

User Manual: NexBot Drives ELC412-014 Electric Gripper

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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: RISK OF ELECTRIC SHOCK. Disconnect and lock out power before servicing. The device operates on 24VDC, which can be hazardous if handled improperly.

WARNING: PINCH HAZARD. Keep hands, clothing, and tools clear of the gripper jaws during operation. Unexpected movement can cause serious crushing injuries.

WARNING: UNEXPECTED MOVEMENT. The gripper may move unexpectedly upon power-up or during program execution. Ensure the robot cell is clear of personnel before operating.

CAUTION: Do not exceed the specified maximum gripping force or payload. Overloading the gripper can cause permanent damage to the internal mechanism and the robot.

NOTICE: The NexBot Drives ELC412-014 is rated to IP54. Do not expose the gripper to high-pressure jets of water or submerge it, as this will damage the electronics.

2. Product Overview

The NexBot Drives ELC412-014 is a parallel electric gripper designed for precision handling and assembly applications in automated environments. This end-of-arm tool eliminates the need for compressed air infrastructure, offering a quieter, cleaner, and more energy-efficient alternative to pneumatic grippers. Its integrated design provides precise control over gripping force, speed, and jaw position, enabling the secure and delicate handling of a wide variety of parts. Key features include a programmable gripping force up to 120 N and a total stroke of 14 mm, allowing for significant operational flexibility. The gripper achieves a high position repeatability of ± 0.02 mm, which is critical for tasks requiring consistent placement, such as electronics assembly or machine tending of small components. The self-locking mechanism ensures that the workpiece is held securely even in the event of a power loss, enhancing operational safety and preventing dropped parts. Communication and control are managed via a standard IO-Link interface, simplifying integration with the robot system and providing diagnostic feedback. Typical applications for the ELC412-014 electric gripper include pick-and-place operations, sorting, kitting, and light-duty assembly. Its compact and lightweight construction minimizes the impact on the robot's overall payload capacity, making it suitable for both collaborative and smaller industrial robot arms. The gripper features a standardized mounting flange for straightforward installation onto the robot wrist. The robust, enclosed design protects internal components from industrial contaminants, ensuring reliable performance and a long service life with minimal maintenance requirements.

3. Getting Started

1. Product Overview

The NexBot Drives ELC412-014 is a high-precision parallel electric gripper for automated applications. It uses a 24VDC motor and communicates via the IO-Link protocol, providing detailed control over jaw position, speed, and force, as well as rich diagnostic feedback.

2. Understanding the IO-Link Interface

IO-Link allows for point-to-point communication between the gripper and an IO-Link master. Process data provides real-time position and status, while parameter data (acyclic) is used for configuration, such as setting the maximum gripping force and speed.

3. Initial Configuration

After installing the IODD file, you can access the gripper's parameters through your PLC or robot control software. Key initial settings include defining the gripper's operating mode (e.g., basic open/close, position mode), setting the maximum current (force), and configuring the jaw travel limits.

4. Operation

Controlling Jaw Position

The gripper's primary advantage is precise position control. You can command the jaws to move to any position within their stroke with a repeatability of ± 0.02 mm, allowing for the handling of various part sizes without mechanical changes.

Tip: Use the position feedback data to verify that a part has been successfully gripped and to measure part dimensions.

Setting Gripping Force

Gripping force is controlled by limiting the motor current via an IO-Link parameter. This allows you to apply a delicate touch for fragile components or a firm grip for heavy objects, all adjustable on-the-fly from the control program.

Tip: Start with a low force setting and gradually increase it to the minimum required to securely hold the part. This saves energy and reduces wear.

Adjusting Speed

The opening and closing speed of the jaws is also configurable. Slower speeds can be used for delicate or precise operations, while higher speeds can reduce cycle times in pick-and-place applications.

Part Detection and Confirmation

The gripper can intrinsically detect if a part is present. By commanding a close to a position inside the part and monitoring the position feedback, you can confirm a successful grip when the jaws stop moving before reaching the commanded endpoint.

Reading Diagnostic Data

The ELC412-014 provides diagnostic information over IO-Link, such as internal temperature, cycle count, and voltage levels. Monitoring this data can help predict maintenance needs and troubleshoot system faults before they cause downtime.

Tip: Set alarms in your PLC for temperature or voltage warnings to enable proactive maintenance.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Perform a visual inspection of the gripper, fingers, and cabling. Check for any loose fasteners or visible signs of damage.	This should be part of the operator's pre-shift checklist.
Weekly	Clean the exterior of the gripper's anodized aluminum housing with a soft, dry cloth. Remove any accumulated dust or debris.	Do not use solvents or harsh cleaning agents. For stubborn grime, use a cloth lightly dampened with isopropyl alcohol.
Monthly	Inspect the full length of the power and communication cable for signs of abrasion, pinching, or cracking, especially near robot joints.	Pay close attention to areas where the cable flexes repeatedly.
Quarterly		

Interval	Task	Notes
	Verify the torque of the gripper's main mounting bolts. Refer to the robot manufacturer's specifications for the correct torque value.	Perform this check with the robot de-energized and locked out.
Annually / 2,000,000 Cycles	Re-lubricate the internal drive mechanism. This task requires partial disassembly and should be performed by a trained technician.	Use only the NexBot-specified lubricant (Part # NXB-LUBE-G04).
As Needed	Check the NexBot Robotics support website for any firmware updates for the ELC412-014. Updates may provide new features or performance improvements.	Firmware updates are performed via the IO-Link interface using a configuration tool.

6. Troubleshooting

Symptom	Possible Cause	Solution
Gripper is unresponsive; no movement.	Loss of 24VDC power, faulty cable, or no communication from the IO-Link master.	Verify 24VDC is present at the connector. Check the M12 cable for damage and ensure it is securely connected at both ends. Check IO-Link master for port faults.
Gripper has weak or inconsistent gripping force.	The gripping force parameter (motor current) is set too low in the controller, or the mechanical drive is binding.	Increase the force parameter in the PLC program. If the issue persists, inspect the mechanism for debris or damage.
IO-Link communication fault is active.	Incorrect IODD file loaded, baud rate mismatch, or a damaged cable/connector.	Ensure the correct IODD file for the ELC412-014 is being used. Cycle power to the gripper and IO-Link master. Replace the cable if damage is suspected.
Jaws stutter or move erratically.	Debris is present in the drive mechanism, or custom fingers are misaligned, causing binding.	Power down and clean the gripper jaws and drive guides. Verify that custom fingers are correctly aligned and securely fastened.
Gripper reports a position error or stall fault.	The gripper was commanded to a position outside its physical limits, or it was blocked by an unexpected obstacle.	Review the motion program to ensure all position commands are within the gripper's stroke. Check the work area for obstructions.

Symptom	Possible Cause	Solution
Gripper feels excessively hot to the touch.	Operating at a duty cycle that is too high, or the ambient temperature exceeds the rated limit.	Reduce the cycle rate of the application if possible. Ensure proper airflow around the gripper and verify the ambient temperature is within the operating range.
Position feedback is not accurate.	The gripper's zero position has not been calibrated, or there is significant mechanical backlash due to wear.	Perform the homing or zeroing routine as described in the advanced manual. If the issue persists after homing, contact NexBot technical support.

7. Technical Specifications

Parameter	Value	Unit
Weight	1.6	kg
Material	Anodized Aluminum 6061-T6	
Voltage	24VDC	
IP Rating	IP54	
Country of Origin	KR	
Protocol	IO-Link	
Dimensions	160 x 95 x 50 mm	
Repeatability	±0.02 mm	
Torque	14 Nm	