User Manual: NexBot Vision MA012-011 6-Axis Robot Arm 25kg Payload

SKU: NXB-ROB-MA012-011 | Version: 1.0 | Brand: NexBot Robotics

Table of Contents

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 workspace while the system is in automatic mode. Unexpected high-speed motion can cause fatal injury.

WARNING: Do not exceed the maximum rated payload of 25 kg. Overloading the robot can lead to motor failure, unpredictable motion, and dropped parts, creating a hazardous situation.

WARNING: All safety devices, including light curtains, area scanners, and emergency stop buttons, must be tested and confirmed functional before starting production.

CAUTION: The robot arm and joint motors can reach high temperatures during operation. Allow the system to cool before performing maintenance to avoid burns.

NOTICE: To maintain the arm's IP67 rating, ensure all maintenance caps and connectors are securely fastened. Failure to do so can lead to damage from dust or fluid ingress.

2. Product Overview

The NexBot Vision MA012-011 is a high-performance 6-axis articulated robot arm designed for a wide range of industrial automation applications requiring precision and reliability. This robot provides an exceptional balance of speed, payload capacity, and working envelope, making it a versatile solution for complex manufacturing challenges. Engineered for medium-duty tasks, the MA012-011 features a substantial 25 kg payload capacity. This allows it to handle parts, tools, and materials with ease, making it ideal for applications such as CNC machine tending, where it can load and unload workpieces consistently around the clock. The arm's robust construction, combined with its six degrees of freedom, provides the dexterity needed to perform intricate movements in confined spaces. This is critical for tasks like arc welding, sealing, and complex assembly operations where the tool must be precisely oriented. A key performance attribute is its impressive horizontal reach of 1750 mm, which creates a large, optimized work envelope. This extended reach enables the arm to service multiple machines, access wide pallets, or cover large workpieces without repositioning, maximizing productivity and floor space utilization. Furthermore, the robot achieves a position repeatability of ±0.03 mm, ensuring that every cycle is performed with exceptional accuracy. This level of precision is vital for quality-critical processes in electronics assembly, metrology, and finishing, reducing defects and rework. Built for durability in demanding industrial environments, the arm is protected with an IP67 rating, making it resistant to dust and water ingress. This ensures dependable operation in facilities with coolants, particulates, or wash-down requirements. The streamlined design facilitates straightforward installation and integration into new or existing production lines. The MA012-011 robot arm is a powerful tool for manufacturers seeking to enhance efficiency, improve product quality, and create a safer, more productive workplace.

3. Getting Started

1. System Power-Up Sequence

To start the NexBot Vision MA012-011, first rotate the main disconnect on the controller cabinet to the 'ON' position. Next, press the 'ON' button on the controller or teach pendant. The system will initialize, and after a brief boot sequence, the main operating screen will appear on the teach pendant.

2. Understanding Operating Modes

The robot operates in three primary modes selected via a key switch: T1 (Manual Low Speed), T2 (Manual High Speed for testing), and AUTO (Automatic Production). For programming and setup, always use T1 mode, which limits the robot's speed for operator safety.

3. Navigating the Teach Pendant

The teach pendant is your primary interface for controlling the robot. Key features include the motion joystick for jogging, the touch screen for programming and configuration, and the hardware emergency stop button and deadman switch for safety.

4. Homing the Robot

Before starting any task, the robot must be homed or 'mastered' to establish a known reference position for all 6 axes. This is typically done once after installation

and is guided by an on-screen wizard. Homing ensures the robot's ±0.03 mm repeatability.

4. Operation

Jogging the Robot

Manual robot movement, or jogging, is performed in T1 mode by enabling the deadman switch and using the joystick. You can select different coordinate systems (e.g., Joint, World, Tool) to control the direction of motion relative to the robot's base or the attached tool.

> **Tip:** For large re-positioning movements, use 'Joint' mode. For precise linear adjustments of the end-effector, use 'Tool' or 'World' mode.

Creating a Program

A program consists of a sequence of recorded points. To create a program, move the robot to a desired location and orientation, then save it as a point. Define the motion type (linear, joint, circular) and speed for the path between points.

