

OPERATIONS DOCUMENT 409

STANDARD OPERATING PROCEDURES FOR AUTONOMOUS MOBILE ROBOT DEPLOYMENT AND MAINTENANCE

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1. PURPOSE AND SCOPE

1. This Operations Document 409 ("Document") establishes the mandatory procedures and protocols for the deployment, operation, and maintenance 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 staff, 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 or operating environment 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. PRE-DEPLOYMENT PROCEDURES

1. Environmental Assessment
 - a) Conduct comprehensive thermal mapping of deployment zone
 - b) Document all temperature variation points
 - c) Verify facility compliance with Company's Technical Specification 207-B
 - d) Complete Environmental Compatibility Report (Form ECR-101)

2. Infrastructure Verification

- a) Validate charging station locations and power specifications
- b) Confirm network connectivity requirements
- c) Verify emergency stop system integration points
- d) Document floor surface conditions and transition zones

4. DEPLOYMENT PROTOCOLS

1. Initial Setup Requirements

- a) Execute IceNav System calibration sequence
- b) Perform thermal sensor alignment
- c) Configure zone-specific operating parameters
- d) Validate fail-safe systems

2. Safety Integration

- a) Program facility-specific safety boundaries
- b) Configure interaction protocols with human operators
- c) Establish emergency response procedures
- d) Document all safety override protocols

5. MAINTENANCE REQUIREMENTS

1. Scheduled Maintenance

- a) Weekly diagnostic scans of thermal management systems
- b) Monthly actuator performance validation
- c) Quarterly full system calibration
- d) Semi-annual IceNav System updates

2. Preventive Maintenance

- a) Daily pre-operation thermal checks
- b) Weekly sensor cleaning and verification
- c) Monthly battery performance analysis
- d) Quarterly wear component inspection

6. OPERATIONAL PARAMETERS

1. The Company's AMRs shall maintain operational status within the following parameters:

- a) Temperature range: -40 C to +45 C
- b) Humidity: Up to 95% non-condensing
- c) Maximum payload: As specified in Product Sheet PS-301
- d) Operational speed: 0.5 m/s to 2.0 m/s

2. Performance Monitoring

- a) Continuous tracking of thermal management metrics
- b) Real-time navigation accuracy monitoring
- c) Power consumption optimization
- d) Payload handling verification

7. COMPLIANCE AND REPORTING

1. All operations must comply with:

- a) Company's Quality Management System
- b) ISO 9001:2015 requirements
- c) Applicable ANSI/RIA R15.08 standards
- d) Customer-specific safety protocols

2. Required Documentation

- a) Daily operation logs
- b) Maintenance records
- c) Incident reports
- d) Performance metrics

8. PROPRIETARY INFORMATION

1. This Document contains confidential and proprietary information of Polar Dynamics Robotics, Inc. and may not be disclosed to third parties without written authorization from the Company's Legal Department.

9. DOCUMENT CONTROL

1. This Document is maintained by the Operations Department and reviewed annually.

2. Revisions require approval from:

- Chief Operations Officer
- Chief Technology Officer
- Chief Robotics Officer

10. AUTHORIZATION

APPROVED AND ADOPTED by Polar Dynamics Robotics, Inc.

By:

Sarah Nordstrom

Chief Operations Officer

Date: _

By:

Dr. James Barrett

Chief Robotics Officer

Date: _