User Manual: NexBot Drives LA013-002 6-Axis Robot Arm 120kg Payload

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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: This robot operates with lethal voltage (400-480VAC). Always perform Lockout/Tagout procedures before opening the controller cabinet. Failure to de-energize will result in death or severe injury.

WARNING: The LA013-002 can move at high speed with extreme force. Never enter the robot's active work cell during automatic operation. Treat the robot as if it could move at any time.

WARNING: Payloads up to 120 kg can be dropped if the end-effector fails or is programmed incorrectly. Ensure the work area is clear of personnel and that the EOAT is correctly installed and maintained.

> **CAUTION:** The robot body is rated IP65 and the wrist is IP67. Do not use high-pressure washers on the main robot body. Follow approved cleaning procedures to avoid damaging seals and electronics.

> **NOTICE:** Always create a system backup before making significant changes to programs or configuration settings. This allows for quick recovery in case of an error.

2. Product Overview

The NexBot Drives LA013-002 is a versatile 6-axis articulated robot arm designed to handle high-payload applications in demanding industrial environments. This robot provides an optimal balance of speed, power, and precision, making it a reliable solution for automating complex manufacturing processes. Its robust construction ensures long-term performance and durability under continuous operation cycles. The primary benefit of the LA013-002 is its substantial 120 kg payload capacity, which allows it to manipulate heavy workpieces, tooling, and assemblies with ease. This capability is complemented by an extensive horizontal reach of 2,702 mm, creating a large, flexible work envelope suitable for serving multiple machines or covering wide conveyor systems. The arm's design incorporates high-stiffness components to minimize deflection under load, achieving a position repeatability of ±0.05 mm. This level of precision is critical for tasks requiring consistent quality, such as spot welding, sealant application, and intricate assembly operations. Common applications for this robot arm include: - Automotive: Body-in-white (BIW) assembly, part transfer, and machine tending. - Logistics and Warehousing: High-capacity palletizing, depalletizing, and sorting of heavy goods. - Metal Fabrication: Handling large castings, loading and unloading CNC machines, and performing spot welding. - General Manufacturing: Heavy material handling, assembly of large components, and inspection. The robot arm is designed for floor mounting and features a streamlined profile to reduce interference within the workcell. The wrist is rated to IP67, providing enhanced protection against dust and liquids, making it suitable for environments with cutting fluids or washdown requirements. The main body is sealed to an IP65 rating. The LA013-002 represents a powerful and dependable automation tool for increasing throughput and improving process stability in heavy industrial sectors.

3. Getting Started

1. System Power-Up Sequence

To start the LA013-002, ensure the main disconnect on the controller is in the 'ON' position and release any engaged Emergency Stop buttons. Press the 'ON' button on the operator panel. The system fans will start, and the teach pendant will boot to the main user interface.

2. Navigating the Teach Pendant

The teach pendant is your primary interface. Use the touchscreen to access menus for program management, I/O status, and system configuration. The physical joystick is used for manual robot movement, and the dead-man switch must be engaged to enable motion.

3. Manual Robot Jogging

To move the robot manually, select 'T1' (Teach) mode, which limits speed for safety. Choose a coordinate system (e.g., Joint, World), then press and hold the dead-man switch. Use the joystick to move the robot along the selected axes or directions.

4. Running a Program in Automatic Mode

Select a program from the program list on the teach pendant. Switch the system mode to 'AUTO' and exit the safeguarded space, ensuring all safety gates are closed. Press the 'Cycle Start' button on the operator panel to begin program execution.

4. Operation

Managing Payload Schedules

The LA013-002's performance is optimized when the correct payload data is active. Define multiple payload schedules for different end-effectors or parts, ensuring the total mass (up to 120 kg) and center of gravity are entered accurately. Activating the correct schedule allows the controller to maximize acceleration and maintain path accuracy.

> **Tip:** Create a 'maintenance' payload schedule with zero mass for when the end-effector is removed. This prevents stress on the gearboxes when moving the robot unloaded.

Understanding Motion Programming

Program paths using a combination of motion types. Use 'Joint' moves for fast point-to-point travel where the exact path is not critical. Use 'Linear' moves for processes requiring a straight-line tool path, such as sealing or assembly.

> **Tip:** Use 'Corner Path' (blending) motions with a defined termination value to create smooth transitions between points, significantly reducing cycle time on complex paths.

