OPERATIONS DOCUMENT 398

STANDARD OPERATING PROCEDURES FOR AUTONOMOUS MOBILE ROBOT DEPLOYMENT AND MAINTENANCE

Effective Date: January 1, 2024

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1. PURPOSE AND SCOPE

1. This Operations Document ("Document") establishes binding operational procedures and protocols for the deployment, maintenance, and decommissioning of Polar Dynamics Robotics, Inc. ("Company") autonomous mobile robots ("AMRs") in temperature-controlled environments.

2. This Document applies to all Company personnel involved in AMR operations, including but not limited to field technicians, deployment specialists, maintenance engineers, and operational supervisors.

2. DEFINITIONS

1. "IceNav System" means the Company's proprietary cold-environment navigation and operation platform.

2. "Critical Operating Temperature" means any ambient temperature below -30 C (-22 F).

3. "Deployment Zone" means any customer facility where Company AMRs are installed and operational.

4. "Thermal Management Protocol" or "TMP" means the Company's standardized procedures for maintaining optimal AMR operating temperatures.

3. DEPLOYMENT PROCEDURES

1. Pre-Deployment Assessment

a) Conduct comprehensive site survey of Deployment Zone

b) Document all thermal zones and transition areas

c) Map facility layout using IceNav mapping protocols

d) Verify facility power infrastructure compatibility

e) Assess wireless communication coverage

2. Installation Requirements

a) AMR units must undergo 24-hour cold-soak testing

b) IceNav calibration must achieve 99.9% accuracy

c) Emergency stop systems verified at all critical points

d) Thermal sensors calibrated to 0.5 C accuracy

4. MAINTENANCE PROTOCOLS

1. Scheduled Maintenance

a) Weekly diagnostic scans of IceNav system

b) Bi-weekly actuator performance verification

c) Monthly thermal management system inspection

d) Quarterly full system calibration

2. Emergency Maintenance

a) 24-hour response time for critical failures

b) Immediate shutdown for thermal anomalies

c) Backup unit deployment within 4 hours

d) Root cause analysis within 48 hours

5. SAFETY AND COMPLIANCE

1. All operations must comply with:

a) ANSI/RIA R15.06-2012 Safety Requirements

b) ISO 10218-1:2011 Robot Safety Standards

c) Company Safety Protocol Document 276

d) Local jurisdiction requirements

2. Required Safety Measures

a) Thermal-resistant emergency stop systems

b) Redundant collision avoidance protocols

c) Real-time performance monitoring

d) Automated fault detection and reporting

6. PERFORMANCE MONITORING

1. Key Performance Indicators

a) Navigation accuracy in sub-zero conditions

b) Thermal management system efficiency

c) Battery performance at Critical Operating Temperature

d) Mean time between failures

2. Reporting Requirements

a) Daily performance logs

b) Weekly efficiency reports

c) Monthly trend analysis

d) Quarterly compliance verification

7. DECOMMISSIONING PROCEDURES

1. AMR units shall be decommissioned when:

a) Reaching 20,000 operating hours

b) Experiencing three critical failures

c) Showing thermal management degradation

d) Customer contract termination

2. Decommissioning Protocol

a) Data wiping of IceNav system

b) Recovery of proprietary components

c) Recycling of approved materials

d) Documentation of disposal

8. CONFIDENTIALITY

1. All information contained herein is confidential and proprietary to Polar Dynamics Robotics, Inc.

2. Disclosure restricted to authorized personnel with signed confidentiality agreements.

9. AMENDMENTS

1. This Document may be amended only by written authorization from the Chief Operations Officer and Chief Technology Officer.

10. EXECUTION

IN WITNESS WHEREOF, this Operations Document has been executed by the duly authorized representatives of the Company.

POLAR DYNAMICS ROBOTICS, INC.

By:

Name: Sarah Nordstrom

Title: Chief Operations Officer

Date: January 1, 2024

By:

Name: Marcus Chen

Title: Chief Technology Officer

Date: January 1, 2024