# OPERATIONS DOCUMENT 378

## STANDARD OPERATING PROCEDURES FOR AUTONOMOUS MOBILE ROBOT DEPLOYMENT AND MAINTENANCE

*Effective Date: January 1, 2024*

*Document Version: 3.2*

*Last Updated: December 15, 2023*

## 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 compliance with Company's Technical Specification 276-B

2. Installation Requirements

a) Calibrate thermal sensors according to Protocol TM-421

b) Initialize IceNav environmental learning algorithms

c) Establish redundant communication protocols

d) Verify emergency shutdown systems

## 4. MAINTENANCE PROTOCOLS

1. Scheduled Maintenance

a) Perform weekly diagnostic scans of thermal management systems

b) Conduct monthly actuator stress tests

c) Calibrate navigation sensors quarterly

d) Replace thermal interface materials semi-annually

2. Emergency Maintenance

a) Response time requirements:

- Critical failures: 2 hours
- Major disruptions: 4 hours
- Minor issues: 24 hours

b) Document all emergency interventions in the Maintenance Log

c) Submit incident reports within 24 hours

## 5. SAFETY AND COMPLIANCE

1. Temperature Monitoring

a) Continuous monitoring of AMR core temperature

b) Automatic shutdown if thermal limits exceeded

c) Alert protocols for temperature anomalies

2. Regulatory Compliance

a) Maintain compliance with ANSI/RIA R15.08-1-2020

b) Adhere to FDA 21 CFR Part 11 where applicable

c) Document all safety incidents per OSHA requirements

## 6. QUALITY CONTROL

1. Performance Metrics

a) Monthly uptime minimum: 98.5%

b) Navigation accuracy threshold:  5mm

c) Thermal variance tolerance:  2 C

2. Quality Assurance

a) Weekly performance reviews

b) Monthly system optimization

c) Quarterly audit of maintenance records

## 7. DECOMMISSIONING PROCEDURES

1. AMR Retirement Criteria

a) Operating hours exceed 20,000

b) Repair costs exceed 40% of replacement value

c) Technology obsolescence as defined in Tech Spec 412-C

2. Decommissioning Steps

a) Data wiping and security protocols

b) Physical decommissioning procedures

c) Component recycling requirements

## 8. CONFIDENTIALITY AND PROPRIETARY INFORMATION

1. All operational procedures, technical specifications, and maintenance protocols contained herein are confidential and proprietary to Polar Dynamics Robotics, Inc.

2. Disclosure of any information contained in this Document to unauthorized parties is strictly prohibited and may result in legal action.

## 9. AMENDMENTS AND UPDATES

1. This Document may be amended or updated by the Company at any time, with notice to relevant

personnel.

2. All amendments must be approved by the Chief Operations Officer and Chief Technology Officer.

## AUTHORIZATION

APPROVED AND ADOPTED by the undersigned duly authorized officers of Polar Dynamics Robotics, Inc.

Date: January 1, 2024

Sarah Nordstrom

Chief Operations Officer

Marcus Chen

Chief Technology Officer

## DOCUMENT CONTROL

Document Owner: Operations Department

Review Cycle: Annual

Next Review Date: January 1, 2025

Distribution: Level 2 - Restricted Internal Distribution