

User Manual: NexBot Vision 643-011 Linear Rail Track (3m)

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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 system operates on 480VAC. Contact with energized components will cause electrocution and death. Disconnect, lock, and tag all power sources before performing any service.

WARNING: The moving track and robot create a high-risk crush and impact zone. All personnel must remain outside of the designated work cell during operation unless specific safety procedures are followed.

WARNING: Never exceed the maximum rated payload of 1200 kg (including robot, tooling, and workpiece). Overloading can cause component failure and unpredictable, hazardous motion.

CAUTION: Keep hands, tools, and clothing away from the rail, pinion gear, and cable carrier during movement to prevent pinch and entanglement injuries.

NOTICE: The system's IP54 rating provides protection from dust and splashing water only. Do not use high-pressure washers for cleaning or expose the system to flooding.

2. Product Overview

The NexBot Vision 643-011 Linear Rail Track is a high-precision ground transport axis designed to significantly expand the operational range of compatible NexBot industrial robots. By providing a robust and accurate seventh axis of motion, this track enables applications such as machine tending across multiple CNCs, palletizing over large areas, and performing long-seam welding or inspection tasks that would otherwise require multiple robot stations or a much larger, fixed-base robot. Constructed with a hardened steel, V-guide rail system on a rigid structural steel base, the 643-011 ensures exceptional straightness and durability under demanding industrial conditions. Its design minimizes deflection and vibration, which is critical for maintaining tool-point accuracy throughout its travel. The system achieves a position repeatability of ± 0.05 mm, allowing for precise and consistent operations even at the extents of its range. With a maximum travel speed of 2.5 m/s, it facilitates rapid transit between workstations, minimizing non-productive time and optimizing cycle times. The track is engineered to support a total dynamic load of up to 1200 kg, accommodating a wide range of NexBot robots, end-of-arm tooling, and heavy workpieces. Its modular design allows for multiple 3-meter sections to be joined seamlessly, providing customizable travel lengths to suit specific facility layouts. An integrated, heavy-duty cable carrier runs the length of the track, protecting robot cables and pneumatic lines from wear, entanglement, and environmental hazards, thereby increasing system reliability and reducing maintenance. Installation is streamlined with precision-machined mounting surfaces and alignment features for straightforward integration into new or existing automation cells.

3. Getting Started

1. System Overview

The NexBot Vision 643-011 is a high-payload, servo-controlled linear track that functions as a 7th axis for your robot. It integrates seamlessly via the EtherCAT protocol, allowing for fully coordinated motion between the robot and the track for complex, large-scale automation tasks.

2. Controller Configuration

Before operation, the track must be configured as an external axis in the NexBot controller software. Use the provided Electronic Data Sheet (EDS) file to add the axis, define its kinematic properties (e.g., travel distance, gear ratios), and map its I/O signals.

3. Powering On and Homing

After a successful installation and configuration, power on the system. The robot controller will establish communication with the track's drive. The first required action is to perform a homing procedure to establish a known machine zero position for accurate positioning.

4. Operation

Manual Jogging

Using the robot teach pendant, you can select the linear track as the active motion group. This allows you to manually jog the robot along the 3-meter rail to test motion, verify clearances, and teach points for a program.

Tip: Always start manual jogging at a low speed override (e.g., 10%) to safely verify the intended direction and path.

Programming Linear Moves

In your robot program, you can command the track using absolute or relative position commands. This is ideal for applications like moving between multiple workstations or palletizing stations arranged in a line.

Coordinated Motion Programming

For tasks like long-seam welding or applying sealant, program the track and robot to move simultaneously. The controller's path planner will synchronize the motion of all 7 axes to maintain a constant tool center point (TCP) speed and orientation relative to the workpiece.

Tip: Using a coordinated linear motion type simplifies programming, as you only need to define the start and end points of the path.

Work Zones and Interference Areas

Define software-based work zones to restrict the track's movement, preventing collisions with fixed equipment or infrastructure within the cell. These safety-rated zones can dynamically enable or disable robot operation based on the track's position.

Payload Schedule Management

Ensure the correct payload schedule is active in the controller. This data, which includes the mass and inertia of the robot and end-of-arm-tooling, is critical for the track's servo drive to optimize motion performance and prevent motor overload faults.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the rail and gear rack for any debris, fluid leaks, or physical damage. Confirm the cable carrier is moving freely.	This is a pre-shift check to be performed by the cell operator.
Weekly	Wipe down the hardened steel rail guides with a clean, dry, lint-free cloth to remove accumulated dust and grime.	Do not use corrosive solvents.
Monthly	Check the tension and physical condition of the main drive belt. Listen	

Interval	Task	Notes
	for any abnormal noises during a slow-speed test run.	Refer to the service manual for correct belt tensioning procedure.
Quarterly	Lubricate the linear bearing blocks using a grease gun with the NexBot-specified lubricant (Type LG-2). Apply grease via the zerk fittings until a small amount purges from the seals.	Over-greasing can increase friction and attract contaminants.
Annually	Perform a torque check on all accessible critical fasteners, including the robot mounting bolts, carriage bolts, and motor mount bolts.	This must be done by a trained technician with a calibrated torque wrench.
Annually	Test the functionality of the physical over-travel limit switches at both ends of the track to ensure they stop motion as intended.	This is a critical safety verification task.

6. Troubleshooting

Symptom	Possible Cause	Solution
Track produces a loud humming or grinding noise	Mechanical obstruction on the rail, worn gear rack or pinion, or failing bearing block.	Power down and inspect the full travel path for debris. Check the gear teeth for abnormal wear. Manually move the carriage to feel for rough spots indicating bearing failure.
Positioning is inaccurate or fails repeatability tests	Loose motor encoder connection, slipping drive belt, or loose robot/carriage mounting bolts.	Check that the encoder cable is secure at both ends. Verify drive belt tension. Re-torque all structural fasteners to their specified values.
Controller reports 'Axis Overtravel Fault'	The robot program commanded a move beyond the configured software limits, or a hardware limit switch was triggered.	Review the robot program to find the erroneous move command. If a hardware limit was hit, inspect for a physical crash or misaligned switch.
Controller reports 'EtherCAT Communication Fault'	The EtherCAT cable is damaged, disconnected, or there is a network configuration error.	Inspect the entire length of the EtherCAT cable for damage. Reseat the connectors at the controller and the track's control box. Verify network settings in the controller.
The track will not move, and the	An emergency stop circuit is active, a safety	Clear all E-stop conditions and ensure all

Symptom	Possible Cause	Solution
controller shows a 'Drive Disabled' status	gate is open, or the drives have not been manually enabled.	safety interlocks are satisfied. Use the teach pendant to enable the servo drives.
Motor Over-Temperature Fault	The motor's cooling fan is obstructed, acceleration/ deceleration parameters are too aggressive for the payload, or duty cycle is too high.	Ensure the motor's fan is clean and has proper airflow. Reduce acceleration values in the motion profile. If the issue persists, review the application's duty cycle.
Track judders or stutters at low speeds	Poor servo tuning parameters for the specific mounted payload, or mechanical binding.	Run the auto-tuning function in the controller software to optimize servo gains for the current payload. If stuttering persists, check for mechanical binding issues.

7. Technical Specifications

Parameter	Value	Unit
Weight	450.0	kg
Material	Hardened Steel Rail on Structural Steel Base	
Voltage	480VAC	
IP Rating	IP54	
Country of Origin	CH	
Protocol	EtherCAT	
Dimensions	3000 x 550 x 220 mm	
Payload	1200 kg	
Axes	1	
Repeatability	±0.05 mm	