OPERATIONS DOCUMENT 390

STANDARD OPERATING PROCEDURES FOR AUTONOMOUS MOBILE ROBOT DEPLOYMENT AND MAINTENANCE

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1. PURPOSE AND SCOPE

1. This Operations Document 390 ("Document") establishes the 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. "Maintenance Protocol" means the prescribed series of inspection, service, and repair procedures detailed in Section 4.

3. DEPLOYMENT PROCEDURES

1. Pre-Deployment Assessment

a) Conduct comprehensive site survey of Deployment Zone

b) Document temperature mapping of operational areas

c) Verify IceNav System compatibility with facility layout

d) Assess RF interference patterns and signal strength

e) Validate emergency stop system placement

2. Installation Requirements

a) AMR charging stations must be installed in temperature-controlled areas

b) Navigation beacons shall be mounted at 3-meter intervals

c) Thermal sensors must be calibrated to 0.5 C accuracy

d) Emergency shutdown protocols must be integrated with facility systems

4. MAINTENANCE PROTOCOLS

1. Scheduled Maintenance

a) Weekly inspection of thermal management systems

b) Bi-weekly calibration of navigation sensors

c) Monthly actuator performance assessment

d) Quarterly full system diagnostics

e) Semi-annual firmware updates

2. Critical Component Monitoring

a) Battery thermal protection systems

b) Cold-resistant actuator assemblies

c) Environmental sensing arrays

d) IceNav System processors

e) Emergency stop circuits

5. SAFETY AND COMPLIANCE

1. The Company shall maintain compliance with:

a) ANSI/RIA R15.06-2012 Safety Requirements

b) ISO 10218-1:2011 Robot Safety Standards

c) CE Marking requirements for European operations

d) UL 3300 Robot Safety Certification

2. Safety Protocols

a) Mandatory safety training for all operational personnel

b) Monthly safety audits of Deployment Zones

c) Quarterly emergency response drills

d) Documentation of all safety incidents

6. PERFORMANCE MONITORING

1. Key Performance Indicators

a) System uptime percentage

b) Navigation accuracy metrics

c) Thermal management efficiency

d) Battery life in cold environments

e) Emergency stop response time

2. Reporting Requirements

a) Daily operational status reports

b) Weekly performance analytics

c) Monthly maintenance summaries

d) Quarterly compliance reviews

7. INTELLECTUAL PROPERTY PROTECTION

1. All operational data collected through the IceNav System remains the exclusive property of the Company.

2. Customer facility layouts and operational data shall be treated as confidential information subject to applicable NDAs.

8. AMENDMENTS AND UPDATES

1. This Document may be amended only by written authorization from the Company's Chief Technology Officer or Chief Operations Officer.

2. All amendments shall be recorded in the Document Version History maintained by the Operations Department.

9. EXECUTION AND APPROVAL

IN WITNESS WHEREOF, this Operations Document 390 has been executed by the duly authorized representatives of Polar Dynamics Robotics, Inc.

APPROVED BY:

Sarah Nordstrom

Chief Operations Officer

Date: December 15, 2023

Dr. James Barrett

Chief Robotics Officer

Date: December 15, 2023

10. DOCUMENT CONTROL

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