

User Manual: NexBot Robotics 332-009 Laser Safety Scanner 5.5m Protection Field

SKU: NXB-GEN-332-009 | 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. All installation, configuration, and maintenance must be performed by qualified personnel in accordance with applicable local and international safety standards. Incorrect implementation can lead to severe injury or death.

WARNING: Do not operate the scanner with a damaged or heavily soiled optical window. Contamination can reduce detection capability and compromise the protective function. Regularly inspect and clean the window as specified.

WARNING: Any modification to the scanner's configuration, including changes to the protective fields, requires a complete re-validation of the safety function. An untested change can render the safety system ineffective.

CAUTION: The scanner's Die-cast Aluminum housing may become warm during normal operation. Avoid prolonged skin contact with the housing to prevent minor burns.

NOTICE: To maintain the IP65 rating, ensure all connectors are fully tightened and any unused ports are sealed with the provided protective caps. Failure to do so can result in damage from dust or moisture ingress.

2. Product Overview

The NexBot Robotics 332-009 is a compact, high-performance laser safety scanner designed to protect personnel and equipment in dynamic industrial environments. This device provides non-contact monitoring of user-defined hazardous areas, making it an essential component for modern robotic cells, automated guided vehicles (AGVs), and machine guarding applications. The core feature of the 332-009 is its ability to create flexible, software-defined protective fields. It boasts a substantial 5.5-meter safety field range and a wide 275° scan angle, ensuring comprehensive coverage with minimal blind spots. This wide angle often reduces the number of devices needed to secure a single area, simplifying installation and lowering total system cost. In addition to the safety field, it supports a warning field up to 20 meters, enabling a two-stage response where machinery can be programmed to slow down upon entry into the warning zone and perform a safety-rated stop upon breach of the protective zone. Engineered for reliability in demanding factory conditions, the scanner is housed in a rugged die-cast aluminum body with an IP65 rating, protecting it from dust ingress and low-pressure water jets from any direction. Its compact design allows for versatile mounting options without obstructing workflow. Configuration is performed via intuitive software, allowing users to define up to 32 distinct, switchable field sets to adapt to changing operational requirements, such as those involving mobile robots or indexing tables. The device utilizes dual OSSD (Output Signal Switching Device) outputs for failsafe integration with safety control systems. Diagnostic data and field status can be accessed over its integrated EtherNet/IP interface, facilitating advanced system monitoring and preventative maintenance.

3. Getting Started

1. Product Overview

The NexBot Robotics 332-009 is a Type 3 electro-sensitive protective equipment (ESPE) based on time-of-flight laser measurement. It scans its surroundings over a wide angle to provide non-contact monitoring of hazardous areas. Its primary role is to signal a stop command to a machine's control system when a person or object enters a pre-defined protective field.

2. Understanding Status Indicators

The device is equipped with multi-color LED indicators that provide at-a-glance status information. A solid green light typically indicates the protective field is clear and the safety outputs are ON. A solid red light indicates an object is detected in the protective field, and a flashing red or yellow light indicates a device fault or warning condition.

3. Software and Connectivity

All configuration of the 332-009 is performed via the NexBot Configuration Suite software over an EtherNet/IP connection. This software allows for the creation of complex field shapes, setting of response times, and advanced diagnostics. A stable network connection is required for initial setup and any subsequent modifications.

4. Operation

Protective Field Monitoring

In its primary operating mode, the scanner continuously monitors the configured protective field. The moment an object is detected within this zone, its two redundant OSSD safety outputs switch to the OFF-state. This signal is used by the machine's safety controller to reliably stop hazardous motion.

Warning Field Functionality

In addition to the protective field, one or more warning fields can be configured. An intrusion into a warning field triggers a non-safety-rated output, which can be used to activate a light or sounder, warning personnel that they are approaching a hazardous area without stopping the machine.

Tip: Use the warning field to improve productivity by preventing unnecessary machine shutdowns. It alerts operators before they trigger a full safety stop.

Dynamic Field Set Switching

The scanner can store multiple pre-configured field sets. This allows the safety zones to be dynamically changed based on the machine's current task, such as using a smaller field during part loading and a larger field during high-speed operation. Field set switching is typically controlled by signals from the machine's main PLC.

