wiring continuity, protective devices, and startup parameters before restarting the unit.
Intermittent communication or status loss	Loose connectors, damaged cabling, or interface mismatch on EtherCAT.	Inspect physical connections, confirm interface settings, and replace damaged cables or connectors as needed.
	Mechanical loading, contamination,	Inspect the installation, restore proper alignment

Symptom	Possible Cause	Solution
Unexpected wear, vibration, or overheating	misalignment, or duty cycle exceeds the intended application conditions.	and cooling, and verify the product is being used within its published operating limits.
Connected equipment performance is inconsistent	The installed product is not configured correctly for the host system or compatible robot series (C-10, R-20, R-50).	Validate the configuration, confirm compatibility, and rerun the functional verification procedure after any corrections.

7. Technical Specifications

Parameter	Value	Unit
Weight	0.85	kg
Material	Aluminum 7075-T6, Anodized	
Voltage	24VDC	
IP Rating	IP67	
Country of Origin	SE	
Protocol	EtherCAT	
Dimensions	110 x 110 x 45 mm	