

# **POLAR BOT MAINTENANCE MANUAL**

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### **COLD CLIMATE VERSION 3.2**

**Polar Dynamics Robotics, Inc.**

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**Effective Date: January 15, 2024**

## **1. LEGAL NOTICES AND DISCLAIMERS**

### **1. PROPRIETARY INFORMATION**

This manual contains confidential and proprietary information of Polar Robotics, Inc. ("PDR"). Distribution limited to authorized maintenance and customers under valid service agreements.

## 2. WARRANTY LIMITATIONS

Compliance with maintenance procedures herein is required to maintain coverage under PDR Service Agreement Form SA-2023. Deviations may void protection.

## 2. SAFETY PROTOCOLS

### 1. REQUIRED CERTIFICATIONS

All maintenance personnel must hold current PDR Cold Environment (CEC-Level 2) prior to servicing units.

### 2. PERSONAL PROTECTIVE EQUIPMENT

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Insulated gloves rated to -40 C

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Anti-static maintenance uniform

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Safety glasses with cold-rating certification

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Steel-toed boots with electrical hazard protection

### 3. ENVIRONMENTAL REQUIREMENTS

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Maximum ambient temperature: -30 C

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Minimum ambient temperature: -40 C

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Maximum humidity: 85%

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Minimum lighting: 500 lux

### **3. BLUECORE(TM) SYSTEM MAINTENANCE**

#### **1. POWER CELL INSPECTION**

- a) Verify BlueCore(TM) power cell temperature maintains -5 C 2 C
- b) Inspect thermal isolation seals monthly
- c) Test voltage output under load (reference Table 3.1.1)
- d) Document readings in PDR Maintenance Log System

#### **2. NAVIGATION SYSTEM CALIBRATION**

- a) Perform monthly zero-point calibration

- b) Verify cold-compensated LiDAR readings
- c) Test emergency stop functionality at operating temperature
- d) Validate position accuracy within 2mm tolerance

## **4. MECHANICAL SYSTEMS**

### **1. DRIVE TRAIN MAINTENANCE**

- a) Inspect cold-rated bearings bi-weekly
- b) Apply PDR-approved low-temperature lubricant (Part #LT-2024)
- c) Test motor torque at specified intervals
- d) Verify encoder feedback accuracy

### **2. CHASSIS INSPECTION**

- a) Check thermal expansion joints monthly

- b) Inspect composite frame for stress fractures
- c) Verify seal integrity around access panels
- d) Document any ice accumulation patterns

## **5. SOFTWARE AND FIRMWARE**

### **1. SYSTEM UPDATES**

- a) Maintain current firmware version per Schedule A
- b) Verify cold-environment parameters post-update
- c) Test all safety systems after software modifications
- d) Document update completion in PDR portal

### **2. DIAGNOSTIC PROCEDURES**

- a) Run weekly diagnostic suite (Program Code: DIAG-CC)

- b) Verify thermal management system performance
- c) Test communication protocols at temperature extremes
- d) Log all diagnostic results

## 6. TROUBLESHOOTING PROCEDURES

### 1. ERROR CODE RESPONSES

Reference PDR Error Code Manual (Doc #EC-2024) for specific responses

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Temperature control failures

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Navigation system errors

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Drive system faults

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Power system warnings

## 2. EMERGENCY PROCEDURES

- a) Immediate shutdown protocol
- b) Emergency extraction process
- c) System recovery procedures
- d) Incident reporting requirements

## 7. MAINTENANCE SCHEDULE

### 1. DAILY CHECKS

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Power system status

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Navigation system verification

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Safety system test

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Operating temperature verification

## 2. WEEKLY MAINTENANCE

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Full diagnostic suite

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Drive system inspection

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Sensor calibration

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Log file review

### 3. MONTHLY SERVICE

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Comprehensive system inspection

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Calibration of all sensors

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Firmware update verification

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Performance optimization

## 8. RECORD KEEPING

### 1. REQUIRED DOCUMENTATION

Maintain records of:

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All maintenance activities

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System modifications

-

Error incidents

-

Performance metrics

## 2. REPORTING REQUIREMENTS

Submit monthly maintenance reports to:

[maintenance.reports@polardynamics.com](mailto:maintenance.reports@polardynamics.com)

## 9. CERTIFICATION

This manual is certified compliant with ISO 9001:2015 and PDR Qual

PS-2024, -

Authorized by:

Dr. James Barrett

Chief Robotics Officer

Polar Dynamics Robotics, Inc.

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