EQUIPMENT CALIBRATION PROCEDURES - COLD ENVIRONMENT

EQUIPMENT CALIBRATION PROCEDURES -

Polar Dynamics Robotics, Inc.

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1. PURPOSE AND SCOPE

1. This document establishes mandatory procedures for the calibratio

2. These procedures apply to all BlueCore(TM)-enabled AMR units an

2. DEFINITIONS

1. "Calibration" means the systematic process of comparing measurem

2. "Cold Environment" refers to any operating environment with sustai

3. "BlueCore(TM) System" means the Company's proprietary cold-res

3. CALIBRATION REQUIREMENTS

1. Frequency Requirements

a) Initial calibration must be performed prior to first deployment

b) Routine calibration every 500 operating hours or quarterly, whichev

first

c) Emergency calibration following any collision event or system fault

d) Recalibration after any component replacement or firmware update

2. Environmental Conditions

a) Primary calibration must be performed at -30 C 2 C

b) Secondary validation at -15 C 2 C and 0 C 2 C

c) Humidity levels must be maintained below 85% RH

d) Calibration area must be free from electromagnetic interference

4. CALIBRATION PROCEDURES

1. Pre-Calibration Requirements

a) Verify calibration equipment certification is current

b) Document pre-calibration readings for all sensors

c) Ensure thermal stabilization period of minimum 4 hours

d) Verify power supply stability within 0.1V

2. Primary Sensor Calibration

a) LiDAR alignment (0.02 accuracy required)

b) Inertial measurement unit zero-point calibration

c) Temperature sensor array offset correction

d) Wheel encoder pulse count verification

3. Navigation System Calibration

a) GPS reference point validation

b) Local positioning system alignment

c) Obstacle detection threshold adjustment

d) Path planning parameter optimization

5. DOCUMENTATION AND RECORDS

1. Required Documentation

a) Calibration certificates for each AMR unit

b) Environmental condition logs

c) Test measurement data

d) Calibration personnel certification

e) Equipment maintenance history

2. Record Retention

a) All calibration records must be maintained for 5 years

b) Electronic copies stored in Company's secure document managem

c) Physical copies archived at designated facility

6. QUALITY CONTROL

1. Verification Requirements

a) Independent verification of calibration results

b) Statistical analysis of measurement drift

c) Cross-reference with historical performance data

d) Compliance with ISO/IEC 17025 standards

2. Non-Conformance Handling

a) Immediate notification to Quality Control Department

b) Documentation of deviation and root cause analysis

c) Corrective action implementation

d) Follow-up verification testing

7. SAFETY PROTOCOLS

1. Personnel Requirements

a) Certified calibration technicians only

b) Proper cold environment PPE required

c) Minimum two-person team for all procedures

d) Current safety training certification

2. Emergency Procedures

a) Emergency shutdown protocols

b) Communication procedures

c) First aid and medical response

d) Incident reporting requirements

8. LEGAL COMPLIANCE

1. This procedure complies with all applicable OSHA standards, ANSI

2. Any deviation from these procedures must be approved in writing b

9. PROPRIETARY NOTICE

APPROVAL AND REVISION HISTORY

Document Owner: Technical Operations Department

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Approved by:

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Dr. James Barrett

Chief Robotics Officer

Date: December 15, 2023

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Sarah Nordstrom

Chief Operating Officer

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