

User Manual: NexBot Drives SA011-006 6-Axis Robot Arm 10kg Payload

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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 present. Disconnect and lock out all power sources before opening the controller cabinet or performing any service. Failure to do so will result in severe injury or death.

WARNING: Robot can move unexpectedly at high speed. Always remain outside the marked work envelope during automatic operation. Ensure all safety guards and interlocks are in place and functional.

WARNING: Improper payload settings can lead to unpredictable robot motion and potential collisions. Always configure the exact payload, including the weight of the end-of-arm tooling and workpiece.

CAUTION: Pinch points exist at all robot joints. Keep hands and clothing away from the robot arm during manual operation or maintenance to prevent injury.

NOTICE: This equipment should only be programmed, operated, and maintained by personnel who have completed certified NexBot Robotics training for the SA011-006 model.

2. Product Overview

The NexBot Drives SA011-006 is a high-performance 6-axis articulated robot arm engineered for precision automation in demanding industrial environments. This versatile robot provides an ideal balance of speed, payload capacity, and work envelope size for a wide range of applications. Its robust construction and reliable performance make it a cornerstone for modern manufacturing and logistics operations. The primary benefit of the SA011-006 is its exceptional flexibility, derived from its six axes of motion. This full articulation allows the arm to maneuver around obstacles and approach workpieces from any angle, which is critical for intricate assembly, welding, or dispensing tasks. With a substantial payload capacity of 10 kg, the robot arm can handle a variety of end-effectors and parts, making it suitable for everything from delicate component placement to light material handling. The generous 1300 mm horizontal reach creates a large, usable workspace, enabling the robot to service multiple machines or cover wide conveyor areas without repositioning. Precision is paramount in automated processes, and the SA011-006 delivers with a position repeatability of ± 0.02 mm. This high degree of accuracy ensures that tasks are performed consistently cycle after cycle, reducing defects and improving overall product quality. The arm's rigid, lightweight cast aluminum structure minimizes vibration and deflection, contributing to its smooth and stable motion paths even at high speeds. The main body of the robot is rated to IP54 for protection against dust and splashing water, while the wrist is sealed to IP67 standards, allowing it to operate reliably in environments with coolants or washdowns. Common applications for this robot arm include: * Machine Tending: Loading and unloading CNC machines, injection molding presses, and stamping presses. * Pick and Place: High-speed sorting, packing, and palletizing. * Assembly: Automating the assembly of electronics, automotive components, and consumer goods. * Dispensing: Applying adhesives, sealants, or paints with consistent pathing and volume. The SA011-006 is designed for straightforward integration into new or existing production lines, featuring a standardized mounting flange and connections.

3. Getting Started

1. Powering On the System

To begin operation, first ensure the main power disconnect to the controller is switched on. Next, press the power button on the controller operator panel. The system will boot, and the teach pendant will display the main startup screen after initialization is complete.

2. Understanding the Teach Pendant

The teach pendant is the primary interface for controlling the SA011-006. It allows for manual jogging, program creation and editing, I/O monitoring, and system configuration. Key features include the dead-man switch for safe manual motion, the emergency stop button, and the touchscreen display for navigation.

3. Jogging the Robot

To move the robot manually, select 'Jog' mode on the teach pendant. You can then choose a coordinate system (e.g., Joint, World, Tool) and press the corresponding axis direction buttons while holding the dead-man switch. This is essential for teaching points and verifying reach.

4. Operation

Defining a Tool Center Point (TCP)

Accurate operation requires defining the focal point of your end-of-arm tool. The system provides guided wizards to define the TCP using a multi-point method. A precise TCP ensures that rotational movements occur around the tool's tip, not the robot's wrist flange.

Tip: For highest accuracy, use a fixed, sharp pointer tool and a stationary reference point in the cell when performing the TCP calibration procedure.

Programming Motion Paths

Create programs by moving the robot to desired positions and recording points. You can define the motion type between points, such as Joint (fastest, unpredictable path), Linear (straight line), or Circular (curved path). Speed, acceleration, and precision settings can be customized for each movement.

