User Manual: NexBot Safety FLR022-008 Collaborative Robot Arm 10kg Payload

SKU: NXB-ROB-FLR022-008 | 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: This equipment operates on 48VDC at high current. Contact with energized terminals can cause severe electrical shock or burns. Always disconnect and lock out power before servicing.

WARNING: The robot can move unexpectedly during programming or automatic operation, creating a crushing and impact hazard. Maintain a safe distance and remain aware of the robot's entire 1300 mm reach envelope at all times.

WARNING: Never exceed the maximum rated payload of 10 kg. Overloading the robot can lead to component failure, unpredictable motion, and potential injury.

CAUTION: The robot's collaborative safety features are designed to mitigate risk but do not eliminate it. A thorough risk assessment must be performed for every application.

NOTICE: The NexBot Safety FLR022-008 has an IP54 rating. It is protected from dust ingress and water spray from any direction, but it is not suitable for high-pressure washdowns or submersion.

2. Product Overview

The NexBot Safety FLR022-008 is a versatile 6-axis collaborative robot arm engineered for seamless integration into a wide range of industrial applications. This cobot is designed to work alongside human operators without the need for traditional safety caging, enhancing productivity and operational flexibility. Its core design principle is safety, incorporating advanced force and torque sensing on all joints to ensure immediate and safe stops upon contact. Key to its performance is a substantial 10 kg payload capacity, which allows the robot to handle a variety of parts, tools, and end-effectors for tasks that are too strenuous or repetitive for manual labor. This capability makes it an ideal solution for automating processes like machine tending, complex assembly, and high-throughput pick-and-place operations. The arm's impressive 1300 mm reach provides a large work envelope, enabling it to service multiple machines or cover extensive assembly areas from a fixed position. Precision is paramount in modern manufacturing, and the FLR022-008 delivers with an exceptional position repeatability of ±0.03 mm. This high degree of accuracy ensures that tasks are performed consistently cycle after cycle, which is critical for quality control, inspection, and delicate material handling. The robot's intuitive programming interface simplifies deployment, reducing the time and technical expertise required to set up and modify automation workflows. The robust construction and use of high-quality components ensure reliable performance and durability in demanding industrial environments. By deploying this collaborative robot, facilities can reallocate skilled labor to more value-added tasks, improve workplace ergonomics, and achieve consistent production output.

3. Getting Started

1. Understanding Collaborative Operation

The NexBot Safety FLR022-008 is a collaborative robot, or 'cobot', designed to work with or near human operators. Its 6 axes are equipped with force and torque sensors that detect contact, causing the robot to enter a safe stop. This allows for operation without traditional hard guarding after a proper risk assessment.

2. Powering On and Homing

To begin, ensure the emergency stop is released and press the power button on the controller. Once the system boots, the teach pendant will prompt you to 'Brake Release and Home'. Press and hold the enabling switch on the back of the pendant and follow the on-screen instructions to initialize all axes.

3. Navigating the Teach Pendant

The teach pendant is your primary interface for programming and operating the robot. Use the touchscreen to navigate between menus for program creation, I/O configuration, and system diagnostics. The physical joystick allows for precise manual movement (jogging) of the robot arm.

4. Using Freedrive Mode

Freedrive mode allows you to teach the robot positions by physically grabbing and guiding the arm. To activate it, press and hold the Freedrive button located on the tool flange. The brakes will release, allowing you to move the arm to a desired position and save it as a waypoint in your program.

4. Operation

Creating a Simple Program

To create a program, navigate to the Program Editor and select 'New Program'. Use a combination of Freedrive and jogging to move the robot to various waypoints, adding 'Move' commands for each position. Logic commands, such as 'Wait' or 'Set I/O', can be added from the command tree to build a complete sequence.

Configuring the Tool Center Point (TCP)

An accurate TCP configuration is critical for precise operation, especially for circular or tool-oriented movements. The system provides a wizard that guides you through a multi-point teaching process to automatically calculate the TCP's position and orientation relative to the tool flange.

