

Medical Bed Side Rail and Latch Reliability Test System

Model KP-RB50 | 6-Axis Robotic Arm Simulation | IEC 60601-2-52 & YY 9706.252-2021



Standards: IEC 60601-2-52, YY 9706.252-2021

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Product Overview

The KingPo KP-RB50 Medical Bed Side Rail and Latch Reliability Test System is a professional automated testing platform designed for repeated operation and durability evaluation of medical bed side rails and latch mechanisms. It utilizes a 6-axis robotic arm to accurately simulate manual side rail operation, providing consistent, repeatable testing for side rail cycling, latch engagement/release reliability, and long-term durability under repeated use.

The system is ideal for medical bed manufacturers, testing laboratories, and R&D teams working with hospital beds, nursing beds, and rehabilitation beds. By automating the side rail operation process with high-precision robotic control, it significantly improves test consistency and reduces operator-dependent variation compared to manual cycling methods.

Key Advantages

- ### High-Precision 6-Axis Robotic Simulation

Engineering: 6-axis robotic arm with ± 0.03 mm repeatability, 1034 mm working radius, and 16 kg maximum load capacity accurately replicates manual side rail and latch operation.

Benefit: Delivers highly consistent and repeatable test results for side rail cycling and latch reliability, eliminating variability inherent in manual testing and improving data quality for regulatory submissions.

- ### Flexible Path Teaching & Configuration

Engineering: 10.1-inch teach pendant allows operators to easily configure or teach custom operation paths based on specific side rail structure, latch location, and test method requirements.

Benefit: Enables rapid adaptation to different medical bed designs and side rail configurations without complex reprogramming, increasing testing efficiency and laboratory throughput.

- ### Standards-Aligned Reliability Testing

Engineering: Supports repeated operation testing aligned with side rail and latch reliability requirements in IEC 60601-2-52 and YY 9706.252-2021 (including clause 201.9.8.3.3.3 for latch reliability).

Benefit: Provides test data suitable for demonstrating compliance with mechanical safety and durability requirements for medical bed side rails and guardrails in regulatory submissions.

- ### Laboratory-Friendly Design

Engineering: Compact base ($\varnothing 190$ mm), low noise operation (< 65 dB), IPX54 protection rating, and 0–200 mm adjustable stroke/travel range make the system suitable for typical medical device testing laboratory environments.

Benefit: Minimizes laboratory space requirements and acoustic disturbance while providing robust protection against dust and water splashes common in testing environments.

- ### Configurable Tooling for Diverse Bed Designs

Engineering: Operation tooling and contact fixtures can be configured or customized according to different side rail structures, latch mechanisms, and bed frame designs.

Benefit: Offers flexibility to test a wide range of medical bed models and side rail configurations with minimal additional investment in custom fixtures.

Technical Specifications

3.1 General System Parameters

Parameter	Specification	Remark / Notes
Model	KP-RB50	Side Rail and Latch Reliability Test System
Operation Method	6-axis robotic arm simulation	Simulates manual side rail operation
Human-Machine Interface	10.1-inch teach pendant	Path teaching and parameter setting

Power Supply	AC 220 V, 50 Hz	Standard laboratory single-phase supply
Typical Samples	Medical beds, hospital beds, nursing beds, rehabilitation beds	Side rails and latch mechanisms

3.2 Robotic Arm Parameters

Parameter	Specification	Remark / Notes
Maximum Load	16 kg	Robotic operation capacity
Working Radius	1034 mm	Robot reach for side rail operation
Degrees of Freedom	6 rotating joints	Full simulated manual operation capability
Repeatability	±0.03 mm	High position accuracy for repeatable tests
Protection Rating	IPX54	Dust and water splash protection
Stroke / Travel	0–200 mm	Adjustable for side rail or latch operation
Noise Level	<65 dB	Suitable for laboratory environments
Base Diameter	190 mm	Compact footprint
Robot Power	410 W	Efficient operation

Testing Principle

The KP-RB50 system uses a 6-axis robotic arm to simulate repeated manual operation of medical bed side rails and latch mechanisms. The robotic arm is positioned according to the specific side rail structure and latch location on the test sample. Operators configure or teach the precise operation path using the 10.1-inch teach pendant to perform side rail movement, latch engagement, or release actions.

This automated approach ensures highly consistent operation force, speed, and path across thousands of cycles, enabling accurate evaluation of side rail cycling durability, latch mechanism reliability, and long-term repeated-use performance. The system is particularly valuable for identifying wear, deformation, or failure modes that may occur after extended use.

Test sequences can be programmed for continuous or intermittent operation, with operators able to monitor side rail movement, latch engagement/release smoothness, abnormal resistance, noise, or any mechanical degradation throughout the test duration.

Typical Applications

- Medical bed manufacturers — Side rail and latch durability testing during product development and production quality control
- Third-party testing laboratories — Compliance testing and certification support for side rail reliability per IEC 60601-2-52 and YY 9706.252-2021
- R&D and engineering teams — Evaluation of new side rail designs, latch mechanisms, and repeated-use performance optimization
- Quality assurance departments — Incoming inspection and batch verification of side rail components and assemblies
- Regulatory and compliance teams — Generation of durability data for technical documentation and market approval submissions

Typical Test Workflow

1. Position the medical bed sample and confirm side rail and latch accessibility.
2. Set robotic arm working position based on side rail structure and latch location.
3. Configure or teach the operation path using the 10.1-inch teach pendant.

4. Confirm robot movement does not interfere with bed frame, side rail, cables, or fixtures.
5. Start repeated operation test per selected method or procedure.
6. Observe side rail movement, latch engagement/release, and any abnormal resistance or noise.
7. Record test results, sample condition after test cycles, and any observed failures or degradation.

Compliance & Manufacturer

This equipment supports test methods for side rail and latch reliability evaluation aligned with IEC 60601-2-52 and YY 9706.252-2021 (particularly clause 201.9.8.3.3.3 for latch reliability through repeated operation simulation). It is designed to assist manufacturers and laboratories in assessing the mechanical durability and safety of medical bed side rails and guardrails.

Note: Full compliance evaluation requires complete application of the relevant standards, including product design, risk management, and laboratory procedures. The system provides automated testing capabilities aligned with specific reliability test needs; final compliance determination remains the responsibility of the manufacturer and accredited testing bodies.

Factory verification of robotic motion, control, and safety functions is performed before delivery. Regular verification of robot positioning, operation path, contact tooling, and safety settings is recommended. Fixture customization, robotic path setup, and test report format adaptation are available based on customer requirements. Manufactured under ISO 9001, ISO 14001, and ISO 45001 quality management systems.

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