

OPERATIONS DOCUMENT 383

STANDARD OPERATING PROCEDURES FOR AUTONOMOUS MOBILE ROBOT DEPLOYMENT AND MAINTENANCE

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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 including thermal mapping
 - b) Verify facility compliance with Company's Technical Specification TD-2023-114
 - c) Document all thermal transition zones and temperature gradients

d) Validate IceNav System compatibility with facility layout

2. Installation Requirements

- a) Follow Company Standard Installation Protocol SIP-2023-12
- b) Calibrate thermal sensors per Technical Bulletin TB-384
- c) Install redundant emergency stop systems at prescribed intervals
- d) Configure facility-specific navigation parameters

4. MAINTENANCE PROTOCOLS

1. Scheduled Maintenance

- a) Perform weekly diagnostic scans of IceNav System
- b) Conduct monthly actuator performance assessments
- c) Execute quarterly thermal management system validation
- d) Document all maintenance activities in Company's CMMS

2. Emergency Maintenance

- a) Response time requirements:
 - Critical failures: 2 hours
 - Non-critical failures: 8 hours
- b) Follow Emergency Response Protocol ERP-2023-08
- c) Maintain minimum spare parts inventory per Schedule A

5. SAFETY REQUIREMENTS

1. Personnel Safety

- a) All technicians must complete Cold Environment Safety Training (CEST-101)
- b) Mandatory use of Company-approved PPE in sub-zero environments
- c) Strict adherence to buddy system protocol below -20 C

2. Equipment Safety

- a) Implement thermal shock prevention measures
- b) Monitor battery performance in extreme temperatures
- c) Maintain emergency shutdown capabilities

6. QUALITY CONTROL

1. Performance Metrics

- a) Monthly uptime requirement: 98.5%
- b) Navigation accuracy tolerance: 5mm
- c) Thermal management efficiency: 95%

2. Documentation Requirements

- a) Maintain detailed deployment logs
- b) Record all maintenance activities
- c) Document safety incidents and near-misses
- d) Archive performance data for 24 months

7. COMPLIANCE AND REPORTING

1. Regulatory Compliance

- a) Adhere to OSHA cold storage workplace standards
- b) Maintain ANSI/RIA R15.08 compliance
- c) Follow ISO 10218-2 guidelines

2. Internal Reporting

- a) Submit monthly performance reports to Operations Department
- b) Report safety incidents within 24 hours
- c) Provide quarterly compliance updates

8. PROPRIETARY INFORMATION

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

2. Unauthorized disclosure is strictly prohibited and may result in legal action.

9. AMENDMENTS AND UPDATES

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

2. All amendments must be documented and distributed to relevant personnel within 48 hours.

AUTHORIZATION

This Operations Document is hereby authorized and approved:

Sarah Nordstrom

Chief Operations Officer

Polar Dynamics Robotics, Inc.

Date: _

Dr. James Barrett

Chief Robotics Officer

Polar Dynamics Robotics, Inc.

Date: _

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