

# ROBOT FLEET SAFETY CERTIFICATION RECORDS

## ROBOT FLEET SAFETY CERTIFICATION RECORD

Polar Dynamics Robotics, Inc.

Document Reference: PDR-CERT-2024-001

Last Updated: January 11, 2024

### 1. CERTIFICATION OVERVIEW

1. This document certifies that the autonomous mobile robot (AMR) fleet
2. All certifications herein apply to the BlueCore(TM) Series 3000 and

## **2. APPLICABLE STANDARDS AND CERTIFICATION**

### **1. International Safety Standards**

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ISO 10218-1:2011 (Robots and robotic devices)

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ISO 13849-1:2015 (Safety of machinery)

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IEC 61496-1:2020 (Safety of machinery - Electro-sensitive protective

### **2. Cold Environment Certifications**

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CSA C22.2 No. 139-13 (Electrically operated valves for use in hazard

-

IEC 60068-2-1 (Environmental testing - Cold)

- - 2 -

NEMA 250 Type 4X (Enclosure environmental ratings)

### 3. Industry-Specific Compliance

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FDA 21 CFR Part 110 (Current Good Manufacturing Practice)

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ANSI/RIA R15.06-2012 (Industrial Robots and Robot Systems Safety)

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OSHA 29 CFR 1910.212 (Machinery and Machine Guarding)

## 3. SAFETY FEATURES VALIDATION

### 1. Emergency Systems

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Emergency stop functionality tested at -40 C, -20 C, 0 C, and 25 C

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Response time validation: <100ms at all operating temperatures

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Redundant safety circuits with cold-temperature compensation

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Certification: T V S D Certificate #PDR-2023-8845

## 2. Navigation and Collision Avoidance

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LiDAR performance verified in condensing environments

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Multi-sensor fusion system tested in frost conditions

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Stopping distance validation: compliant with ISO 13855:2010

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Certification: SGS Certificate #NAV-2023-PDR-442

### 3. Battery Safety Systems

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Cold-weather battery management system certification

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Thermal runaway prevention protocols validated

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Charging safety interlocks verified

-

Certification: UL Certificate #E485721

## 4. TESTING METHODOLOGY AND RESULTS

## 1. Environmental Chamber Testing

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Duration: 1,000 hours continuous operation

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Temperature cycles: -40 C to 25 C

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Humidity range: 20% to 95% RH

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Test Report: TR-PDR-2023-112

## 2. Load Testing

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Maximum rated load: 1,500 kg

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Safety factor validation: 1.5x rated load

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Dynamic stability testing at maximum speed

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Test Report: TR-PDR-2023-113

### 3. Software Safety Validation

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BlueCore(TM) OS version 4.2.1 safety protocols

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Navigation algorithm freeze protection

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Sensor data integrity verification

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Validation Report: VR-PDR-2023-089

## 5. MAINTENANCE AND INSPECTION REQUIREMENTS

### 1. Scheduled Inspections

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Daily: Safety sensor cleaning and verification

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Weekly: Emergency stop system testing

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Monthly: Full system diagnostic review

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Quarterly: Third-party safety audit

### 2. Documentation Requirements

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Maintenance logs must be retained for 5 years



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Incident reports must be filed within 24 hours

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Safety audit reports must be archived for 7 years

## **6. CERTIFICATION VALIDITY**

1. This certification is valid for all BlueCore(TM) Series 3000 and 4000

2. Certification period: January 1, 2024 through December 31, 2024

3. Renewal Requirements

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Annual safety system revalidation

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Updated environmental testing

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Compliance with any new applicable standards

## **7. CERTIFICATION AUTHORITY**

The undersigned hereby certifies that all safety validations and testing procedures have been performed in accordance with applicable standards and regulations.

CERTIFIED BY:

/s/ Dr. James Barrett

—

Dr. James Barrett

Chief Robotics Officer

Polar Dynamics Robotics, Inc.

Date: January 11, 2024

/s/ Sarah Nordstrom

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Sarah Nordstrom

Chief Operating Officer

Polar Dynamics Robotics, Inc.

Date: January 11, 2024

## **8. DISCLAIMER**

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certification, the Company makes no warranties regarding the continued performance of safety systems beyond regular maintenance and inspection intervals.