> **Tip:** For non-symmetrical tools, use the 6-point TCP teaching method for the highest accuracy.

Setting Safety Boundaries

The safety configuration menu allows you to define virtual planes that the robot cannot cross, protecting nearby equipment or operators. You can also define zones where the robot's speed is automatically limited, enhancing safety during human-robot interaction.

Managing Payload Settings

Always set the correct payload mass and center of gravity in the system settings. This information is crucial for the robot's dynamic model, ensuring smooth motion and accurate force sensing for collaborative stops. Incorrect settings can lead to excessive vibration or nuisance safety stops.

Integrating with PROFINET

The NexBot Safety FLR022-008 acts as a PROFINET I/O device. After configuring its IP address and device name, you can integrate it into your PLC project using the provided GSD file. This allows the PLC to start/stop programs, monitor status, and exchange I/O data with the robot.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the robot arm and cables for any signs of wear, damage, or fluid leaks. Ensure the work area is free of debris.	This check should be performed by the operator before starting the first shift.
Weekly	Clean the robot's surfaces using a soft, lint-free cloth lightly dampened with isopropyl alcohol. Do not spray liquids directly onto the robot.	Ensure the robot is powered down before cleaning.
Monthly	Test all emergency stop buttons and the collaborative safety stop function by carefully making contact	Document the successful completion of this safety function test.

Interval	Task	Notes
	with the arm while it is moving slowly.	
Quarterly	Check the torque of the base mounting bolts to ensure they have not loosened due to vibration.	Refer to the installation guide for the correct torque specification.
Annually	Inspect the seals on each of the 6 axes for signs of cracking, tearing, or degradation. Check for excessive grease leakage.	Contact NexBot support if seal damage is found.
Annually	Create a full backup of the robot's system software, programs, and configuration settings onto a USB drive.	Store the backup in a secure location.
As Needed	Check the NexBot Robotics support portal for any firmware updates. Follow the provided instructions to install updates.	Firmware updates can provide new features and improve performance.

6. Troubleshooting

Symptom	Possible Cause	Solution
Robot fails to power on; no lights on controller.	No incoming 48VDC power or main fuse is blown.	Verify the 48VDC power source is active using a multimeter. Check and replace the main fuse in the controller if necessary.
Protective Stop: Joint Collision Detected	The robot's arm has made contact with an object or the force sensing is too sensitive.	Check the robot's path for obstructions. If no collision occurred, increase the collision detection threshold slightly in the safety settings.
Robot position is not accurate or repeatable.	TCP or payload settings are incorrect, or the robot base is loose.	Re-run the TCP and Payload configuration wizards. Verify the torque of the base mounting bolts.
PROFINET communication error.	Network cable is disconnected/ damaged, or IP address conflict exists.	Inspect the PROFINET cable and its connections. Ensure the robot's IP address is unique on the network and matches the PLC project configuration.
Teach pendant screen is frozen or unresponsive.	A software fault has occurred or the pendant cable is loose.	Perform a controlled reboot of the robot controller. If the problem persists, check the physical connection of the pendant cable at both ends.
	The program is attempting to align	Modify the waypoint to introduce a slight angle or

Symptom	Possible Cause	Solution
Singularity Error: Cannot maintain tool orientation.	Axis 1 and Axis 6, which can cause unpredictable joint speeds.	use a 'MoveJ' command instead of 'MoveL' to pass through the singularity zone.
Robot cannot reach a programmed waypoint.	The target waypoint is outside the robot's 1300 mm reach envelope.	Jog the robot manually to the desired position. If it cannot reach, the waypoint must be moved closer to the robot base.

7. Technical Specifications

Parameter	Value	Unit
Weight	32.5	kg
Material	Cast Aluminum	
Voltage	48VDC	
IP Rating	IP54	
Country of Origin	US	
Protocol	PROFINET	
Reach	1300 mm	
Payload	10 kg	
Axes	6	
Repeatability	±0.03 mm	