Restart Interlock (Reset)

After a protective field trip, the system will not automatically restart when the field is cleared. A manual reset signal is required, which ensures that an operator has intentionally acknowledged the condition and verified that the hazard zone is clear before resuming operation.

Tip: Position the reset button outside of the hazardous area but with a clear view of it to prevent unintentional restarts.

Device Diagnostics

The 332-009 continuously performs self-diagnostics. In case of an internal fault, contamination, or communication error, the OSSD outputs will go to the OFF-state, and the device will provide a diagnostic code via its LEDs and the EtherNet/IP connection. These codes can be looked up in the troubleshooting table or viewed in the configuration software.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the scanner's optical window for heavy dust, dirt, moisture, or physical damage. Ensure no objects are blocking the scanner's field of view.	This is a pre-shift check to be performed by the machine operator.
Weekly	Perform a functional trip test. Use a standardized test object to enter	

Interval	Task	Notes
	the protective field and confirm that the machine's hazardous motion stops correctly.	Document the completion of this test in the machine's safety log.
Monthly	Clean the optical window. Using a soft, lint-free cloth and an approved optical cleaning solution (isopropyl alcohol based), gently wipe the window clean.	Do not use abrasive cloths, harsh solvents, or compressed air, as this can permanently damage the window's anti-reflective coating.
Quarterly	Check mounting hardware for tightness. Verify that the scanner has not become loose or misaligned due to machine vibration.	If realignment is necessary, a full re-validation of the protective field must be performed.
Annually	Perform a full system re-validation. This includes verifying the configured fields in the software match the application's requirements, inspecting all wiring, and measuring the system's overall stop time.	This task should be performed by a certified safety technician.
As Needed	Check for and apply firmware updates via the NexBot Configuration Suite. Updates may provide enhanced features or security improvements.	Always back up the existing configuration before initiating a firmware update.

6. Troubleshooting

Symptom	Possible Cause	Solution
Scanner status LED is off.	No 24VDC power is supplied to the unit, or the power cable is faulty.	Use a multimeter to confirm 24VDC is present at the power pins of the M12 connector. Check power supply, fuses, and cable integrity.
OSSD outputs remain OFF even when the protective field is clear.	The scanner's optical window is dirty, an untaught object is in the field, or the device is misaligned.	Clean the optical window. Check for objects that were not present during the teach-in. Verify the scanner's physical alignment.
Machine stops unexpectedly (nuisance trips).	Environmental factors like heavy dust, fog, or highly reflective surfaces are interfering with the laser. The protective field may be defined too close to moving parts.	Use the software's filtering options to reduce sensitivity to particulates. Adjust the protective field to provide more clearance from the hazard.
Cannot establish a connection with	Incorrect IP address settings on the laptop or	Ensure the laptop's IP address is on the same

Symptom	Possible Cause	Solution
the configuration software.	scanner, a faulty Ethernet cable, or a network firewall is blocking communication.	subnet as the scanner. Try a different Ethernet cable. Temporarily disable the firewall to test connectivity.
Scanner has a flashing red or yellow fault LED.	The device has detected an internal error or a critical external condition (e.g., severe contamination, over-temperature).	Connect with the NexBot Configuration Suite to read the specific diagnostic error code. Cycle power to the scanner. If the fault persists, consult the detailed manual or contact technical support.
System does not restart after the field is cleared.	The manual reset signal is not being received or the restart interlock is configured improperly in the safety controller.	Verify the wiring of the reset button. Check the logic in the safety PLC or safety relay to ensure it is correctly processing the reset command after the OSSDs go high.
Warning field triggers, but the protective field does not stop the machine.	There is a wiring error on the OSSD outputs, or the safety PLC logic is incorrect.	Verify that the OSSD outputs are wired to the correct safety inputs. Scrutinize the safety controller's logic to ensure it is programmed to act on the OSSD signals.

7. Technical Specifications

Parameter	Value	Unit
Weight	1.2	kg
Material	Die-cast Aluminum	
Voltage	24VDC	
IP Rating	IP65	
Country of Origin	JP	
Protocol	EtherNet/IP	
Dimensions	105 x 102 x 152 mm	