User Manual: NexBot Robotics 332-001 Laser Safety Scanner 5.5m Protective Field

SKU: NXB-GEN-332-001 | 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: This device is a safety component. Bypassing, disabling, or incorrectly configuring this device can lead to death or catastrophic injury.

WARNING: Installation, configuration, and maintenance must be performed only by qualified personnel who are trained in machine safety principles and relevant standards (e.g., ISO 13849-1).

WARNING: Never modify the Die-cast Aluminum housing of the scanner. Any modification will void the warranty, compromise the IP65 rating, and render the safety function unreliable.

CAUTION: The scanner's optical window is sensitive. Do not use abrasive materials or harsh solvents for cleaning, as this can permanently scratch the surface and degrade performance.

NOTICE: The NexBot Robotics 332-001 must be integrated into a complete machine safety system. The performance of this single component does not guarantee the safety of the entire machine.

2. Product Overview

The NexBot Robotics 332-001 Laser Safety Scanner provides robust, non-contact monitoring of hazardous areas in automated industrial environments. This Type 3 safety device is engineered to protect personnel from dangers associated with moving machinery by creating user-defined protective fields. It is a critical component for building compliant and productive robotic systems, from high-speed articulated arms to collaborative applications. Featuring a substantial 5.5-meter protective field range and an expansive 275° scanning angle, the 332-001 scanner offers comprehensive coverage for large work areas with a minimal blind spot, often reducing the need for multiple units. Its design achieves Performance Level d (PL d) in accordance with EN ISO 13849-1, ensuring reliable operation in safety-critical functions. The scanner's high angular resolution allows for precise object detection, and users can configure multiple field sets, including two protective fields and up to eight warning fields, to dynamically adapt to changing operational requirements. This flexibility is ideal for applications like machine tending, where access needs vary depending on the robot's state. Key applications for the 332-001 scanner include horizontal area guarding for robot cell entry, vertical access protection, and collision avoidance for automated guided vehicles (AGVs). In collaborative robot settings, it can be used to monitor the workspace and trigger a speed reduction or complete stop when personnel enter a designated zone. The scanner's selectable object resolution (30 mm, 50 mm, 70 mm) allows it to be tailored for detecting anything from a hand to a full person, preventing unintended shutdowns while maintaining safety. Installation is streamlined through a compact, rugged die-cast aluminum housing and standard M12 connectors. Configuration is managed via intuitive software, allowing for easy setup of complex field shapes to fit precisely around machinery. Onboard diagnostic LEDs provide immediate visual feedback on the scanner's operational status, simplifying troubleshooting and maintenance. The integrated OSSD (Output Signal Switching Device) outputs connect directly to a robot's safety control system, providing a dependable stop signal when the protective field is breached.

3. Getting Started

1. Product Overview

The NexBot Robotics 332-001 is a Type 3 electro-sensitive protective device designed for non-contact hazard area monitoring. It utilizes a class 1 infrared laser to scan its surroundings, creating user-defined protective fields up to 5.5 meters in range and a warning field that can extend further. Its rugged IP65-rated aluminum housing and EtherNet/IP connectivity make it ideal for modern industrial automation.

2. Principle of Operation

The scanner operates on the principle of time-of-flight. It emits pulses of laser light and measures the time it takes for the light to reflect off an object and return. This data is used to create a precise map of the surrounding area, which is then compared against the configured protective fields to detect intrusions.

3. Understanding Status Indicators

The device features multi-color LED indicators to provide its current status at a glance. A solid green light typically indicates the protective field is clear and the machine is safe to operate. A solid red light indicates an object is in the protective field and the safety outputs are in a stop state, while a yellow light often signifies an object in the warning field.

4. Operation

Normal Operating State

During normal operation, the scanner continuously scans the monitored area. As long as no objects are detected within the active protective field, its OSSD outputs will remain in a safe, closed state, allowing the machine to run. The status indicator will remain solid green.

Warning Field Detection

If an object or person enters the outer warning field, the scanner will trigger a non-safety output. This is typically used to activate an audible alarm or a flashing light, alerting personnel that they are approaching a hazardous area without stopping the machine.

