

# User Manual: NexBot Robotics HA014-005 6-Axis Robot Arm 250kg 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:** This robot operates with lethal 480VAC voltage. All electrical service must be performed by qualified personnel after a full lock-out/tag-out procedure. Failure to comply will result in death or serious injury.

**WARNING:** The robot can move at high speed and with great force. All personnel must remain outside of the guarded work cell during automatic operation. Never enter the robot's work envelope while it is enabled.

**WARNING:** Never exceed the maximum rated payload of 250 kg. Overloading the robot can cause component failure, unpredictable motion, and potential for ejected parts, leading to severe injury or equipment damage.

**CAUTION:** Robot motors and gearboxes become hot during operation. Avoid contact with these surfaces to prevent burns. Allow the system to cool before performing maintenance.

**NOTICE:** The HA014-005 has an IP67 rating. To maintain this rating, ensure all connector covers and access panels are securely fastened at all times. Failure to do so may result in damage from dust or water ingress.

## 2. Product Overview

The NexBot Robotics HA014-005 is a six-axis industrial robot arm designed for high-payload automation applications in demanding manufacturing environments. This robot provides a robust solution for tasks that require significant lifting capacity and a large work envelope, streamlining operations that are otherwise labor-intensive or ergonomically challenging. Its heavy-duty construction and powerful drive system deliver consistent performance under continuous operation. The key feature of the HA014-005 is its substantial 250 kg payload capacity, which enables the handling of heavy workpieces such as automotive components, large castings, or fully loaded pallets. This capability allows for the automation of heavy material transfer and machine tending for large CNCs. The robot arm also features an extensive horizontal reach of 3,100 mm, creating a vast, flexible work area. This extended reach is ideal for servicing multiple stations, stacking pallets to significant heights, or accessing points across large machinery, maximizing floor space utilization. Precision is maintained even at high speeds and full extension, with a position repeatability of  $\pm 0.07$  mm. This level of accuracy is critical for applications like spot welding, large-part assembly, and precise material placement, ensuring consistent product quality and minimizing waste. The six degrees of freedom provide the dexterity needed for complex tool manipulation and movement around obstacles within a crowded production cell. The arm's IP67-rated structure ensures it is fully protected against dust and water ingress, making it suitable for harsh conditions found in foundries, machining shops, and general manufacturing facilities. The internally routed cabling minimizes interference and wear, contributing to higher uptime and reduced maintenance. The standardized base mounting pattern simplifies integration into new or existing automation cells.

## 3. Getting Started

### 1. Power-On Sequence

To start the NexBot Robotics HA014-005, first ensure the main disconnect to the controller is switched on. Turn the key on the controller panel to the 'ON' position, then release any emergency stop buttons on the controller and teach pendant. The system will boot up and be ready for operation.

### 2. Navigating the Teach Pendant

The teach pendant is your primary interface for controlling the robot. Use the touchscreen for programming and configuration, the joystick for manual jogging, and the physical buttons for mode selection and motion control. Always keep the deadman switches engaged while jogging the robot.

### 3. Homing the Robot

Before starting any task, the robot must be homed to establish its precise position. This is typically done by running a pre-defined homing program or using a menu function on the teach pendant. Homing ensures that all programmed points are accurate relative to a known reference.

## 4. Operation

### Manual Robot Movement (Jogging)

In T1 (Teach) mode, you can manually move the robot using the teach pendant. Select from different coordinate systems such as JOINT for individual axis movement, or WORLD/TOOL for linear movement relative to the robot's base or the attached tool.

**Tip:** For precise linear alignment with fixtures, use the WORLD or USER coordinate systems instead of JOINT mode.

### Creating a Program

A program is a sequence of recorded points and instructions. To create a program, move the robot to a desired position, record the point, and select the motion type (e.g., linear, joint) to get to the next point. Instructions for activating grippers or waiting for signals are added between motion commands.

