User Manual: NexBot Robotics LA013-001 6-Axis Robot Arm 120kg Payload

SKU: NXB-ROB-LA013-001 | 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: Never enter the robot's safeguarded work envelope while power is on and the system is in automatic mode. Unexpected high-speed motion can cause fatal injury.

WARNING: The LA013-001 has a maximum payload of 120 kg. Exceeding this limit, or failing to define the payload properties correctly, can lead to uncontrolled motion, component failure, and serious injury.

WARNING: Before performing any maintenance, execute a full Lockout/Tagout procedure on the main electrical disconnect. Stored electrical and pneumatic energy can be hazardous.

CAUTION: The robot's gearbox and motor surfaces can reach high temperatures during operation. Allow the unit to cool before direct contact to avoid burns.

NOTICE: Use only genuine NexBot Robotics replacement parts and software updates. The use of unauthorized components may void the warranty and lead to unpredictable system behavior.

2. Product Overview

The NexBot Robotics LA013-001 is a six-axis articulated robot arm engineered for high-payload, long-reach industrial applications. This robot provides an optimal balance of speed, power, and precision for tasks that require moving heavy objects over a large work area, making it ideal for automating demanding processes in manufacturing and logistics. Featuring a robust payload capacity of 120 kg, the LA013-001 arm can effortlessly handle large workpieces, heavy tooling, and complex end-of-arm-tooling (EOAT) assemblies. Its substantial horizontal reach of 2,655 mm allows it to service multiple stations, tend larger machines, or stack pallets to significant heights, maximizing the efficiency of the production floor. The six degrees of freedom ensure exceptional dexterity, enabling the arm to maneuver in complex paths and reach confined spaces within a workcell, which is critical for intricate assembly or processing tasks. Built for reliability in demanding factory environments, the LA013-001 features a rigid mechanical structure made from cast iron and aluminum alloy. The entire arm is sealed to an IP67 rating, providing complete protection against dust ingress and temporary water immersion, ensuring dependable operation in environments with coolants, dust, or wash-down procedures. With a position repeatability of ±0.06 mm, this robot arm delivers the consistency required for high-quality production in applications such as spot welding, material handling, machine tending, and palletizing. Its streamlined design facilitates straightforward integration into new or existing automation cells, minimizing deployment time. The LA013-001 robot arm is a powerful and versatile solution for boosting throughput and handling the toughest automation challenges.

3. Getting Started

1. System Components

The NexBot Robotics LA013-001 system includes the six-axis robot arm (SKU: NXB-ROB-LA013-001), the system controller cabinet, a handheld teach pendant, and interconnecting cables. The teach pendant is the primary human-machine interface for manual control, programming, and diagnostics.

2. Power-On Procedure

To power on the system, first ensure the main disconnect switch on the controller cabinet is in the 'ON' position. Then, turn the keyswitch on the operator panel to 'ON'. The system will initialize, which involves a boot sequence and self-check diagnostics that may take several minutes.

3. Navigating the Teach Pendant

Familiarize yourself with the key features of the teach pendant, including the emergency stop button, the three-position dead-man switch, the screen interface, and the axis jogging keys. Understanding how to select motion types and coordinate systems is fundamental to operating the robot.

4. Performing a First Movement (Jogging)

After powering on, enable the motors and select a low speed override (e.g., 10%). While holding the dead-man switch, select the 'JOINT' coordinate system and use the corresponding keys to manually move each of the robot's six axes. This confirms basic functionality and motor control.

4. Operation

Defining a Tool Center Point (TCP)

A TCP defines the exact working point of your end-of-arm-tooling. The controller uses this point for all programmed linear and circular movements. An accurate TCP is absolutely essential for achieving the robot's ±0.06 mm repeatability.

> **Tip:** For the highest precision, use the multi-point teaching method with a fixed pointer to define your TCP, approaching the reference point from several different angles.

Setting Payload Data

For optimal performance and to prevent motor overloads, you must accurately define the payload data for the attached tool and workpiece. This includes the mass (up to 120 kg), the center of gravity coordinates (X, Y, Z), and the moments of inertia. The controller uses this data to calculate the required motor torque and optimize motion paths.

Creating a Basic Program

A program consists of a sequence of taught points and instructions. To create a program, use the teach pendant to jog the robot to a desired location, then record the position. Define the motion type (e.g., linear, joint) to the next point and repeat the process to build a complete path.

