

LOW-TEMPERATURE COMPONENT CERTIFICATION

CERTIFICATION DATE: January 11, 2024

DOCUMENT NUMBER: LTC-2024-011

ISSUING ENTITY: Polar Dynamics Robotics, Inc.

CERTIFICATION SCOPE: IceNav(TM) Series 3000 Autonomous Mobile Robot Platform

1. CERTIFICATION STATEMENT

Polar Dynamics Robotics, Inc., a Delaware corporation with its principal place of business at 2850 Arctic Circle Drive, Cambridge, MA 02142 ("Company"), hereby certifies that its IceNav(TM) Series 3000 Autonomous Mobile Robot Platform ("Product") and all critical components thereof have been tested and validated for operation in low-temperature environments in accordance with applicable industry standards and regulatory requirements.

2. COMPONENT SPECIFICATIONS

1 The following critical components have been certified for continuous operation in temperatures ranging from -40 C to +25 C:

- a) PDR-CT350 Cold-Resistant Actuators
- b) Arctic-Grade Lithium Iron Phosphate Battery Systems
- c) Thermal-Managed Control Units
- d) Cold-Hardened Sensor Arrays
- e) Temperature-Stabilized Navigation Systems

2 All components listed in Section 2.1 have undergone rigorous testing pursuant to:

- ISO 13849-1:2015 Safety of machinery
- IEC 60068-2-1 Environmental testing - Cold
- ANSI/RIA R15.06-2012 Industrial Robot Safety

3. TESTING PROTOCOLS

1 Component Testing Methodology:

- Duration: 1,000 continuous operational hours

- Temperature Cycling: -40 C to +25 C (1 C tolerance)
- Humidity Range: 15% to 95% non-condensing
- Operational Load: 100% rated capacity

2 Testing Facilities:

- Primary: Polar Dynamics Advanced Testing Laboratory (Cambridge, MA)
- Secondary: T V S D America (New Brighton, MN)
- Verification: Independent third-party validation by Arctic Robotics Institute

4. PERFORMANCE SPECIFICATIONS

1 Certified Operating Parameters:

- Minimum Operating Temperature: -40 C
- Maximum Operating Temperature: +25 C
- Temperature Change Rate Tolerance: 15 C/hour
- Continuous Operation Duration: 12 hours
- Emergency Operation Duration: 24 hours

2 Performance Degradation Limits:

- Maximum Allowable Efficiency Loss: <5% at -40 C
- Maximum Response Time Variation: <50ms at extreme temperatures
- Position Accuracy Maintenance: 0.5mm across temperature range

5. COMPLIANCE DECLARATIONS

1 The Company hereby declares that all components meet or exceed:

- OSHA 29 CFR 1910.212 General Requirements for Machines
- CE Marking requirements for low-temperature operation
- UL 1740 Standard for Industrial Robots and Robotic Equipment
- CSA-Z434-14 Industrial Robots and Robot Systems

2 Environmental Compliance:

- RoHS 2011/65/EU
- REACH Regulation (EC) No 1907/2006

- California Proposition 65

6. WARRANTY AND LIABILITY

1 This certification warrants component performance under specified conditions for a period of twenty-four (24) months from the date of installation or thirty (30) months from the date of manufacture, whichever occurs first.

2 The Company's liability under this certification is limited to repair or replacement of components that fail to meet the specified performance criteria under normal use and maintenance conditions.

7. CERTIFICATION AUTHORITY

This certification is issued under the authority of:

Dr. Elena Frost, Ph.D.

Chief Executive Officer

Polar Dynamics Robotics, Inc.

Dr. James Barrett

Chief Robotics Officer

Polar Dynamics Robotics, Inc.

8. VALIDATION

The undersigned hereby certify that the information contained in this document is true and accurate to the best of their knowledge as of the date first written above.

POLAR DYNAMICS ROBOTICS, INC.

By: _

Name: Dr. Elena Frost

Title: Chief Executive Officer

Date: January 11, 2024

By: _

Name: Dr. James Barrett

Title: Chief Robotics Officer

Date: January 11, 2024

[CORPORATE SEAL]

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