Defining Tool and Payload Data

Accurately defining the Tool Center Point (TCP) and payload is critical for precision and performance. Use the built-in utilities to define the geometry of your end-effector. Enter the payload mass (up to 25 kg) and center of gravity to allow the controller to optimize motion dynamics.

> **Tip:** Whenever you change the end-of-arm-tooling, always create and activate a new set of tool and payload data to ensure optimal performance and avoid motor overloads.

Configuring Digital I/O

The robot interacts with external equipment like grippers, sensors, and PLCs through its I/O system, primarily over the PROFINET network. Use the I/O configuration screen to map and label signals, which can then be controlled within your robot programs.

Executing a Program in Automatic Mode

Once a program is tested and finalized, it can be run in automatic mode. Select the program, reset any alarms, and ensure all personnel are outside the safety-fenced area. Initiate the cycle from the PLC or operator panel to begin production.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm, cables, and end-effector for any signs of wear, damage, or fluid leaks. Clear any debris from the robot's work area.	This check should be performed by the operator at the start of each shift.
Weekly	Test the functionality of the teach pendant emergency stop button	Log the results of the safety check in your

Interval	Task	Notes
	and all external E-stop circuits and safety gates.	facility's maintenance records.
Monthly	Check the air filters on the controller cabinet for dust accumulation. Clean with compressed air or replace if necessary to ensure proper cooling.	In dusty environments, this check should be performed more frequently.
Annually	Create a full backup of all robot programs, system configuration, and mastering data. Store the backup on a secure network drive or external media.	Perform this task before making any major software updates or program changes.
Every 3,000 Hours	Check the tightness of the robot's base mounting bolts using a calibrated torque wrench.	Vibration during operation can cause fasteners to loosen over time.
Every 10,000 Hours	Replace the grease in the gearboxes for axes 1, 2, and 3. This requires specialized equipment and should be performed by a trained technician.	Use only NexBot-approved NB-Lube G-17 grease.
Every 20,000 Hours	Replace the internal controller battery. This CMOS battery retains system memory and mastering data when main power is off.	This procedure must be performed with the controller powered on to prevent data loss.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot stops with a 'Singularity' error.	The robot's wrist axes (4, 5, 6) are nearly aligned, making a linear path mathematically impossible to calculate.	In the program, slightly adjust the orientation of the preceding point or change the motion type to 'Joint' for the problematic move.
Teach pendant displays a 'PROFINET Communication Failure' alarm.	The network cable is disconnected/ damaged, or there is a network configuration issue (e.g., IP conflict).	Check the physical cable connections at the robot controller and network switch. Verify the robot's IP settings with a network administrator.
Positioning is not accurate or repeatable.	The TCP definition is incorrect, the payload data is wrong, or the robot base has shifted.	Re-run the TCP teaching procedure. Verify the payload settings match the installed tool. Check that the base mounting bolts are secure.

Symptom	Possible Cause	Solution
A 'Motor Overload' fault occurs on a specific axis.	Payload exceeds the 25 kg limit, acceleration is set too high, or there is a mechanical binding in the joint.	Verify the payload weight. Reduce the acceleration parameter in the program. Move the axis manually to feel for any resistance or binding.
Robot will not move in manual mode.	An emergency stop is active, a safety fence is open, the deadman switch is not engaged, or motor power is off.	Check the status of all safety circuits on the teach pendant. Ensure the 'Motors On' button has been pressed and the deadman switch is held in its center position.
The robot drifts slightly after completing a move.	The motor brakes are worn or require adjustment.	Listen for a distinct 'click' when motors are de-energized, indicating brake engagement. If no sound is heard or drifting continues, schedule a service call for brake inspection.
Controller fan is excessively loud or not spinning.	The fan is failing or its air path is blocked by dust and debris.	Power down and lock out the controller. Clean the fan and heat sink fins with compressed air. If the fan does not spin on power-up, it must be replaced to prevent overheating.

7. Technical Specifications

Parameter	Value	Unit
Weight	285.0	kg
Material	Cast Aluminum Alloy	
Voltage	400-480VAC 3-Phase	
IP Rating	IP67 (Arm) / IP54 (Base)	
Country of Origin	JP	
Protocol	PROFINET	
Reach	1750 mm	
Payload	25 kg	
Axes	6	
Repeatability	±0.03 mm	