

# **MAINTENANCE SCHEDULE - ARCTIC PHARMA STORAGE**

**Effective Date: January 15, 2024**

**Document Reference: PDR-MS-2024-001**

## **1. OVERVIEW AND SCOPE**

1. This Maintenance Schedule ("Schedule") governs the preventative maintenance, inspection, and servicing requirements for Polar Dynamics Robotics, Inc. ("PDR") autonomous mobile robots ("AMRs") deployed at Arctic Pharma Storage facilities ("Facilities").
2. This Schedule applies to all IceNav(TM)-enabled AMR units operating in temperature-controlled environments ranging from -30 C to +5 C.

## **2. EQUIPMENT COVERED**

1. This Schedule applies to the following PDR equipment:
  - PolarBot(TM) Series 3000 AMRs (Units 3001-3025)
  - CryoNav(TM) Control Systems (v4.2 and above)
  - ThermalGuard(TM) Actuator Assemblies
  - IceNav(TM) Sensor Arrays (Generation 4)

## **3. MAINTENANCE INTERVALS**

1. Daily Inspections:
  - Visual inspection of thermal seals and enclosures
  - Battery charge level verification
  - Navigation sensor calibration check
  - Operating temperature log review
  - Emergency stop system verification
2. Weekly Maintenance:
  - ThermalGuard(TM) actuator performance testing
  - Condensation management system inspection
  - Drive train lubrication assessment
  - Software diagnostic reports review

- Path optimization algorithm validation

### 3. Monthly Service Requirements:

- Complete system diagnostics
- Thermal management system cleaning
- Actuator load testing
- Navigation accuracy validation
- Battery system deep cycle test
- Firmware updates as required

### 4. Quarterly Major Service:

- Full mechanical inspection
- Thermal seal replacement
- Actuator rebuild/replacement
- Control system calibration
- Safety system certification
- Performance benchmark testing

## **4. MAINTENANCE PROCEDURES**

### 1. All maintenance shall be performed by PDR-certified technicians in accordance with:

- PDR Service Manual TD-2024-V3
- ISO 9001:2015 quality management requirements
- GMP standards for pharmaceutical environments
- OSHA safety regulations
- Client facility-specific protocols

### 2. Documentation Requirements:

- Digital service records maintained in PDR Cloud
- Signed inspection checklists
- Calibration certificates
- Component replacement logs
- Performance test results

- Incident reports (if applicable)

## **5. PERFORMANCE STANDARDS**

### **1. AMR units must maintain:**

- 98% uptime in operating conditions
- 0.5 C thermal stability
- Navigation accuracy within 15mm
- Battery life >12 hours per charge
- Zero safety incidents

### **2. Failure to meet performance standards triggers immediate maintenance review.**

## **6. SPARE PARTS AND INVENTORY**

### **1. Minimum On-site Inventory:**

- ThermalGuard(TM) actuator assemblies (2 units)
- Sensor arrays (3 units)
- Control boards (2 units)
- Battery packs (4 units)
- Thermal seals (complete set)

### **2. Parts Replacement Schedule:**

- Thermal seals: Every 90 days
- Battery packs: Every 180 days
- Actuators: Every 365 days or 3,000 operating hours
- Sensors: As needed based on calibration results

## **7. EMERGENCY PROCEDURES**

### **1. In case of system failure:**

- Immediate notification to PDR Support
- AMR safe-state activation
- Area isolation if required
- Emergency maintenance within 4 hours

- Incident documentation and review

## **8. COMPLIANCE AND REPORTING**

### **1. Monthly Reports:**

- Maintenance compliance summary
- Performance metrics
- Incident reports
- Parts consumption
- System optimization recommendations

### **2. Quarterly Audits:**

- Maintenance record review
- Safety compliance verification
- Performance trend analysis
- Technical update status

## **9. MODIFICATIONS**

1. This Schedule may be modified only by written agreement between PDR and Arctic Pharma Storage.

2. PDR reserves the right to update maintenance requirements based on:

- New technical developments
- Safety requirements
- Regulatory changes
- Performance optimization needs

## **10. AUTHORIZATION**

This Maintenance Schedule is hereby authorized and adopted:

POLAR DYNAMICS ROBOTICS, INC.

**By:**

Name: Katherine Wells

Title: Chief Financial Officer

Date: January 15, 2024

ARCTIC PHARMA STORAGE

**By:**

Name: [Authorized Representative]

Title: [Title]

**Date:**