Configuring Payload Settings

For optimal performance and to avoid alarms, you must configure the payload properties. Enter the weight (up to 10 kg), center of gravity, and moments of inertia for the attached tooling and workpiece. The robot uses this data to calculate the dynamics required for smooth and precise motion.

Tip: Use the 'Payload Estimation' utility if you do not know the exact inertia values. While not as precise as calculated data, it provides a stable starting point.

Using Automatic Mode

Once a program is complete and tested, it can be run in Automatic mode. This mode allows the robot to execute the program at full speed without requiring constant operator input. All safety guards must be closed, and the system must be started from an external signal (PLC) or the operator panel.

Monitoring PROFINET I/O

The robot communicates with other automation devices via its PROFINET interface. The teach pendant provides a diagnostic screen to monitor the status of digital and analog I/O signals in real-time. This is useful for troubleshooting communication with PLCs, sensors, and actuators.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm, cables, and controller for any visible damage, leaks, or loose connections. Check the teach pendant for any active fault messages.	Perform this check before starting automatic operation each day.
Weekly	Clean the robot arm and controller exterior with a soft, dry	

Interval	Task	Notes
	cloth. Check the integrity and strain relief of the main umbilical and teach pendant cables.	Do not use solvents or high-pressure water, which could damage seals.
Monthly	Test the functionality of all emergency stop buttons and safety interlocks (e.g., light curtains, door switches) to ensure they correctly halt robot operation.	Document the results of each safety check in a maintenance log.
Quarterly	Check the torque of the robot's base mounting bolts to ensure they have not loosened due to vibration.	Refer to the installation guide for correct torque specifications.
Annually	Inspect the seals on all axis joints for signs of wear, cracking, or grease leakage. This is especially critical for the IP67-rated wrist.	Contact NexBot support for seal replacement procedures if damage is found.
Every 10,000 Hours	Replace the batteries for the absolute encoder backup located in the robot base. This prevents the loss of position data during a power outage.	This procedure must be performed with the main power applied to the controller to avoid losing mastering data.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot fails to power on; teach pendant is blank.	No incoming power or an emergency stop circuit is open.	Verify the main circuit breaker is on. Check that all connected emergency stop buttons are released. Measure incoming voltage at the controller.
Positioning is inaccurate or has poor repeatability (less than ± 0.02 mm).	The Tool Center Point (TCP) is not calibrated correctly, the robot base is loose, or the payload settings are incorrect.	Re-run the TCP calibration procedure. Check the torque on the robot's mounting bolts. Verify the configured payload data matches the attached tooling.
A 'Collision Detected' or 'Torque Overload' alarm occurs.	The robot arm has physically collided with an object, or the payload exceeds the 10 kg limit or is improperly defined.	Carefully jog the robot away from the obstruction. Inspect the program path for potential collision points. Verify payload settings are accurate.
Cannot establish PROFINET communication with PLC.	Incorrect IP address, device name, faulty cable, or network switch issue.	Verify the robot's network settings match the PLC project configuration. Test the network cable. Check the link/activity lights on

Symptom	Possible Cause	Solution
		the controller and network switch.
Robot stops with a 'Safety Circuit Open' alarm.	An emergency stop button was pressed, a safety gate was opened, or a light curtain was breached.	Clear the intrusion from the safety device, close the gate, or release the E-stop button. Reset the safety system from the controller panel to clear the alarm.
Grease is leaking from a joint seal.	The joint seal is damaged or has failed due to age or contamination.	Immediately stop operation to prevent further damage. Clean the area and inspect the seal. Contact NexBot technical support for a replacement seal kit and service procedure.
Teach pendant is unresponsive or frozen.	Software issue or temporary communication loss between the pendant and controller.	Attempt to cycle power to the teach pendant by disconnecting and reconnecting its cable. If the issue persists, cycle power to the entire robot controller.

7. Technical Specifications

Parameter	Value	Unit
Weight	125.0	kg
Material	Cast Aluminum Alloy	
Voltage	400-480VAC 3-Phase	
IP Rating	IP54 (Body), IP67 (Wrist)	
Country of Origin	IT	
Protocol	PROFINET	
Reach	1300 mm	
Payload	10 kg	
Axes	6	
Repeatability	±0.02 mm	