

# **OPERATIONS DOCUMENT 372**

## **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 of Deployment Zone
  - b) Document all thermal zones and transition areas
  - c) Map facility layout using IceNav mapping protocols

- d) Verify power infrastructure compatibility
- e) Assess floor surface conditions and friction coefficients

## 2. Initial Configuration

- a) Upload facility-specific navigation parameters
- b) Calibrate thermal sensors according to Specification Sheet TD-147
- c) Initialize redundant safety systems
- d) Establish emergency shutdown protocols
- e) Configure customer-specific operational parameters

## 4. MAINTENANCE REQUIREMENTS

### 1. Scheduled Maintenance

- a) Weekly diagnostic scans of thermal management systems
- b) Monthly actuator performance assessments
- c) Quarterly calibration of navigation sensors
- d) Semi-annual firmware updates
- e) Annual comprehensive system overhaul

### 2. Thermal Management Protocols

- a) Monitor actuator temperature every 15 minutes during operation
- b) Log thermal cycling data in compliance with SOP-892
- c) Implement automatic thermal protection measures when temperatures exceed specifications
- d) Maintain detailed records of all thermal events

## 5. SAFETY PROTOCOLS

### 1. Emergency Procedures

- a) Immediate shutdown protocol activation
- b) Customer notification requirements
- c) Emergency response team deployment
- d) Incident documentation and reporting
- e) Recovery and restart procedures

## 2. Safety Compliance

- a) Adherence to ANSI/RIA R15.06 standards
- b) Compliance with ISO 10218-1 and 10218-2
- c) Implementation of safety-rated monitored stops
- d) Maintenance of safety clearance zones

## **6. QUALITY CONTROL**

### 1. Performance Monitoring

- a) Real-time tracking of operational metrics
- b) Weekly performance reports
- c) Monthly efficiency analyses
- d) Quarterly system optimization reviews

### 2. Documentation Requirements

- a) Maintenance logs
- b) Incident reports
- c) Performance data
- d) Calibration records
- e) Training certifications

## **7. PROPRIETARY INFORMATION**

- 1. All technical specifications, operational procedures, and system configurations contained within this Document are confidential and proprietary to Polar Dynamics Robotics, Inc.
- 2. Disclosure of any information contained herein to unauthorized parties is strictly prohibited and may result in legal action.

## **8. 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 Technology Officer and Chief Operations Officer.

## **9. EXECUTION AND ACKNOWLEDGMENT**

IN WITNESS WHEREOF, this Operations Document has been executed by the duly authorized representatives of Polar Dynamics Robotics, Inc.

**By:**

Name: Sarah Nordstrom

Title: Chief Operations Officer

Date: January 1, 2024

**By:**

Name: Dr. James Barrett

Title: Chief Robotics Officer

Date: January 1, 2024

## **10. DOCUMENT CONTROL**

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