User Manual: NexBot R-20 Articulated Robot, 50kg

SKU: NXB-ROB-R20-050-A | 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: Never enter the robot's work envelope while power is on. Unexpected motion can cause fatal or severe injury.

WARNING: All electrical installation and service must be performed by qualified personnel only after disconnecting and locking out the main power supply. The controller contains hazardous voltages up to 480VAC.

WARNING: The robot must be securely anchored to a foundation capable of withstanding its 1180.0 kg weight and all dynamic operational forces. Failure to do so can result in the robot tipping over.

CAUTION: Robot gearboxes and motors can reach high temperatures during operation. Allow the robot to cool before performing maintenance to avoid risk of burns.

NOTICE: The IP67 rating applies to the robot arm only. The robot controller must be installed in a clean, dry environment protected from liquids and corrosive materials.

2. Product Overview

NexBot R-20 Articulated Robot, 50kg (NXB-ROB-R20-050-A) 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 Components

The NexBot R-20 system includes the 6-axis articulated robot arm (SKU: NXB-ROB-R20-050-A), the system controller cabinet, and the handheld teach pendant. The controller houses the power and logic components, while the teach pendant is the primary human-machine interface.

2. Power-On Procedure

Ensure the main breaker on the controller is in the ON position. Press the 'POWER ON' button on the controller's operator panel. The system will boot, and after a brief self-test, the main menu will be displayed on the teach pendant.

3. Understanding Operating Modes

The robot operates in two primary modes selected by a key switch: T1 (Teach) and AUTO (Automatic). T1 mode enables low-speed manual movement for programming and setup. AUTO mode is for full-speed production execution and requires all safety circuits to be active.

4. Operation

Manual Jogging

In T1 mode, enable the drives and hold the deadman switch on the teach pendant. Use the joystick or axis-specific buttons to move the robot. You can switch between JOINT, WORLD, and TOOL coordinate systems for intuitive positioning.

Tip: Use the WORLD coordinate system for simple linear movements along the X, Y, and Z axes of the cell.

Creating a Program

A program consists of a sequence of motion and logic instructions. To create a new program, manually jog the robot to a desired location, then use the 'Record Point' function on the teach pendant to save the coordinates. Add motion instructions (Linear, Joint, Circular) to define the path between points.

Configuring End-of-Arm Tooling (EOAT)

To ensure accurate motion, you must define the weight, center of gravity, and Tool Center Point (TCP) of any installed gripper or tool. The system provides guided setup wizards to simplify this process. An incorrect payload or TCP will result in poor performance and potential motor overloads.

> **Tip:** Re-run the TCP calibration wizard anytime the end-of-arm tool is modified or replaced.

Integrating with a PLC

The NexBot R-20 uses PROFINET for high-speed communication with a master PLC. The PLC can start/stop robot programs, monitor robot status, and exchange production data by reading and writing to predefined registers in the robot controller. Ensure the GSDML file is correctly installed in your PLC engineering software.

Running in Automatic Mode

Select the desired program on the teach pendant. Ensure all personnel are outside the safety-fenced area and all access gates are closed. Switch the mode selector to AUTO, then initiate the production cycle using a signal from the PLC or the 'CYCLE START' button on the operator panel.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect robot arm, cables, and controller for any signs of damage, fluid leaks, or loose connections. Check for any active fault messages on the teach pendant.	This check should be part of the operator's pre-shift startup procedure.
Weekly	Test the functionality of all E-stop buttons and safety interlocks (e.g., gate switches). Wipe down the robot arm and controller exterior with a clean, dry cloth.	Log all safety checks in the facility maintenance log.
Monthly	Inspect and clean the air intake filters on the controller cabinet. A clogged	Filter replacement may be needed more

Interval	Task	Notes
	filter can lead to overheating.	frequently in dusty environments.
Annually	Check the torque of the robot's base mounting bolts. Replace the backup batteries inside the robot controller to prevent loss of programs and calibration data.	Battery replacement should be performed by a qualified technician with the main power off.
Every 10,000 Hours	Perform a re-greasing of all robot joints according to the service manual procedures. Inspect the main umbilical cable for signs of wear or abrasion.	Use only the NexBot-specified grease to ensure proper gearbox performance.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot fails to power on; no lights on controller.	No incoming 3-phase power or main breaker is tripped.	Verify that the 400-480VAC supply is active. Check and reset the main circuit breaker on the controller and at the facility panel.
Teach pendant displays 'E-Stop Active' fault.	An emergency stop button is pressed on the pendant, controller, or external safety circuit.	Locate the active E-stop button, twist to release it, and then press the 'RESET' button on the controller.
Robot moves inaccurately or does not reach the programmed point.	The Tool Center Point (TCP) is not calibrated correctly, or the payload data is wrong.	Verify the correct tool and payload data are active. Re-run the TCP calibration procedure.
Controller displays 'Axis Overtravel' alarm.	A robot axis has moved beyond its defined software limits.	In T1 mode, press the 'FAULT RESET' button. Select the correct axis and jog it in the opposite direction until it is back within its working range.
PROFINET communication failure with PLC.	Network cable disconnected, incorrect IP address, or device name mismatch.	Check the physical network cable at both ends. Verify the robot's network settings match the configuration in the PLC project.

Symptom	Possible Cause	Solution
Program execution is jerky and not smooth.	Motion termination type is set incorrectly (e.g., fine instead of continuous) or payload is not properly defined.	Review the program and change motion types to 'CNT' for smooth blending between points. Verify payload mass and center of gravity are correctly entered.
Robot loses mastering/ calibration after extended shutdown.	Controller backup batteries are depleted.	Schedule a service visit from a qualified technician to replace the batteries and re-master the robot's encoders.

7. Technical Specifications

Parameter	Value	Unit
Weight	1180.0	kg
Material	Cast Aluminum Alloy	
Voltage	400-480VAC 3-Phase	
IP Rating	IP67	
Country of Origin	US	
Protocol	PROFINET	