User Manual: NexBot Robotics SA011-004 6-Axis Robot Arm 10kg Payload

SKU: NXB-ROB-SA011-004 | 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: Hazardous voltage (400VAC) is present inside the controller cabinet. Disconnect, lock out, and tag out all power sources before opening panels or performing service.

WARNING: The robot can move unexpectedly at high speed, even when paused. All personnel must remain outside the robot's maximum working envelope during automatic operation.

WARNING: Never exceed the maximum payload of 10 kg. Overloading the robot can lead to motor failure, excessive wear, and unpredictable motion, creating a severe safety hazard.

> **CAUTION:** Pinch points exist at all 6 axes of the robot arm. Keep hands, clothing, and tools clear of the joints during movement to prevent injury.

> **NOTICE:** The IP54 body and IP67 wrist ratings are only valid if all seals and cable glands are correctly installed and maintained. Do not use high-pressure washers directly on the robot arm.

2. Product Overview

The NexBot Robotics SA011-004 is a versatile 6-axis articulated robot arm engineered for precision automation in applications with payloads up to 10 kg. This robot provides an optimal balance of speed, payload capacity, and working envelope, making it suitable for a wide range of industrial tasks. Its robust construction and high-performance servo system deliver reliable operation in demanding production environments. The key to the SA011-004's performance is its combination of a generous 1100 mm reach and exceptional position repeatability of ±0.02 mm. This level of precision ensures that processes such as intricate assembly, material dispensing, and quality inspection are performed consistently, reducing cycle times and improving product quality. The 10 kg payload capacity allows the arm to handle a variety of parts and end-of-arm tooling, from small electronic components to larger machined parts. The six axes of motion provide maximum dexterity, enabling the robot to maneuver around obstacles and access difficult-to-reach points within a work cell. Constructed from high-strength cast aluminum alloy, the robot arm's structure is both lightweight and rigid, minimizing vibration and settling time for faster, more accurate movements. The arm is rated at IP54 for the main body with an enhanced IP67 rating for the wrist, ensuring protection against dust and water ingress in typical industrial settings. This durability makes the robot arm a dependable asset for applications including pick-and-place, packaging, palletizing, and machine tending. Integration into existing automation systems is streamlined through standardized communication interfaces and a compact mounting footprint.

3. Getting Started

1. Powering On the System

To power on the SA011-004, first turn on the main electrical disconnect supplying the controller. Then, turn the main power switch on the controller cabinet to the 'ON' position. The system will boot up, and the teach pendant will become active after a brief initialization sequence.

2. Understanding the Teach Pendant

The teach pendant is the primary interface for controlling the robot. Key features include the emergency stop button, the 3-position dead-man switch for enabling motion, mode selection keys (T1, T2, AUTO), and a touchscreen for programming and configuration.

3. Performing a Homing Routine

Before running any program, the robot must be 'homed' to establish a precise reference position for each axis. This is typically done after

powering on the system by selecting the 'Home' function from the main menu and following the on-screen prompts. The robot will move each axis to its zero-degree mark.

4. Operation

Manual Jogging

Manual movement, or jogging, is used for teaching points and repositioning the robot. You can select different coordinate systems, such as 'Joint' to move one axis at a time, 'World' to move linearly along the X, Y, and Z axes of the robot base, or 'Tool' to move relative to the installed end-effector.

> **Tip:** For precise linear movements, always use the 'World' or 'Tool' coordinate systems after a proper Tool Center Point (TCP) has been defined.

Creating a Program

A program is a sequence of recorded points and instructions. To create one, select 'New Program', then jog the robot to the desired position and 'Record Point'. You can add logic, I/O commands, and motion types (linear, joint, circular) between points to build a complete automation task.

Defining Tool Center Point (TCP)

The TCP is the focal point of your end-of-arm tool. Accurately defining its X, Y, and Z offset from the robot's wrist flange is critical for achieving the specified ±0.02 mm repeatability and for performing accurate linear movements. Use the built-in TCP teaching utility for best results.