> **Tip:** Use 'Joint' moves for long-distance, non-linear travel to maximize speed, and 'Linear' moves for paths that require a straight line, such as approaching a workpiece.

Running in Automatic Mode

Before running a program in automatic mode, ensure all personnel have exited the safeguarded area and all safety gates are closed. Select the desired program, reset any alarms, and initiate the cycle from the PLC or HMI. The robot will then execute the programmed path at the defined speed.

Using User Coordinate Systems

User Coordinate Systems (User Frames) allow you to create a custom reference frame aligned with a fixture or workpiece. Programming movements relative to a User Frame simplifies teaching points on angled or skewed surfaces, as you can jog the robot along the axes of the workpiece itself rather than the robot's world frame.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm, cables, and controller for any signs of wear, damage, or fluid leaks. Confirm that the work area is free of obstructions.	This check should be performed by the operator at the start of each shift.
Weekly	Clean the exterior of the robot arm and controller using a lint-free cloth and an approved mild cleaning solution. Check the teach pendant screen and cable for damage.	Despite the IP67 rating, do not use high-pressure washers or caustic chemicals for cleaning.
Quarterly	Inspect and clean the air filters for the controller cabinet's cooling fans. Check the tightness of the robot's base mounting bolts.	Clogged filters can lead to controller overheating and faults.
Annually	Replace the encoder backup batteries located in the robot base. This prevents the loss of mastering data during a prolonged shutdown.	The system will generate a 'Battery Low' warning when replacement is imminent. Perform this task with the main power on to avoid losing position data.
Every 4000 Operating Hours	Perform re-lubrication of the gearboxes for axes 1 through 6. This must be done by a certified technician.	Use only the specific grease type listed in the service manual. Using incorrect lubricant will cause severe damage.
Every 12000 Operating Hours	Perform a full mechanical inspection, including a backlash check and repeatability test, to ensure the robot remains within its ±0.06 mm specification.	This service may require specialized laser tracking or dial indicator equipment.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot fails to power on; teach pendant is blank.	No main power, an emergency stop is active, or a circuit breaker has tripped.	Verify 400-480VAC 3-Phase power is supplied to the controller. Check and reset all circuit breakers. Ensure all E-Stop buttons on the pendant, controller, and safety circuit are released.
Positioning accuracy is poor, not meeting ±0.06 mm spec.	The Tool Center Point (TCP) is defined incorrectly, the wrong payload schedule is active, or the base bolts are loose.	Carefully re-teach the TCP. Verify the active payload data matches the installed tooling. Check and re-torque the M24 base mounting bolts to the specified value.
A 'Singularity' error occurs during a linear move.	The programmed path forces two or more robot axes to align (e.g., axes 4 and 6), making a linear path mathematically impossible to maintain.	Slightly alter the angle of the tool or the position of the point causing the error. Alternatively, change the move type to a 'Joint' move for that segment of the path.
'Motor Overload' fault on a specific axis.	Payload is too heavy or defined incorrectly; acceleration is too high; robot is mechanically binding.	Verify the defined payload mass and center of gravity are correct. Reduce the programmed acceleration value. Manually move the robot through the fault position to check for any obstructions or binding.
Robot stops with a 'Safety Circuit Open' or 'Gate Open' message.	An external safety device (e.g., safety gate, light curtain, area scanner) has been triggered.	Ensure the workcell is clear of personnel and all safety gates are properly closed. Check the status of all connected safety devices. Reset the safety system to clear the fault.
PROFINET communication is lost.	Network cable is disconnected or damaged, IP address	Inspect the physical Ethernet cable and its connections at the controller and network

Symptom	Possible Cause	Solution
	conflict, or issue with the PLC master.	switch. Verify the robot's IP settings are correct and not duplicated on the network. Check the diagnostic buffer of the PLC for more information.
Controller issues an 'Encoder Battery Low' warning.	The internal batteries that retain encoder position during power-off are nearing depletion.	Schedule maintenance to replace the batteries as soon as possible. Failure to do so before they are fully depleted will result in the robot losing its mastering data upon the next full shutdown, requiring a complete re-mastering procedure.

7. Technical Specifications

Parameter	Value	Unit
Weight	1280.0	kg
Material	Cast Iron and Aluminum Alloy	
Voltage	400-480VAC 3-Phase	
IP Rating	IP67	
Country of Origin	KR	
Protocol	PROFINET	
Dimensions	950 x 750 mm (Base Footprint)	
Reach	2,655 mm	
Payload	120 kg	
Axes	6	
Repeatability	±0.06 mm	