User Manual: NexBot Robotics 621-007 Door Interlock, PLe/SIL3

SKU: NXB-GEN-621-007 | 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: Electrical shock hazard. Always disconnect and lock out power before installation, maintenance, or service. This device is connected to hazardous voltages.

WARNING: This is a PLe/SIL3 rated safety component. Bypassing, modifying, or improperly installing this device can result in serious injury or death. All integration must be performed by qualified personnel.

WARNING: Do not use the NexBot Robotics 621-007 Door Interlock as a mechanical stop for the guard door. A separate physical stop must be installed to prevent impact damage to the interlock and actuator.

CAUTION: The solenoid can generate heat during operation. The die-cast zinc alloy housing may become warm to the touch. Allow the unit to cool before servicing.

NOTICE: To maintain the IP67 environmental protection rating, ensure the wiring compartment cover and cable gland are always installed and tightened correctly.

2. Product Overview

The NexBot Robotics 621-007 is a solenoid-controlled door interlock designed to safeguard personnel by preventing access to hazardous areas during robotic operations. This essential safety component ensures that machine guards, gates, and doors remain securely locked until the machinery has reached a safe state, mitigating risks in automated environments. Its primary application is in the perimeter guarding of industrial robot cells, where it integrates directly with the system's safety controller. Key features include a high functional safety rating, certified to PLe (EN ISO 13849-1) and SIL3 (IEC 62061). This certification provides confidence that the interlock meets stringent international safety standards. The unit operates with a 24VDC solenoid, allowing for electrical control over the locking mechanism, which can be tied to the robot controller's status. With a robust locking pin and a holding force of up to 1500 N, it reliably prevents gates from being forced open during operation. The housing is constructed from a durable die-cast zinc alloy and is sealed to an IP67 rating, making it suitable for demanding industrial environments where dust and liquids are present. Integrated diagnostic LEDs provide clear, at-a-glance status indication for locked, unlocked, and fault conditions, simplifying troubleshooting for maintenance personnel. Installation is straightforward, with standard mounting patterns compatible with common machine framing and guard door profiles. The 621-007 interlock is a critical element for building compliant safety systems for applications such as robotic welding, automated assembly, packaging, and material handling. By ensuring that access doors cannot be opened while the robot is in motion, this interlock provides a fundamental layer of protection for operators and technicians.

3. Getting Started

1. Product Overview

The NexBot Robotics 621-007 is a power-to-lock solenoid interlock switch designed for high-risk industrial applications. It meets the stringent requirements of PLe (EN ISO 13849-1) and SIL3 (IEC 62061), ensuring reliable guard locking for personnel protection around robotic cells and other automated machinery.

2. Principle of Operation

The interlock uses a solenoid to control a locking pin. When the machine is running, the safety controller energizes the solenoid with 24VDC, locking the actuator in place and preventing the guard door from opening. When a request to access is granted, the controller de-energizes the solenoid, allowing the door to be opened.

3. Safety Circuit Integration

This device features dual-channel, redundant safety contacts that must be wired to a safety monitoring relay or safety PLC. The controller monitors these contacts to verify the guard's status (open/closed) and ensure the integrity of the safety function at all times.

4. Operation

Normal Locked State

During machine operation, the interlock will be in a locked state, commanded by the safety controller. The guard door cannot be opened, and status indicators will typically show a 'Locked' and 'Safe' condition. This ensures personnel are protected from moving machinery.

Access Request and Unlocking

To access the guarded area, an operator typically presses a request-to-enter button. The machine controller will execute a safe stop sequence. Once the machine is in a safe state (e.g., all motion has ceased), the controller removes the 24VDC signal from the solenoid, unlocking the door.

> **Tip:** The delay between the access request and the door unlocking is determined by the machine's stop time and is configured in the safety controller.

Manual Override

In the event of a power failure or emergency, a manual override mechanism may be used to unlock the door. This typically requires a specific tool to prevent unauthorized use. Using the override should be a restricted procedure, as it bypasses the safety lock.

Fault Detection

The 621-007 continuously monitors its internal state. If a fault is detected, such as a contact failure or internal short, it will signal the fault to the safety controller. The controller should then prevent a machine restart until the fault is cleared.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Perform a functional test. Close the guard door, verify the machine can run, then open the guard door and confirm the machine immediately enters a safe stop condition.	Log all functional test results as part of the machine's safety validation records.
Monthly	Visually inspect the interlock body and actuator for signs of mechanical wear, deformation, or damage. Check that all mounting hardware is tight.	Pay close attention to the actuator entry point for signs of wear from misalignment.
Quarterly	Inspect the electrical cable for signs of abrasion, cracking, or chemical damage. Ensure the cable gland remains tight and secure.	This is especially important for applications with dynamic movement or harsh environments.
Annually	Clean the exterior of the powder-coated housing with a soft, damp	Cleaning helps with visual inspection and heat dissipation.

Interval	Task	Notes
	cloth. Do not use high-pressure washers or aggressive solvents.	
Annually	Verify the mechanical alignment of the actuator and interlock. The actuator should enter the interlock head without binding or excessive force.	Re-align if necessary to prevent premature wear on the locking mechanism.

6. Troubleshooting

Symptom	Possible Cause	Solution
Guard door will not lock when commanded.	Mechanical misalignment, debris in the lock mechanism, or no 24VDC signal to the solenoid.	Check alignment of actuator and interlock. Inspect for foreign objects. Use a multimeter to verify the lock signal from the safety controller.
Guard door will not unlock.	Solenoid is still energized, or there is mechanical tension on the door preventing the pin from retracting.	Verify the safety controller has removed the 24VDC lock signal. Gently push or pull on the door to relieve pressure on the locking pin, then try again.
Safety controller reports an interlock fault.	Internal component failure, mismatched signals from safety contacts, or a wiring short/open circuit.	Cycle power to the interlock. Check all wiring for continuity and integrity. If the fault persists, the unit may need to be replaced.
Interlock operation is intermittent.	Loose terminal connections, damaged wiring, or severe mechanical vibration.	De-energize and check all wiring connections at the interlock and the control panel. Assess the mounting for excessive vibration and reinforce if needed.
Visible moisture or contamination inside the wiring compartment.	Incorrectly installed or damaged cable gland, or a compromised housing seal.	Immediately disconnect power. The unit must be replaced as its internal components and safety function are likely compromised. Ensure the new unit is sealed correctly.
Actuator shows significant scoring or wear.	Chronic misalignment between the door and the fixed guard.	Replace the actuator. Before placing back in service, perform a thorough re-alignment of the interlock body and the new actuator to prevent recurrence.
Unit is excessively hot to the touch.	Incorrect voltage (e.g., >24VDC) being	Verify the power supply voltage is within the specified tolerance for the device. If the voltage is

Symptom	Possible Cause	Solution
	applied, or a failing solenoid coil.	correct, the internal solenoid may be failing and the unit should be replaced.

7. Technical Specifications

Parameter	Value	Unit
Weight	0.8	kg
Material	Die-Cast Zinc Alloy, Powder Coated	
Voltage	24VDC	
IP Rating	IP67	
Country of Origin	KR	
Dimensions	145 x 40 x 50 mm	