

# MOTOR CONTROLLER INTEGRATION SPECIFICATION

## MOTOR CONTROLLER INTEGRATION SPEC

Document No.: NF-MCS-2023-114

Effective Date: January 15, 2024

Version: 2.1

### 1. PURPOSE AND SCOPE

1 This Motor Controller Integration Specification ("Specification") esta

2 This Specification applies to all Series X-300 and X-400 AMR units

## 2. DEFINITIONS

1 "Control System" means the integrated hardware and software components that manage the motor's operation.

2 "Motor Assembly" refers to the complete motor unit, including brushless motor, gearbox, and mounting bracket.

3 "Integration Protocol" means the standardized procedures and specifications for connecting the motor assembly to the control system.

## 3. TECHNICAL REQUIREMENTS

1 Motor Controller Specifications

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Operating Voltage: 24V DC  $\pm$  0.5V

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Maximum Current Draw: 15A continuous, 25A peak

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Communication Protocol: CAN-FD 2.0B

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Response Time: 2ms

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Position Accuracy: 0.02 degrees

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Temperature Range: -10 C to 50 C

## 2 Safety Features

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Overcurrent Protection: Automatic shutdown at >27A

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Thermal Protection: Progressive derating above 75 C

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Emergency Stop Integration: Response time <100ms

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Watchdog Timer: 250ms maximum reset interval

## 4. INTEGRATION PROTOCOLS

### 1 Hardware Integration

- a) All motor controller installations must utilize NaviFloor-approved mounting brackets (Part No. NF-MCB-2024).
- b) Cooling systems must maintain controller temperature below 65 C under full load.
- c) Power distribution must comply with NaviFloor Power Distribution Specification NF-PDS-2023-089.

### 2 Software Integration

- a) Controller firmware must be NaviFloor version 7.2.4 or higher.
- b) Communication stack must implement NaviFloor's proprietary terra protocols.
- c) All parameter updates must be logged to non-volatile memory.

## 5. QUALITY ASSURANCE

### 1 Testing Requirements

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Full load testing for minimum 4 hours

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Temperature cycling: -5 C to 45 C, 5 cycles

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Vibration testing per IEC 60068-2-6

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EMC compliance testing per EN 61000-6-2

## 2 Documentation Requirements

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Test results for each controller unit

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Calibration certificates

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Integration verification checklist

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Quality control signoff documentation

## **6. COMPLIANCE AND CERTIFICATION**

### 1 Regulatory Standards

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UL 1004-1 for rotating electrical machines

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CE marking requirements

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RoHS compliance

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ISO 13849-1 Performance Level D

2 Internal Standards

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NaviFloor Quality Management System (QMS-2023)

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NaviFloor Safety Protocol NF-SP-2023-118

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## **7. MAINTENANCE AND SUPPORT**

### **1 Preventive Maintenance**

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Quarterly controller diagnostics

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Annual firmware updates

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Biannual calibration verification

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Monthly performance data analysis

### **2 Technical Support**



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24/7 emergency support availability

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Remote diagnostics capability

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Maximum 4-hour response time for critical issues

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Quarterly performance review meetings

## **8. PROPRIETARY RIGHTS**

1 All specifications, designs, and integration protocols contained here

2 This document contains confidential and proprietary information and

## 9. REVISION HISTORY

Version 2.1 - January 15, 2024

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Updated voltage specifications

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Added new safety protocols

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Revised testing requirements

Version 2.0 - July 1, 2023

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Initial release of unified specification

## 10. APPROVAL AND AUTHORIZATION

This Specification has been reviewed and approved by:

—

Dr. Elena Kovacs

Chief Research Officer

NaviFloor Robotics, Inc.

**Date:** \_

—

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Chief Technology Officer

NaviFloor Robotics, Inc.

**Date:** \_

