User Manual: NexBot Vision HA014-003 6-Axis Robot Arm 250kg Payload

SKU: NXB-ROB-HA014-003 | 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: RISK OF FATAL CRUSHING INJURY. Never enter the robot's operating envelope while power is enabled. Always engage safety fences and interlocks during automatic operation.

WARNING: HIGH VOLTAGE. The robot controller contains live 480VAC circuits. Disconnect and lock out main power before opening controller panels or performing any maintenance.

WARNING: UNEXPECTED MOTION. The robot may move unexpectedly during programming or recovery operations. Maintain a safe distance and always keep the teach pendant's emergency stop button accessible.

CAUTION: HEAVY PAYLOAD. Exceeding the 250 kg maximum payload can cause excessive wear, component failure, and

unpredictable robot behavior. Always verify workpiece weight and configure payload data correctly.

NOTICE: The NexBot Vision HA014-003 is rated IP67 but is not intended for submersion. Do not use high-pressure jets directly on joint seals or electrical connectors during cleaning.

2. Product Overview

The NexBot Vision HA014-003 is a powerful 6-axis articulated robot arm engineered for high-payload material handling, machine tending, and complex assembly applications. This robot is designed to operate in demanding industrial environments, providing a robust platform for tasks that require significant strength and reach without sacrificing precision. Its core feature is the substantial 250 kg payload capacity, which enables the handling of heavy workpieces such as engine blocks, large castings, and fully loaded pallets. The arm's rigid construction, featuring a cast iron base and high-strength steel alloys, minimizes deflection under heavy loads, ensuring consistent performance. This structural integrity is critical for achieving a position repeatability of ±0.07 mm, a specification that guarantees accuracy in applications like spot welding, precise part insertion, and CNC machine tending. The generous 3,100 mm horizontal reach provides an extensive work envelope, allowing the HA014-003 to service multiple stations, access large machinery, or stack materials across a wide area. With six axes of motion, the robot arm offers maximum dexterity, capable of orienting tools and parts at complex angles required for intricate assembly or processing tasks. The arm is protected with an IP67 rating, making it resilient to dust ingress and capable of withstanding temporary water immersion, ensuring reliability in harsh production settings. Internal routing of cables and air lines protects them from wear and snagging, simplifying installation and reducing maintenance downtime. The HA014-003 is an ideal solution for automating physically demanding and repetitive processes in the automotive, foundry, and logistics industries, improving both safety and operational efficiency.

3. Getting Started

1. System Power-Up Sequence

Before starting, ensure the main disconnect is switched on. Press the 'ON' button on the robot controller. The system will initialize, and the teach pendant will display the main status screen after the boot process is complete.

2. Understanding the Teach Pendant

The teach pendant is the primary human-machine interface. It features a color touchscreen for programming and status display, physical buttons for axis jogging, and a three-position enabling switch for safe manual operation. Familiarize yourself with the location of the emergency stop button.

3. Selecting an Operating Mode

The robot has three primary operating modes: T1 (Manual, Slow Speed), T2 (Manual, High Speed - requires special authorization), and AUTO

(Automatic Production). The mode is selected using a physical key switch on the controller for safety. For initial setup and programming, always use T1 mode.

4. Operation

Manual Jogging

To move the robot manually, select T1 mode and activate the enabling switch on the teach pendant. Use the jog keys to move the robot in different coordinate systems, such as JOINT, WORLD, or TOOL. This is essential for teaching points and clearing minor faults.

> **Tip:** For precise linear movements, use the WORLD or TOOL coordinate systems. For repositioning individual joints, use the JOINT coordinate system.

Defining a Tool Center Point (TCP)

The TCP defines the focal point of the attached end-of-arm tooling. Accurately defining the TCP is critical for path accuracy and positioning. Use the built-in wizards on the teach pendant to define the TCP using the multi-point method.

> **Tip:** A poorly defined TCP is a common source of positioning errors. Redefine the TCP whenever the end-of-arm tooling is changed or adjusted.

