FACTORY AUTOMATION & ROBOTICS SYSTEM — TECHNICAL SPECIFICATION DOCUMENT

Version: 3.1

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Confidential — Manufacturing Division Only

1. System Overview

The Factory Automation & Robotics System (FARS) coordinates robotic arms on Assembly Lines A, B, and C, monitors 150+ IoT sensors, controls conveyor belts, manages automated quality inspection, and enforces safety protocols.

2. Operational Metrics & Machine Thresholds

Robotic Arm Tolerances:

- Arm A: Max Reach 2.1m, Accuracy ±0.35mm, Max Load 40kg, Max Joint Temp 78°C, Max Angular Velocity 240°/sec

- Arm B: Max Reach 1.8m, Accuracy ±0.30mm, Max Load 55kg, Max Joint Temp 82°C, Max Angular Velocity 260°/sec

- Arm C: Max Reach 2.4m, Accuracy ±0.25mm, Max Load 30kg, Max Joint Temp 75°C, Max Angular Velocity 220°/sec

Shutdown Rule: Temp > Max +5°C → emergency cooling + stop ≤3s.

Conveyor Belt Requirements:

Nominal speed 1.35 m/s; deviation ±0.10 m/s; Max torque 240 Nm; vibration shutdown at 1.2 g RMS; alignment tolerance ≤3.5 mm.

Sensor Calibration Standards:

Thermal ±1.2°C (14 days), Optical ±0.05mm (7 days), Force ±3N (21 days). Exceeding 2× accuracy → OUT_OF_CALIBRATION.

3. Performance SLAs

Uptime 99.7%; robot cycle ≤380ms ±20ms; fault detection ≤2.5s; alert ≤1s; shutdown ≤3s.

4. Safety Requirements

Human in Zone A → stop ≤200ms.

Conveyor drift >3.5mm → slow to 0.6 m/s then stop.

Emergency stop → shutdown ≤1.2s.

5. Data Formats

Includes JSON payloads for Sensor Update & Robot Task Execution (see long spec in chat).

6. Error Codes

201-DRIFT-DETECTED, 304-OVERLOAD-WARNING, 412-CALIBRATION-FAILED, 509-OVERHEAT-SHUTDOWN, 610-HUMAN-IN-ZONE, 701-VIBRATION-CRITICAL.

7. Process Workflows

Arm failure workflow, conveyor drift correction, human intrusion safety flow.

8. Compliance

ISO 10218–1, ISO 13849–1, logs retained 24 months.

9. Additional Notes

Return 'not found' if info is missing.

AQI failure target <0.75%.

Recalibrate joints every 5000 cycles.