OPERATIONS DOCUMENT 406

STANDARD OPERATING PROCEDURES FOR AUTONOMOUS MOBILE ROBOT DEPLOYMENT AND MAINTENANCE

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1. PURPOSE AND SCOPE

1. This Standard Operating Procedure ("SOP") document establishes the mandatory operational protocols for the deployment, maintenance, and decommissioning of Polar Dynamics Robotics, Inc. ("Company") autonomous mobile robots ("AMRs") in temperature-controlled environments.

2. This SOP applies to all Company personnel involved in AMR operations, including but not limited to field technicians, maintenance engineers, deployment specialists, 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 procedure for maintaining optimal AMR operating temperature in extreme cold environments.

3. PRE-DEPLOYMENT PROCEDURES

1. Site Assessment Requirements

a) Complete thermal mapping of deployment zone

b) Verification of floor surface conditions

c) RF interference testing

d) Emergency power systems evaluation

e) Network infrastructure assessment

2. Equipment Preparation

2.1. Each AMR unit must undergo:

a) Full diagnostic scan

b) Thermal resistance certification

c) IceNav calibration

d) Battery capacity verification

e) Actuator load testing

3. Documentation Requirements

3.1. Maintain records of:

a) Pre-deployment checklist completion

b) Site-specific risk assessment

c) Customer facility documentation

d) Emergency response protocols

e) Network security clearances

4. OPERATIONAL PROTOCOLS

1. Standard Operating Conditions

1.1. Monitor and maintain:

a) Operating temperature range (-40 C to +25 C)

b) Battery charge levels (minimum 30%)

c) Network connectivity (99.9% uptime)

d) Sensor calibration accuracy

e) Navigation system performance

2. Emergency Procedures

2.1. Implement immediate response for:

a) Power failures

b) Network outages

c) Collision incidents

d) Temperature control failures

e) Navigation system errors

5. MAINTENANCE REQUIREMENTS

1. Scheduled Maintenance

1.1. Perform at intervals of:

a) Daily system checks

b) Weekly diagnostic scans

c) Monthly actuator servicing

d) Quarterly thermal system optimization

e) Annual certification renewal

2. Preventive Maintenance

2.1. Regular inspection of:

a) Thermal management systems

b) Navigation sensors

c) Battery systems

d) Motor assemblies

e) Safety mechanisms

6. COMPLIANCE AND REPORTING

1. Regulatory Compliance

1.1. Maintain compliance with:

a) ANSI/RIA R15.06-2012

b) ISO 10218-1:2011

c) CE Marking requirements

d) UL 3300 certification

e) OSHA guidelines

2. Documentation Requirements

2.1. Maintain records of:

a) Maintenance logs

b) Incident reports

c) Performance metrics

d) Safety certifications

e) Training records

7. PROPRIETARY INFORMATION

1. All procedures, specifications, and technical details contained within this document are confidential and proprietary to Polar Dynamics Robotics, Inc.

2. Unauthorized disclosure, reproduction, or distribution is strictly prohibited and may result in legal action.

8. AMENDMENTS AND UPDATES

1. This SOP is subject to periodic review and updates as required by:

a) Technological advances

b) Regulatory changes

c) Operational requirements

d) Safety standards

e) Customer needs

9. AUTHORIZATION

This Standard Operating Procedure is hereby authorized and approved by:

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