Setting Payload Data

The HA014-003 requires accurate payload data to optimize motion, prevent motor overload, and ensure safety. Enter the mass (up to 250 kg), center of gravity, and moments of inertia for the attached tooling and workpiece. The system has multiple payload schedules that can be selected by the program.

Loading and Executing a Program

Programs can be loaded from internal storage or a USB device. In AUTO mode, select the desired program from the teach pendant menu. After ensuring the work cell is clear, press the 'CYCLE START' button on the operator panel to begin execution.

> **Tip:** Always perform a dry run of a new or modified program at low speed before running at full production speed.

Fault Recovery

When a fault occurs, the robot will stop and an error message will be displayed on the teach pendant. Identify the cause using the troubleshooting guide, correct the issue, and press the 'RESET' button to clear the fault. You may need to manually jog the robot back to a safe home position.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm, cables, and controller for any signs of damage, leaks, or loose connections. Check the work area for debris.	This check should be performed by the operator at the start of each shift.
Weekly	Wipe down the robot arm and controller exterior. Check the teach pendant cable for wear or damage.	Use only approved cleaning agents that will not damage paint or seals.
Quarterly	Check the torque of the robot base mounting bolts to ensure they remain at the specified value.	Perform this check more frequently in high-vibration environments.
Annually (or 4000 hours)	Replace the grease in the gearboxes for Axes 1, 2, and 3. Collect and analyze a sample of the old grease for signs of premature wear.	Use only NexBot specified lubricant type. This task requires trained personnel.
Biennially (or 8000 hours)	Replace the grease in the gearboxes for Axes 4, 5, and 6.	This is a more involved procedure and may require partial disassembly of the wrist assembly.
Biennially	Replace the backup batteries in the robot controller and inside the robot base. This prevents the loss of system configuration and axis position data.	Batteries must be replaced while main power is applied to the controller to avoid data loss.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot fails to power on; controller fan is off.	No incoming 480VAC power or main E-Stop circuit is open.	Verify the main facility breaker is on. Check that all external E-Stop buttons connected to the safety circuit are released.
Alarm: 'PROFINET Communication Fault'	Ethernet cable is disconnected, damaged, or there	Check the physical cable connection at the controller and the network switch. Verify the robot's IP address

Symptom	Possible Cause	Solution
	is a network configuration issue.	settings and ensure the master PLC is online.
Alarm: 'Axis 2 Overtravel Limit'	The robot was jogged or programmed to move beyond its physical soft or hard limit.	In T1 mode, press and hold the 'FAULT RESET' button while jogging the affected axis back into its valid working range.
Alarm: 'Payload Data Invalid'	The selected payload schedule has not been configured or the values are out of range for the robot's capacity.	Navigate to the Payload Settings menu on the teach pendant and enter the correct mass and inertia properties for the current tooling and workpiece.
Robot motion is jerky or vibrates excessively.	Incorrect payload data, worn mechanical components, or poorly tuned motion parameters.	Verify payload data is accurate. If correct, inspect for mechanical looseness in the end-of-arm tooling. If the issue persists, contact NexBot technical support for advanced tuning.
Alarm: 'Motor Over-Temperature Axis 5'	The robot is operating continuously at high speed with maximum payload, or the motor cooling fan has failed.	Reduce the cycle speed or duty cycle. Allow the robot to cool down. Visually inspect the motor housing for obstructions preventing airflow.
Positioning accuracy is poor (greater than ±0.07 mm).	Robot requires mastering, the TCP is defined incorrectly, or the base mounting has become loose.	Perform the axis mastering procedure. Re-teach the TCP accurately. Check the torque on the main mounting bolts at the robot's base.
Teach pendant screen is blank but buttons are lit.	Pendant is in screen-saver mode, backlight has failed, or there is an internal fault.	Touch the screen to wake it. Cycle power to the robot controller. If the screen remains blank, the pendant may require service.

7. Technical Specifications

Parameter	Value	Unit
Weight	2300.0	kg
Material	Cast Iron and Aluminum Alloy	
Voltage	480VAC	
IP Rating	IP67	
Country of Origin	US	
Protocol	PROFINET	
Reach	3100 mm	
Payload	250 kg	
Axes	6	
Repeatability	±0.07 mm	