### Defining Payload and Tool Data

Accurately defining the mass, center of gravity, and inertia of your End-of-Arm Tooling (EOAT) is critical for performance. Use the payload setup menu to enter these values for your specific tool, up to the 250 kg limit. Incorrect settings can cause vibration, slow cycle times, and excessive wear.

**Tip:** Use the built-in payload identification function to automatically estimate the properties of a complex or unknown payload.

### PROFINET I/O Configuration

The HA014-005 communicates with external devices using the PROFINET protocol. In the I/O configuration screen, you can map digital and analog signals to control grippers, receive inputs from sensors, or synchronize actions with a master PLC. Ensure the GSDML file is correctly installed in your engineering station.

### Running in Automatic Mode

Once a program is tested and ready for production, switch the controller key to 'AUTO' mode. After ensuring the safety cell is clear of personnel and all gates are closed, the program can be initiated from the PLC or an operator panel. The robot will then execute the programmed task at full production speed.

## 5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm, cables, and connectors for any signs of physical damage, wear, or fluid leaks.	Pay close attention to the cable dress pack for chafing or abrasion.
Weekly	Test all emergency stop buttons and safety interlocks (e.g., light curtains, gate switches) to ensure they function correctly.	A documented safety check is recommended.

Interval	Task	Notes
Quarterly	Clean or replace the air filters for the main controller cabinet to ensure proper cooling of electronics.	In dusty environments, this interval should be shortened to monthly.
Annually	Check the torque of the main base mounting bolts and the J6 tool flange bolts. Re-torque if necessary.	Use a calibrated torque wrench to the specifications in the service manual.
Annually / 4000 Hours	Lubricate all specified grease points on the robot arm axes. Use only NexBot-approved grease.	Over-greasing can damage seals; follow the recommended procedure.
Every 2 Years	Replace the absolute encoder backup batteries located in the robot base. This prevents the loss of mastering data.	The robot must be re-mastered if battery power is lost.

## 6. Troubleshooting

Symptom	Possible Cause	Solution
Robot stops with a 'Collision Detected' alarm.	The robot arm has physically impacted an object, or the collision sensitivity is set too low for the current operation.	Inspect the robot and work area for the point of collision. If no collision occurred, adjust the collision detection sensitivity settings for that specific motion.
Teach pendant screen is blank but controller has power.	The teach pendant cable is loose, damaged, or the pendant itself has failed.	Power down the controller. Reseat the teach pendant cable at both ends. Inspect the cable for damage and replace if necessary.
Robot is unable to reach a programmed point.	The point is outside the robot's work envelope, or a soft limit is configured that restricts movement.	Manually jog the robot towards the point to verify it is reachable. Check and adjust the axis soft limit parameters in the configuration menu.
PROFINET communication fault.	Network cable is disconnected, damaged, or there is an IP address or device name conflict on the network.	Verify the physical cable connection and status LEDs on the controller's network port. Use a diagnostic tool to check for network conflicts and confirm the robot's configuration matches the PLC project.
Poor repeatability (robot does not return to the same point accurately).	The attached tool (EOAT) is loose, the payload data is incorrect, or the robot	Verify all mounting bolts on the J6 flange are tight. Re-run the payload identification routine. If the problem persists, perform a

Symptom	Possible Cause	Solution
	requires mastering calibration.	full robot mastering procedure.
Robot loses its position (mastering) after controller is powered off.	The encoder backup batteries are dead or failing.	Power down and lock out the system. Replace the batteries in the robot base, then power on and perform the mastering procedure for all six axes.
Axis motor overheats and faults.	Payload is too high, acceleration is too aggressive, or the brakes on the axis are not fully disengaging.	Verify the defined payload does not exceed 250 kg. Reduce the acceleration parameters in the program. Listen for brake release sounds and inspect brake power circuit if necessary.

## 7. Technical Specifications

Parameter	Value	Unit
Weight	2350.0	kg
Material	Cast Iron and Aluminum Alloy	
Voltage	480VAC	
IP Rating	IP67	
Country of Origin	IT	
Protocol	PROFINET	
Reach	3100 mm	
Payload	250 kg	
Axes	6	
Repeatability	±0.07 mm	