

User Manual: NexBot Robotics ELC412-004 Electric Gripper 120N

SKU: NXB-GEN-ELC412-004 | 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: CRUSHING HAZARD. Keep hands and all body parts clear of the gripper jaws during operation. The mechanism can move without warning, causing severe personal injury.

WARNING: Disconnect and lockout all 24VDC power before performing any service, maintenance, or adjustments. Contact with energized circuits can cause electric shock.

WARNING: Do not operate the gripper if the housing or electrical cable is damaged. A compromised housing could expose internal moving parts or electrical components.

CAUTION: The gripper housing can become hot during continuous operation. Allow the unit to cool down before handling to avoid minor burns.

NOTICE: This device is rated IP54, protecting it from dust and water spray. Do not submerge the gripper or expose it to high-pressure jets, as this will damage internal electronics.

2. Product Overview

The NexBot Robotics ELC412-004 is a versatile two-finger parallel electric gripper engineered for precision handling and assembly tasks in automated industrial environments. This end-of-arm tool provides reliable performance for applications requiring consistent force and position control, such as electronics manufacturing, CNC machine tending, and packaging. Key features include a fully programmable gripping force, adjustable from 5 N up to a maximum of 120 N, allowing for the secure handling of both delicate and robust components without causing damage. The gripper's stroke is 12 mm per finger, providing flexibility for a range of part sizes. Its design incorporates high-resolution position feedback and onboard motion control, which simplifies system integration and eliminates the need for external management hardware. With a positioning repeatability of ± 0.02 mm, the ELC412-004 ensures that parts are placed accurately every cycle, contributing to higher production quality and reduced scrap rates. Communication is streamlined via an integrated IO-Link interface, enabling real-time diagnostics, parameter adjustments, and seamless connection to the main robot system. This smart communication protocol provides valuable data on grip status, position, and operating temperature, facilitating predictive maintenance and process optimization. The gripper's housing is constructed from durable, hard-anodized aluminum, and it carries an IP54 rating, making it suitable for deployment in environments with moderate exposure to dust and moisture. Installation is straightforward, utilizing a standard ISO 9409-1-50-4-M6 mounting pattern for direct attachment to compatible NexBot Robotics arm models.

3. Getting Started

1. Unpacking and Initial Inspection

Carefully remove the NexBot Robotics ELC412-004 from its protective packaging. Inspect the anodized aluminum body and M12 connector for any signs of physical damage that may have occurred during shipping. Verify the model number on the device label matches your order.

2. IO-Link Device Description (IODD) File

To configure and operate the gripper, you must first install its IODD file into your IO-Link Master's engineering software. Download the latest version of the IODD file for the NXB-GEN-ELC412-004 from the NexBot Robotics support portal and follow your software's instructions for importing it.

3. Basic Configuration

Once the gripper is powered and connected, your IO-Link Master should automatically detect it. Using your configuration software, you can access the gripper's parameters to set its operating mode, speed, force, and stroke limits. You can also view process data such as current position and device status.

4. Operation

Programmable Gripping Force

The ELC412-004 allows for precise control of gripping force from 5 N to 120 N via an IO-Link parameter. This enables the handling of a wide range of objects, from fragile electronics to robust machined parts. The force should be set to the

minimum required to securely hold the object to maximize gripper life and energy efficiency.

Tip: For applications with varying parts, program different force values for each recipe to prevent part damage and ensure a reliable grip every time.

Position Control and Repeatability

The gripper's jaws can be commanded to move to any position within their stroke. This feature is ideal for pre-positioning the jaws before gripping or for applications requiring partial clamping. The gripper provides high-resolution position feedback and maintains a repeatability of ± 0.02 mm for precision tasks.

Part Detection Feedback

The gripper provides digital feedback bits indicating whether a part has been successfully gripped, if a part was lost, or if the jaws closed without encountering a part. This crucial information allows the robot program to make intelligent decisions, such as retrying a pick or moving to a reject bin, improving overall system reliability.

