

# **OPERATIONS DOCUMENT 373**

## **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 including thermal mapping
  - b) Verify facility compliance with Company's Technical Specification 276-B
  - 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 455

b) Calibrate thermal sensors per Technical Bulletin 2023-07

c) Install redundant emergency stop systems at prescribed intervals

d) Verify charging station thermal management systems

## 4. MAINTENANCE PROTOCOLS

### 1. Scheduled Maintenance

a) Perform weekly diagnostic scans of IceNav System

b) Conduct monthly actuator stress tests

c) Calibrate thermal management systems quarterly

d) Replace cold-environment seals per maintenance schedule

### 2. Emergency Procedures

a) Implement rapid shutdown protocol if thermal anomalies detected

b) Follow Emergency Response Plan 92-C for system failures

c) Document all incidents in Company's secure incident management system

## 5. SAFETY AND COMPLIANCE

### 1. The Company shall maintain compliance with:

a) ISO 10218-1:2011 for robotic safety standards

b) ANSI/RIA R15.06-2012 for industrial robot safety

c) Company's proprietary Cold Environment Safety Protocol (CESP-2023)

### 2. Safety Documentation

a) Maintain digital logs of all safety incidents

b) Update safety protocols quarterly based on operational data

c) Conduct monthly safety audits of all deployed systems

## 6. QUALITY CONTROL

## 1. Performance Metrics

- a) Monitor and record AMR uptime in sub-zero environments
- b) Track navigation accuracy in varying temperature conditions
- c) Measure thermal management system efficiency

## 2. Quality Assurance

- a) Conduct weekly performance reviews
- b) Implement corrective actions within 24 hours of identified issues
- c) Maintain quality control documentation for 7 years

## **7. PROPRIETARY INFORMATION**

- 1. All technical specifications, procedures, and protocols contained herein constitute confidential and proprietary information of the Company.
- 2. Disclosure of any portion of this Document to third parties is strictly prohibited without prior written authorization from the Company's Legal Department.

## **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 Operations Officer and Chief Robotics Officer.

## **9. EXECUTION AND APPROVAL**

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

APPROVED BY:

Sarah Nordstrom

Chief Operations Officer

Date: December 15, 2023

Dr. James Barrett

Chief Robotics Officer

Date: December 15, 2023

Katherine Wells

Chief Financial Officer

Date: December 15, 2023

## **10. DOCUMENT CONTROL**

Document Number: OPS-373-2024

Version: 3.2

Classification: Confidential

Review Cycle: Annual

Next Review Date: December 15, 2024