COLD CLIMATE RISK ASSESSMENT DOCUMENTATION

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Polar Dynamics Robotics, Inc.

Document Reference: CCRA-2024-001

Last Updated: January 11, 2024

1. PURPOSE AND SCOPE

1 This Cold Climate Risk Assessment Documentation ("Assessment")

2 This Assessment covers all Company products designed for operati

2. DEFINITIONS

1 "Cold Climate Operation" refers to sustained robotic system operati

2 "Critical Component" means any system element whose failure wou

3 "BlueCore(TM) Platform" refers to the Company's proprietary cold-r

3. RISK ASSESSMENT METHODOLOGY

1 Testing Protocol

-

Sustained operation testing at -40 C for 168 consecutive hours

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Rapid temperature cycling between -40 C and +10 C

Power consumption monitoring under variable load conditions

-

Navigation accuracy verification in condensing environments

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Battery performance degradation analysis

2 Risk Categories

-

Mechanical system integrity

-

Electronic component reliability

-

Software performance

-

Power system efficiency

-

Navigation accuracy

-

Safety system functionality

4. IDENTIFIED RISKS AND MITIGATION STRATEGI

1 Mechanical Systems

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Risk: Material brittleness at extreme temperatures

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Mitigation: Implementation of proprietary composite materials rated fo

-

Verification: 10,000-cycle durability testing completed December 2023

2 Electronic Components

-

Risk: Condensation during temperature transitions

-

Mitigation: Hermetically sealed enclosures with active moisture contro

-

Verification: IP67 rating achieved for all critical components

3 Power Systems

-

Risk: Battery capacity reduction in sub-zero conditions

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Mitigation: Thermal management system maintaining optimal cell tem

-

Verification: Demonstrated 92% capacity retention at -40 C

5. COMPLIANCE AND CERTIFICATION

1 The Company maintains the following certifications relevant to cold

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ISO 9001:2015 Quality Management System

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IEC 60068-2-1 Environmental Testing

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UL 1740 Robot Safety Standards

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IP67 Environmental Protection Rating

2 All testing procedures conform to ANSI/RIA R15.06-2012 safety req

6. OPERATIONAL REQUIREMENTS

1 Environmental Controls

-

Maximum humidity: 85% non-condensing

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Air quality: ISO Class 8 cleanroom or better

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Floor surface condition: Maintained above dew point

2 Maintenance Protocols

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Weekly inspection of seals and gaskets

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Monthly calibration of temperature sensors

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Quarterly replacement of desiccant packages

Semi-annual full system diagnostic review

7. EMERGENCY PROCEDURES

1 The Company maintains documented emergency procedures for:

-

Power failure recovery

-

Navigation system malfunction

-

Communication loss protocols

-

Emergency stop verification

-

Thermal runaway prevention

8. LIABILITY AND DISCLAIMER

1 This Assessment reflects current knowledge and testing as of the da

2 Operation outside specified parameters or failure to follow maintena

9. CERTIFICATION

The undersigned hereby certifies that this Assessment accurately refl
Company's cold climate risk evaluation procedures and mitigation stra
of the date below.

POLAR DYNAMICS ROBOTICS, INC.

By:

Name: Dr. James Barrett

Title: Chief Robotics Officer

Date: January 11, 2024

By:

Name: Marcus Chen

Title: Chief Technology Officer

Date: January 11, 2024

10. REVISION HISTORY

Version 1.0: Initial documentation (March 15, 2023)

Version 1.1: Updated testing protocols (June 30, 2023)

Version 2.0: Current version (January 11, 2024)