Configuring Payload Data

To optimize performance and longevity, you must configure the payload data for the attached tool and workpiece. Enter the mass (up to 10 kg), center of gravity, and moments of inertia into the payload settings. The robot's control system uses this data to adjust motor torque and motion dynamics.

Automatic (AUTO) Mode

AUTO mode is used for production runs. After selecting a program, turn the key switch to 'AUTO', exit the safety-fenced area, and initiate the cycle via an external start signal (e.g., from a PLC over PROFINET). The teach pendant will be disabled while the robot is running in automatic mode.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm, cables, and controller for any signs of damage, wear, or fluid leaks. Ensure	This check should be performed by the operator before

Interval	Task	Notes
	the work area is clean and free of debris.	starting the first shift.
Weekly	Wipe down the robot arm with a cloth and approved cleaning solution to remove dust and grime. Check the teach pendant cable for cuts or abrasions.	Do not use solvents or high-pressure water.
Monthly	Check the tightness of the robot base mounting bolts and the end-of-arm tooling fasteners.	Use a torque wrench to verify bolts are at their specified torque values.
Quarterly	Inspect and clean the controller cabinet's cooling fan filters. Ensure fans are operating and airflow is unobstructed.	Clogged filters can lead to controller overheating.
Annually	Replace the backup batteries for the axis encoders located in the robot base. This prevents the loss of mastering data during a power outage.	This must be done with the main power applied to the controller to avoid losing position data.
Every 8,000 Operating Hours	Perform a complete grease replacement for all 6 axis gearboxes according to the procedure in the service manual.	Use only NexBot Robotics approved lubricant.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot stops with an 'Axis Overtravel' alarm.	A programmed point or manual jog command attempted to move an axis beyond its physical or software-defined limit.	Switch to manual (T1) mode, select the affected axis, and jog it in the opposite direction until it is back within its safe working range. Reset the alarm.
PROFINET communication is lost.	A network cable is disconnected, the robot's IP address is incorrect, or there is a network fault.	Check the physical cable connection at the controller and network switch. Verify the robot's IP settings match the network configuration. Ping the robot's IP address from a PC on the same network.

Symptom	Possible Cause	Solution
Poor positioning accuracy; not meeting ±0.02 mm repeatability.	The Tool Center Point (TCP) is defined incorrectly, the EOAT is loose, or the payload settings are wrong.	Re-run the TCP calibration utility. Check and re-torque all fasteners on the wrist and tool. Verify that the correct payload data is active for the current task.
A 'Motor Overload' or 'Collision Detect' alarm occurs.	The robot has collided with an object, the payload exceeds 10 kg, or acceleration/ deceleration parameters are too high.	Inspect the workcell for obstructions. Verify the weight of the workpiece and EOAT. Reduce the programmed speed and acceleration values in the program.
The teach pendant screen is blank but the controller has power.	The teach pendant cable is not fully connected, or the pendant itself is faulty.	Power down the controller. Disconnect and reconnect the teach pendant cable, ensuring the connectors are secure. Power on and if the problem persists, contact NexBot support.
Robot fails to master with a 'Mastering Data Lost' error.	The encoder backup batteries were dead or were replaced while main power was off.	Replace the encoder backup batteries. The robot will need to be re-mastered using the mechanical zero-positioning jigs. Refer to the service manual for the full procedure.
Unusual grinding or whining noise from a joint.	Lack of lubrication in a gearbox or a failing bearing.	Immediately stop the robot. Inspect the suspect axis for signs of grease leakage. Schedule maintenance to check lubrication levels and inspect the gearbox for mechanical damage.

7. Technical Specifications

Parameter	Value	Unit
Weight	65.0	kg
Material	Cast Aluminum Alloy	

Parameter	Value	Unit
Voltage	400VAC 3-Phase	
IP Rating	IP54 (Body), IP67 (Wrist)	
Country of Origin	IT	
Protocol	PROFINET	
Reach	1100 mm	
Payload	10 kg	
Axes	6	
Repeatability	±0.02 mm	