Working with Tool and User Frames

A 'Tool Frame' defines the Tool Center Point (TCP) of your end-effector, which is essential for all Cartesian motion. A 'User Frame' defines a custom coordinate system relative to a fixture or work surface, simplifying programming for tasks on angled or offset surfaces.

Singularity Avoidance

A wrist singularity occurs when axes 4 and 6 align, making linear motion impossible. The controller will issue a warning when approaching a singularity. Program paths to keep the wrist slightly offset from this alignment or change the robot's configuration to avoid it entirely.

Using the PROFINET Interface

The LA013-002 communicates with the cell PLC via its PROFINET interface. This connection is used to exchange I/O signals for part

presence sensors, gripper control, and system status. Ensure the GSDML file is correctly installed in your PLC engineering software for seamless integration.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Perform a visual inspection of the robot arm, cabling, and end-effector for any signs of physical damage, loose components, or fluid leaks.	This pre-shift check should be performed by the machine operator.
Weekly	Test all Emergency Stop buttons and safety interlocks (gates, light curtains) to ensure they are functioning correctly and halt robot motion.	Log all safety checks in the machine's maintenance record.
Monthly	Clean the controller cabinet air filters to ensure proper cooling of the electronics. Check for excessive dust or debris buildup inside the cabinet.	Use compressed air at low pressure to clean filters; replace if damaged.
Quarterly	Check the torque of the M24 robot base mounting bolts to ensure the robot remains securely anchored to the foundation.	Refer to the installation manual for the correct torque specification.
Annually	Replace the absolute encoder backup batteries located in the robot base. This is critical to prevent the loss of mastering data during a power failure.	Perform this task with the main power on to avoid losing position data. Follow the procedure in the service manual.
Annually / 2000 Hours	Perform scheduled lubrication of all 6-axis gearboxes. Purge old grease and apply the NexBot-specified lubricant.	Failure to use the correct grease or procedure can lead to premature mechanical failure.
Every 5 Years	Schedule a preventative maintenance service with a certified NexBot technician to inspect internal components, check for mechanical backlash, and replace wear items like cables and seals.	This service is recommended to ensure long-term reliability and precision.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot stops with a 'Collision Detection' alarm.	The robot has physically hit an unexpected object, or the sensitivity setting is too high for the current operation.	Check the robot's path for obstructions. If no collision occurred, adjust the collision detection sensitivity settings for that specific motion or program.
Teach pendant screen is blank but controller has power.	The teach pendant cable is loose, damaged, or the pendant itself has failed.	Power down the system. Reseat the teach pendant cable at both the controller and pendant ends. Inspect the cable for damage. If the problem persists, contact support.
Error: 'SRVO-068 DCLV Overvoltage'.	Excessive regenerative energy, typically from high-speed downward or decelerating motions with a heavy payload.	Reduce the deceleration parameter or programmed speed for the move causing the fault. If the issue is frequent, an external regenerative resistor kit may be required.
Robot motion is jerky or not smooth.	Incorrect payload data, worn mechanical components, or poorly tuned motor parameters.	Verify that the active payload schedule is correct. If payload is correct, run a drivetrain diagnostic test and contact NexBot support for advanced tuning.
PROFINET communication drops intermittently.	Network interference, a faulty cable, or a network switch issue.	Ensure the PROFINET cable is a high-quality shielded type and is not routed next to high-voltage power lines. Test the cable and check the network switch's diagnostic logs.
Error: 'Mastering Data Lost'.	Encoder backup batteries failed and the system experienced a total power loss.	The robot must be re-mastered. Replace the encoder batteries immediately to prevent a recurrence, then follow the mastering procedure in the service manual.

Symptom	Possible Cause	Solution
Robot does not reach the exact programmed position.	The Tool Center Point (TCP) is not defined correctly, or the robot has suffered a minor collision, shifting the mechanical alignment.	Re-run the TCP calibration procedure to ensure it is accurate. If the TCP is correct, check the robot's mastering and consider a touch-up of the affected program points.

7. Technical Specifications

Parameter	Value	Unit
Weight	1250.0	kg
Material	Cast Aluminum Alloy	
Voltage	400-480VAC 3-Phase	
IP Rating	IP65 (Body), IP67 (Wrist)	
Country of Origin	IT	
Protocol	PROFINET	
Dimensions	800 x 650 mm (Base Footprint)	
Reach	2,702 mm	
Payload	120 kg	
Axes	6	
Repeatability	±0.05 mm	