> **Tip:** Use the warning field to improve workflow by alerting operators before they cause a full machine stop, increasing overall productivity.

Protective Field Intrusion

When any object breaches the inner protective field, the scanner's redundant OSSD safety outputs will immediately open. This signals the machine's safety circuit to initiate a safe stop, bringing all hazardous motion to a halt to prevent injury.

System Reset

After a protective field intrusion, the scanner will remain in a locked stop state even after the obstruction is removed. A manual reset signal, typically from a button located outside the hazardous area, must be sent to the safety circuit to acknowledge the situation and allow the machine to be restarted.

Monitoring via EtherNet/IP

The integrated EtherNet/IP protocol allows for rich diagnostic data to be sent to a PLC or HMI. This includes current field status, distance measurements, and device health, enabling advanced monitoring and troubleshooting without a direct PC connection.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the scanner's optical window for heavy buildup of dust, dirt, or moisture.	This is especially important in environments with welding, cutting, or coolant spray.
Weekly	Perform a trip test by inserting a standardized test object into the protective field to ensure the machine safety circuit responds correctly.	Log the results of each test in the machine's maintenance record.
Monthly	Clean the optical window using a soft, lint-free microfiber cloth and a mild solution of isopropyl alcohol and water.	Power down the device before cleaning. Never spray liquid directly onto the scanner.
Quarterly	Check the mounting bracket and all fasteners to ensure they remain tight and the scanner has not shifted from its commissioned position.	Re-verify alignment if any fasteners are found to be loose.
Annually	Perform a full re-validation of the safety function. This includes verifying the configured field shapes against the actual hazard zone and measuring the system's overall stop time.	This task must be performed by a qualified safety engineer.
Annually	Inspect all cabling for signs of abrasion, cracking, or damage to the connectors. Ensure all connections are secure.	Replace any damaged cables immediately with genuine NexBot Robotics parts.

6. Troubleshooting

Symptom	Possible Cause	Solution
Scanner has a persistent red 'fault' LED.	Internal hardware error, excessive temperature, or critical configuration corruption.	Perform a power cycle by turning the 24VDC supply off and on. If the fault persists, connect with the configuration software to read the specific diagnostic code and contact NexBot support.
	The protective field is being breached	Clean the optical window. Observe the

Symptom	Possible Cause	Solution
Machine stops unexpectedly (nuisance trips).	by environmental factors like airborne dust, insects, reflective surfaces, or machine vibration.	area for environmental factors. If necessary, use the software to adjust field sensitivity or 'teach' new static objects into the background.
Scanner fails to detect a person entering the hazardous area.	The protective field is incorrectly configured, the optical window is completely obscured, or the device has a critical failure.	IMMEDIATELY and SAFELY stop all machine motion. Lock out the machine. Verify the field configuration covers the entire hazard zone and re-commission the device. If the problem persists, replace the scanner.
Cannot establish communication with the configuration software.	Incorrect IP address on the PC or scanner, faulty Ethernet cable, or a network firewall is blocking the connection.	Ensure the PC's network adapter is on the same subnet as the scanner's default IP. Try a different Ethernet cable or a direct connection. Temporarily disable firewalls to test connectivity.
Status LED is blinking red.	The scanner is receiving external interference or has detected an issue with its OSSD output wiring (e.g., a short circuit).	Check for sources of strong EMI near the scanner or its cables. Power down the system and inspect the OSSD wiring for shorts or damage between the two channels.
Scanner does not power on (no LEDs).	No 24VDC power, incorrect polarity, or a blown internal fuse.	Use a multimeter to verify 24VDC is present at the scanner's power terminals. Double-check that the positive and negative wires are connected correctly. If power is verified, contact support.

7. Technical Specifications

Parameter	Value	Unit
Weight	1.1	kg
Material	Die-cast Aluminum	
Voltage	24VDC	

Parameter	Value	Unit
IP Rating	IP65	
Country of Origin	KR	
Protocol	EtherNet/IP	
Dimensions	105 x 102 x 152 mm	