TEMPERATURE MAPPING VALIDATION REPORT Q4 2023

TEMPERATURE MAPPING VALIDATION REP

Polar Dynamics Robotics, Inc.

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Date: December 15, 2023

1. EXECUTIVE SUMMARY

This Temperature Mapping Validation Report documents the results o
comprehensive temperature mapping studies conducted at Polar Dyn
primary testing facility located at 4501 Industrial Drive, Dover, Delawa

during Q4 2023. The validation was performed to verify environmenta

for BlueCore(TM) technology platform testing and certification proced

2. STUDY PARAMETERS

2.1 Testing Environment

- Primary Test Chamber: Environmental Testing Bay 3 (ETB-3)
- Chamber Dimensions: 40' x 60' x 20' (48,000 cubic feet)
- Temperature Range Capability: +25 C to -40 C
- Humidity Control Range: 20% to 85% RH

2.2 Monitoring Equipment

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Temperature Sensors: Vaisala HMT143 (Calibration Date: 09/15/2023

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Data Loggers: TempTrak(TM) Pro Series Model PT-500

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Calibration Reference: NIST Traceable Certificate #VL-2023-0892

3. METHODOLOGY

3.1 Mapping Protocol

Temperature mapping was conducted according to Protocol TMP-202

FDA 21 CFR Part 11 compliance requirements and ISPE Good Practi

Chain Management (2011).

3.2 Sensor Placement

27 temperature sensors were positioned in a three-dimensional grid p

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9 sensors at floor level (0.5m)

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9 sensors at mid-height (3.0m)

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9 sensors at ceiling level (5.5m)

3.3 Test Duration

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Study Period: October 1 - December 31, 2023

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Data Collection Interval: 5 minutes

Total Data Points: 26,208 per sensor

4. RESULTS ANALYSIS

4.1 Temperature Distribution

- Mean Temperature: -28.4 C
- Standard Deviation: 0.8 C
- Maximum Recorded: -26.2 C
- Minimum Recorded: -30.1 C
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Temperature Uniformity Index (TUI): 0.92

4.2 Critical Deviations

No critical temperature excursions outside the specified range (-25 C were recorded during the validation period.

4.3 Recovery Times

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Door Opening Recovery (Standard): 12.4 minutes

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Power Interruption Recovery: 18.7 minutes

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Emergency Generator Activation: <30 seconds

5. BLUECORE(TM) PERFORMANCE VALIDATION

5.1 Navigation System Performance

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Sensor Response Time: <50ms at -30 C

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Position Accuracy: 2.3cm at extreme temperatures

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Path Planning Success Rate: 99.7%

5.2 Power Systems

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Battery Performance: 94% efficiency at -30 C

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Charging Cycle Completion: 100% success rate

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Power Management System Response: Within specifications

6. COMPLIANCE ASSESSMENT

6.1 Regulatory Standards

This validation study complies with:

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ISO/IEC 17025:2017

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ISTA 7D Temperature Test Standards

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ASTM D3103-07 (Temperature Testing)

6.2 Quality Assurance

All testing procedures were conducted under Polar Dynamics Robotic

Management System (QMS-2023-V2) and supervised by qualified pe

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Validation Status

The temperature mapping study demonstrates that the testing environ
maintains required conditions for BlueCore(TM) technology validation
acceptable uniformity and stability.

7.2 Recommendations

Implement quarterly sensor calibration checks

Update recovery time monitoring procedures

Install redundant temperature logging system

Enhance door seal maintenance protocol

8. AUTHORIZATION

This report has been reviewed and approved by:

Dr. James Barrett

Chief Robotics Officer

Polar Dynamics Robotics, Inc.

Date: December 15, 2023

Victoria Wells

Chief Financial Officer

Polar Dynamics Robotics, Inc.

Date: December 15, 2023

9. DISCLAIMERS

This document contains confidential and proprietary information belon

All temperature mapping data and validation results are specific to the environment and conditions described herein. Results may not be rep of other facilities or environmental conditions.

10. APPENDICES

A. Raw Temperature Data Logs

B. Calibration Certificates

C. Testing Environment Floor Plans

D. Equipment Specifications

E. Standard Operating Procedures

F. Deviation Reports

Document End

Version 1.0

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