

User Manual: NexBot Robotics 631-007 Pressure Safety Mat 1000x1000mm

SKU: NXB-GEN-631-007 | 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 Hazard. Disconnect and lockout all power sources before installation, maintenance, or service. Failure to do so can result in severe injury or death from electric shock.

WARNING: This is a safety device. Never bypass, disable, or modify the mat or its associated safety circuit. Bypassing the device will defeat its protective function and can lead to fatal accidents.

WARNING: The protective function relies on regular testing. The mat's operation must be verified at the start of every shift or production run to ensure the safety system is functioning correctly.

CAUTION: Avoid dropping heavy or sharp objects onto the mat surface. Punctures or impacts can permanently damage the internal sensors and require immediate replacement of the unit.

NOTICE: The NexBot Robotics 631-007 Pressure Safety Mat must be connected to a certified safety monitoring relay or safety PLC that complies with relevant safety standards for your region.

2. Product Overview

The NexBot Robotics 631-007 Pressure Safety Mat is a robust, fail-safe floor device designed to protect personnel by detecting their presence within a hazardous robot work area. This mat provides a critical layer of protection in automated cells by sending an immediate stop signal to the robot controller when a specified weight threshold is exceeded, indicating a person has entered the guarded zone. Constructed from a high-durability, non-slip polyurethane material, the mat is engineered to withstand the rigors of industrial environments, including exposure to oils, coolants, and common chemicals. Its IP67 rating ensures it is completely protected against dust ingress and can withstand temporary water immersion, making it suitable for washdown applications and demanding production floors. The mat's construction ensures a long operational life with minimal maintenance. With a response time of less than 25ms, it provides rapid signaling to the safety control system, contributing to a shorter overall stopping time for connected machinery. The standard activation force of 35 kg is calibrated to reliably detect personnel while minimizing the risk of false triggers from dropped tools or materials. Typical applications for the 631-007 mat include perimeter guarding for articulated robot cells used in palletizing, machine tending, and welding, as well as safeguarding the operational envelope of SCARA robots in assembly and dispensing tasks. Installation is straightforward, with the mat connecting directly to a certified safety controller or safety relay. For secure floor mounting and edge protection, it is recommended to use the corresponding aluminum trim kits, which also help to prevent trip hazards. This safety mat is an essential component for building a comprehensive and compliant machine safety system.

3. Getting Started

1. Product Overview

The NXB-GEN-631-007 is a 1000 x 1000 mm pressure-sensitive safety mat designed for personnel detection in dangerous areas. Constructed from durable polyurethane with an IP67 rating, it provides a robust, fail-safe input to a machine's safety-related control system.

2. Principle of Operation

The mat contains two separate conductive plates held apart by non-conductive spacers. When a specified weight is applied, the plates make contact, closing a circuit. This change in state is monitored by a safety controller, which signals the machine to stop.

3. Fail-Safe Design

The mat utilizes a 4-wire system that allows a safety controller to monitor for not only actuation but also for open circuits (e.g., a cut cable) or short circuits. Any of these conditions will result in a stop signal, ensuring the system fails to a safe state.

4. Operation

Normal State (Unactuated)

During normal machine operation, the safety mat should be clear of all personnel, tools, and debris. The associated safety controller will indicate a closed safety circuit, permitting the machine to run.

Tip: Ensure the area around the mat is kept clear to prevent accidental trips and to maintain a clear path of egress.

Active State (Actuated)

When a person steps onto any part of the mat's active surface, the mat will send a signal to the safety controller. This immediately opens the safety circuit, commanding the hazardous motion of the machine to stop.

System Reset Procedure

After the mat has been actuated and the hazard has been cleared, the machine will not restart automatically. The operator must exit the hazardous area completely, and then press a separate, manually-operated reset button located outside the protected zone.

Tip: The reset button should be positioned to give a clear view of the entire safeguarded space to ensure no one is inside before restarting the machine.

Fault Conditions

If the mat's cable is cut or a short circuit occurs, the safety controller will detect the fault and issue a stop command to the machine. The system will be prevented from restarting until the fault is diagnosed and corrected.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the mat for surface damage, tears, or excessive wear. Ensure the mat is free from debris, liquids, or any objects that could cause an unintended activation.	This check should be part of the operator's pre-shift inspection checklist.
Weekly	Perform a functional test by stepping on the mat during a safe, non-production moment. Verify that the machine's hazardous motion stops as expected.	Log the result of this test in the machine's safety log.
Monthly	Clean the mat surface using a soft cloth with a mild detergent and water solution. Do not use harsh chemical solvents, abrasives, or high-pressure washers.	Ensure the mat is completely dry before returning the machine to service.
Quarterly	Inspect the cable and conduit for signs of wear, abrasion, or damage.	This task should be performed by a

Interval	Task	Notes
	Check the wiring connections inside the control cabinet for tightness and any signs of corrosion.	qualified technician with the machine under LOTO.
Annually	A qualified safety professional should perform a full validation of the safety system, including the mat's response time and its integration with the overall machine control system.	Keep detailed records of annual validations for compliance purposes.

6. Troubleshooting

Symptom	Possible Cause	Solution
Machine will not start; safety controller indicates a mat fault.	An object (tool, debris, cart) is on the mat, or there is a wiring fault.	Visually inspect the mat and remove any objects. If the mat is clear, de-energize the system and inspect wiring for shorts or open circuits using a multimeter.
Stepping on the mat does not stop the machine.	Critical failure. The mat, wiring, or safety controller has failed, or the safety circuit has been bypassed.	IMMEDIATELY STOP AND LOCKOUT THE MACHINE. This is a highly dangerous condition. A qualified technician must perform a full diagnostic of the entire safety circuit, from the mat to the machine's final switching devices.
Safety controller shows intermittent mat faults.	Loose wiring connection at the controller or junction box, or internal damage to the mat from repeated impacts.	Power down and LOTO the machine. Check and re-torque all terminal screw connections for the mat. Inspect the mat surface for signs of delamination or damage.
Visible cut, gouge, or tear on the mat surface.	Impact from a sharp object, forklift tine, or dropped tool.	The mat's integrity is compromised. The mat must be replaced immediately. Do not attempt to repair the surface.
Mat is physically warped or will not lay flat.	Improper installation, chemical exposure causing the material to swell, or extreme temperature changes.	Attempt to re-install the mat and trim. If the mat remains warped, it may not detect presence correctly and should be replaced.
Safety controller indicates a ground fault.	Moisture has entered the wiring or the cable insulation has been breached and is touching a grounded machine frame.	Inspect the entire length of the cable for damage. Check seals on any junction boxes. Use a multimeter to isolate the location of the fault.

7. Technical Specifications

Parameter	Value	Unit
Weight	18.5	kg
Material	Polyurethane	
Voltage	24VDC	
IP Rating	IP67	
Country of Origin	JP	
Dimensions	1000 x 1000 x 15 mm	