

User Manual: NexBot Safety

VAC413-008 Vacuum Gripper 8kg Payload

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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 place hands or any body part in the robot's work envelope during operation. Unexpected motion can cause crushing injuries.

WARNING: The maximum payload for the VAC413-008 is 8 kg. Exceeding this limit can result in the part being dropped, potentially causing equipment damage or personal injury.

WARNING: Always confirm a stable vacuum level is achieved before accelerating the robot arm. A poor grip can lead to the workpiece becoming a dangerous projectile.

CAUTION: The gripper housing may become warm to the touch after prolonged, high-cycle operation. Allow the unit to cool before performing maintenance.

NOTICE: This device is rated IP54, protecting it from dust and water spray from any direction. Do not submerge the gripper or expose it to high-pressure cleaning jets.

2. Product Overview

The NexBot Safety VAC413-008 is an electric vacuum gripper designed for reliable, high-speed pick-and-place applications in automated manufacturing and logistics. This end-of-arm tooling integrates its own vacuum generation, eliminating the need for external compressed air lines, which simplifies installation, reduces system complexity, and lowers operating costs. The gripper is engineered for performance, featuring a high-flow design that enables rapid attachment and release cycles, crucial for maximizing throughput in demanding environments. Key to its design is the ability to handle a wide variety of object sizes and surfaces, from porous materials like cardboard to smooth, non-porous surfaces like sheet metal or plastic totes. With a lifting capacity of up to 8 kg, the VAC413-008 is well-suited for challenging tasks in packaging, palletizing, and machine tending. The gripper's robust construction from anodized aluminum ensures durability and longevity even in continuous-duty industrial settings. Its integrated non-return valve is a critical safety feature, ensuring the gripper maintains its hold on a part even in the event of an unexpected power interruption, preventing dropped parts and potential equipment damage. Operating on standard 24VDC power and controlled via IO-Link, the VAC413-008 provides diagnostic feedback and allows for easy integration into existing control systems. The standard ISO 9409-1-50-4-M6 mounting flange ensures compatibility with a wide range of NexBot robot models and other industrial robots. Installation is straightforward, requiring only a single electrical connection and mechanical mounting to the robot wrist. For maintenance, the suction cups are designed for quick replacement to minimize downtime.

3. Getting Started

1. Product Overview

The NexBot Safety VAC413-008 is a self-contained electric vacuum gripper designed for automated material handling. It integrates an electric vacuum pump, eliminating the need for external compressed air and simplifying system design. All control and diagnostics are handled via the industry-standard IO-Link communication protocol.

2. IO-Link Configuration

To configure the gripper, you must first download the IODD (IO Device Description) file from the NexBot Robotics support website. Import this file into your IO-Link master's engineering tool. This will allow the controller to recognize the VAC413-008 and access its process data and parameters.

3. First Operational Test

Once configured, you can perform a simple test by setting the 'Activate Vacuum' bit in the IO-Link process data output. You should hear the pump start. To release, reset the 'Activate Vacuum' bit and set the 'Activate Blow-off' bit to quickly vent the system.

4. Operation

Activating and Deactivating Vacuum

The primary function of the gripper is controlled by a single bit in the process data. Setting this bit high energizes the internal vacuum pump. Setting it low de-energizes the pump, and the system will naturally vent to atmosphere.

Tip: For the fastest possible part release, use the dedicated 'Blow-off' command, which briefly reverses airflow to push the part off the suction cup.

Monitoring Grip Status

The gripper provides real-time vacuum level data via the IO-Link input process data. Monitor this value in your robot program to confirm that a part has been successfully gripped before initiating any transport motion. This feedback is critical for creating a reliable application.

Tip: Program a minimum vacuum threshold that must be met before the robot is allowed to move. This prevents dropping parts due to an incomplete seal.

Parameter Adjustment

Advanced settings, such as the vacuum level setpoint and the duration of the blow-off pulse, can be adjusted via acyclic IO-Link parameter writes. This allows you to fine-tune the gripper's performance for specific applications, like handling delicate parts or porous materials.

Handling Different Workpieces

The performance of the gripper is highly dependent on the workpiece surface and the suction cup interface used. For non-porous, smooth surfaces, a small cup may suffice. For irregular or semi-porous objects like cardboard, a larger cup or a foam pad interface is recommended to achieve a proper seal.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the suction cup(s) for any cuts, tears, or embedded debris. A damaged suction cup is the most common cause of grip failure.	Perform this check at the beginning of each shift.
Weekly	Clean the exterior housing of the gripper with a soft cloth lightly dampened with isopropyl alcohol. Remove any accumulated dust or grime.	Ensure the unit is powered off before cleaning.
Monthly	Check the tightness of the main mounting bolts. Using a torque wrench, verify they are still at the specified 8 Nm.	Vibration can cause bolts to loosen over time.
Quarterly	Inspect the internal air filter. If the gripper has a user-serviceable filter,	Operating in a dusty environment may

Interval	Task	Notes
	remove it and clean with low-pressure compressed air or replace if visibly contaminated.	require more frequent filter checks.
Annually	Replace the suction cup(s) as part of a preventative maintenance program. The sealing material can degrade over time even if it shows no visible damage.	Keep spare suction cups in stock to minimize downtime.
As Needed	Clean the suction cup sealing lip with isopropyl alcohol to remove any film or residue that could compromise the seal.	This is particularly important when handling parts with oil or mold-release agents.

6. Troubleshooting

Symptom	Possible Cause	Solution
Gripper fails to achieve vacuum and pick up a part.	Damaged or worn suction cup, clogged filter, incorrect robot positioning, or internal pump failure.	Inspect and replace the suction cup. Check the filter for blockages. Verify the cup is positioned flat against the part surface. If the pump does not run, check power.
Gripper drops the part during robot motion.	Payload exceeds 8 kg limit, insufficient vacuum level achieved, or robot acceleration/ deceleration is too high.	Verify part weight. In the program, ensure motion does not begin until a sufficient vacuum threshold is met. Reduce robot jerk and acceleration values.
The status LED on the gripper is off.	No 24VDC power, faulty power cable, or internal electronics failure.	Use a multimeter to confirm 24VDC is present at the gripper's connector. Test the cable for continuity. If power and cable are good, the unit may require service.
IO-Link communication cannot be established.	Incorrect IO-Link master port configuration, faulty M12 cable, or incorrect IODD file used.	Ensure the master port is set to 'IO-Link' mode. Swap the cable with a known good one. Download and install the correct IODD for the VAC413-008.
Part is not released quickly when commanded.	The blow-off function is disabled or its duration is too short. The part may also be sticking to the cup.	Use the IO-Link parameters to enable the blow-off feature and increase the pulse duration. Clean the suction cup to remove any sticky residue.
Vacuum level reading is	There is a leak in the system, either at the	Reseat or replace the suction cup. Test with a

Symptom	Possible Cause	Solution
unstable or fluctuating.	suction cup seal or internally. The workpiece surface may also be porous.	known flat, non-porous surface. If the issue persists, the unit may have an internal leak requiring service.
Gripper seems weaker than usual.	A small leak has developed, or the internal air filter is partially clogged, restricting airflow.	Carefully inspect the full length of the suction cup for small nicks or cuts. Clean or replace the air filter.

7. Technical Specifications

Parameter	Value	Unit
Weight	1.4	kg
Material	Anodized Aluminum 6061-T6	
Voltage	24VDC	
IP Rating	IP54	
Country of Origin	CH	
Protocol	IO-Link	
Dimensions	150 x 100 x 95 mm	
Torque	8 Nm	