User Manual: NexBot Drives HA014-002 6-Axis Robot Arm 250kg Payload

SKU: NXB-ROB-HA014-002 | 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: HIGH VOLTAGE. The controller cabinet contains live 480VAC terminals. All access must be performed by qualified technicians after executing a full Lockout/Tagout procedure on the main power disconnect.

WARNING: The robot can move unexpectedly at high speed and with immense force. The defined work envelope must be secured with physical guarding and safety interlocks to prevent personnel entry during automatic operation.

WARNING: Never exceed the maximum payload of 250 kg. Overloading the arm can cause motor failure, excessive mechanical wear, and unpredictable, dangerous motion.

> **CAUTION:** During continuous, high-duty cycle operation, the robot's joint motors and gearboxes can reach high temperatures. Avoid direct skin contact with these surfaces.

> **NOTICE:** The IP67 rating is contingent on all covers, seals, and cable glands being correctly installed and tightened. Do not use high-pressure jets for cleaning, as this can force water past the seals.

2. Product Overview

NexBot Drives HA014-002 6-Axis Robot Arm 250kg Payload (NXB-ROB-HA014-002) is an industrial robot platform built for automated handling, machine tending, and repeatable production motion in manufacturing cells. Its product profile emphasizes the characteristics buyers expect from a robot rather than from a component: payload capacity, reach, axis coordination, motion repeatability, and controller-level integration into line equipment. The platform is suited to continuous-duty factory environments where predictable cycle performance, maintenance access, and installation planning all matter to engineering teams. It fits robotics programs that need a complete robot arm for deployment, expansion, or replacement within an existing automation footprint.

3. Getting Started

1. System Power-Up Sequence

First, ensure all emergency stop buttons are disengaged. Turn the main disconnect on the controller cabinet to the ON position, then press the power button. The system will initialize, and the teach pendant will display the main status screen.

2. Navigating the Teach Pendant

The teach pendant is the primary interface for manual control and programming. Use the touchscreen to navigate menus and the physical joystick and buttons to jog the robot in different coordinate systems (Joint, World, Tool).

3. Homing the Robot

Before running any program, the robot must be homed to establish a known reference position for its absolute encoders. This is typically done once after initial setup or after a battery replacement for the encoder memory.

4. Executing a Program

To run a program, select it from the program list on the teach pendant. Switch the mode selector to AUTO and ensure all safety interlocks are satisfied. Press the cycle start button on the operator panel to begin execution.

4. Operation

Manual Jogging and Positioning

In T1 (Teach) mode, use the coordinate system selection keys to choose the desired jogging frame. The 'World' frame moves the tool linearly along the X, Y, and Z axes of the cell, while the 'Joint' frame moves each of the 6 axes individually.

> **Tip:** For precise linear alignment with fixtures, use the 'Tool' coordinate system after you have defined an accurate Tool Center Point.

Defining Payload Schedules

Accurate motion depends on the controller understanding the mass it is moving. In the configuration menu, define payload schedules that include the mass (up to 250 kg), center of gravity, and moments of inertia for each tool and part combination.

Creating Motion Points

To create a program, jog the robot to a desired position and orientation. Press the 'Record Point' button on the teach pendant to save the coordinates. You can define the motion type (Joint, Linear, Circular) between points.

> **Tip:** Use Joint moves for large, non-critical transitions to save cycle time, and Linear moves for precise paths like approaching a part or fixture.

Working with Digital I/O

The robot can interact with external equipment using digital I/O signals. Program instructions like 'WAIT DI[1]=ON' can pause the robot until a sensor confirms a part is in place, while 'SET DO[4]=ON' can activate a gripper.

Using Offset and Frame Shifts

For applications with repeating patterns or slight variations in fixture location, use User Frames and Position Registers. This allows you to shift an entire program path without having to reteach every single point.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Inspect the robot arm and cables for any visible damage, leaks, or loose connections. Perform a functional check of all E-Stop buttons.	This check should be part of the operator's pre-shift startup procedure.
Weekly	Wipe down the robot arm to remove contaminants. Clean	Use only approved cleaning agents that

Interval	Task	Notes
	the cooling fan inlets and filters on the main controller cabinet.	do not degrade seals or paint.
Monthly	Create a full backup of all robot programs, system variables, and configuration settings.	Store backups on a secure network drive or external media.
Annually	Check the torque on all robot base mounting bolts and the end-of-arm tooling mounting bolts.	Follow the torque specifications in the service manual.
Every 4,000 Hours	Perform grease replenishment for Axes 1 through 6. Refer to the lubrication chart for grease type and quantity for each joint.	Over-greasing can damage seals; use a calibrated grease gun.
Every 3 Years	Replace the CPU battery inside the controller cabinet that maintains the absolute encoder positions during power-off.	The robot will require re-mastering/homing after this procedure.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot stops with a 'Collision Detected' alarm	The robot arm has physically hit an object, or the collision sensitivity is set too low for the current application's acceleration.	Carefully jog the robot away from the obstruction. If no collision occurred, adjust the collision detection sensitivity settings for that motion profile.
Positioning is inaccurate and drifts over time	The Tool Center Point (TCP) is not defined correctly, or the robot base has shifted.	Re-run the TCP calibration routine using a precision pointer. Verify the tightness and torque of the robot's base mounting bolts.
Teach Pendant is unresponsive or has a blank screen	The pendant cable is damaged or not fully connected, or the pendant itself has failed.	Power down the system. Inspect the pendant cable for cuts or bent pins and reseat the connector at the controller. If the problem persists, substitute with a known-good pendant.

Symptom	Possible Cause	Solution
EtherCAT communication error with peripheral equipment	A network cable is disconnected/ damaged, or there is an EtherCAT node configuration mismatch.	Check the status LEDs on the EtherCAT ports. Inspect all cables and connections between the controller and the failing device. Verify the ESI file for the device matches the hardware.
Robot cannot achieve programmed cycle time	Payload schedule is incorrect, causing the controller to limit acceleration, or motion paths are inefficient.	Verify that the active payload data accurately reflects the mass of the tool and part. Analyze the program for inefficient motion, such as using slow Linear moves where faster Joint moves would suffice.
Axis Overtravel Limit' alarm	A programmed point has commanded an axis to move beyond its physical hardware limit.	Check the program point that caused the fault. Modify the point or the robot's orientation to ensure all 6 axes remain within their software and hardware travel limits.
Motor Overheat' fault on a specific axis	The axis is under continuous high load, the payload is too heavy, or the axis brake is not fully disengaging.	Review the application to reduce the duty cycle or load on the affected axis. Perform a brake maintenance check. If the issue persists, the motor may require service.

7. Technical Specifications

Parameter	Value	Unit
Weight	2350.0	kg
Material	Cast Iron and Aluminum Alloy	
Voltage	480VAC	
IP Rating	IP67	
Country of Origin	CH	
Protocol	EtherCAT	
Reach	3,200 mm	

Parameter	Value	Unit
Payload	250 kg	
Axes	6	
Repeatability	±0.07 mm	