Adjusting Speed

The opening and closing speed of the gripper jaws is adjustable. Use higher speeds to reduce cycle time in high-throughput applications, and lower speeds to ensure gentle handling of delicate or sensitive workpieces.

Tip: Running at 70-80% of maximum speed can significantly reduce mechanical wear over the life of the unit without a major impact on cycle time.

Diagnostic Monitoring

The ELC412-004 continuously monitors its internal condition, providing diagnostic data such as device temperature and motor current via IO-Link. Monitoring these values can help predict maintenance needs and troubleshoot errors like over-temperature or over-current faults before they cause a line stoppage.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect gripper fingers for wear or damage. Check for any debris in the jaw mechanism that could cause binding.	Perform this check at the start of each shift for critical applications.
Weekly	Wipe down the gripper housing with a clean, dry, lint-free cloth. Ensure air can circulate freely around the unit.	Do not use compressed air or chemical solvents for cleaning, as this may force contaminants inside or damage the anodized finish.
Monthly	Inspect the full length of the electrical cable for signs of abrasion, kinking, or damage, especially at flex points.	An intermittently failing cable is a common source of difficult-to-diagnose faults.

Interval	Task	Notes
Quarterly	Using a calibrated torque wrench, verify that the robot flange mounting screws are tightened to the specified 4 Nm.	Robot motion and vibration can cause fasteners to loosen over time.
Annually	Perform a functional test by commanding the gripper through its full range of motion, speed, and force settings. Compare behavior to baseline performance.	Log the results to track long-term performance trends.
Every 2 Million Cycles	Re-lubricate the internal drive mechanism according to the official NexBot Robotics service manual.	This procedure should only be performed by a qualified technician using approved lubricant.

6. Troubleshooting

Symptom	Possible Cause	Solution
Gripper is unresponsive; status LED is off.	Loss of power or faulty cable.	Use a multimeter to confirm 24VDC at the cable end. Inspect the cable for damage and ensure both ends are securely connected.
Gripper has power (LED is on) but does not communicate with the master.	Incorrect port configuration, faulty IO-Link master, or damaged communication line in cable.	Verify the gripper is assigned to the correct port in the controller software. Try connecting the gripper to a different port. Test with a known-good cable.
Gripper drops parts during robot movement.	Insufficient gripping force or unsuitable finger surface.	Increase the gripping force parameter via IO-Link. If the problem persists, replace worn finger inserts or use fingers made from a higher-friction material.
Gripper movement is slow or seems weak.	Low voltage supply or an over-current condition caused by an obstruction.	Check that the 24VDC supply is not dropping under load. Power down and inspect the jaw mechanism for any foreign objects or debris that may be causing it to bind.
A diagnostic fault (e.g., over-temperature) is reported.	Exceeding duty cycle limits, high ambient temperature, or internal component failure.	Review the application's cycle time to ensure it is within the gripper's specifications. Ensure adequate airflow around the gripper. If the fault persists

Symptom	Possible Cause	Solution
		in a cool state, contact support.
Gripper position feedback is inaccurate or does not match the actual position.	Loose gripper fingers or an internal encoder fault.	Ensure the gripper fingers are securely tightened to the jaws. Initiate a homing or re-referencing sequence. If the issue remains, the unit may require service.
Gripper makes an audible grinding or clicking noise.	Internal gear damage or debris in the drive mechanism.	Immediately stop operation to prevent further damage. Power down and carefully inspect for external causes. The unit will likely require factory service.

7. Technical Specifications

Parameter	Value	Unit
Weight	1.4	kg
Material	Aluminum 6061-T6, Anodized	
Voltage	24VDC	
IP Rating	IP54	
Country of Origin	DE	
Protocol	IO-Link	
Dimensions	165 x 90 x 75 mm	
Repeatability	±0.02 mm	
Torque	4 Nm	