



## EV Charging Gun Electronic Lock Comprehensive Tester High-Precision Actuation, Force & Durability Analysis per IEC 62196-1

---

### 1. Executive Summary

The **EV Charging Gun Electronic Lock Tester** is an advanced, high-precision validation platform engineered by **KingPo** for the comprehensive assessment of electronic locking mechanisms in electric vehicle charging infrastructure. This system is specifically developed to quantify mechanical durability, axial pull force, unlocking resistance, and electrical response times under high-cycle stress. It serves as a definitive compliance tool for manufacturers and laboratories operating under **IEC 62196-1:2022**, **GB/T 20234.1-2023**, and **GB/T 18487.1-2023**.

### 2. Engineering Excellence & Professional Construction

The system utilizes a modular design and high-grade industrial components to ensure stability during extended testing periods:

- **Precision Servo-Driven Architecture:** Employs a servo-motorized force application mechanism for controlled, repeatable axial thrust and tension.
- **Intelligent Control Interface:** Integrated with a **Mitsubishi PLC** and a 7-inch color HMI,

Website: [www.kingpo.hk](http://www.kingpo.hk)

Tel: 0086 769 81627526

Address: No.9, University Rd., Songshan Lake, Dongguan, Guangdong, China

E-mail: [sales@kingpo.hk](mailto:sales@kingpo.hk)

Fax: 0086 769 89032367



allowing for complex sequence programming and real-time data visualization.

- **High-Resolution Instrumentation:** Equipped with laboratory-grade load cells and linear displacement sensors for sub-millimeter and sub-Newton accuracy.
- **Universal Interface Compatibility:** Features interchangeable fixtures designed for GB (China), Type 2 (EU), and US-standard charging connectors.
- **Safety & Structural Integrity:** The robust mechanical frame includes anti-vibration foot pads and integrated electrical safeguards against short-circuits and overloads.

### 3. Detailed Technical Specifications

#### Mechanical & Kinematic Parameters

Parameter	Technical Specification	Operational Significance
Pull Force Range	0 – 50 N	Accuracy: $\pm 0.5\%$ F.S.; Resolution: 0.1 N
Unlocking Force Range	0 – 100 N	Accuracy: $\pm 0.5\%$ F.S.; Resolution: 0.1 N
Displacement Range	0 – 50 mm	High-resolution tracking of lever stroke
Response Time	Millisecond resolution (ms)	Critical for evaluating lock/unlock safety speed

#### Electrical & Automation Specifications

Parameter	Technical Specification	Operational Significance
Load Current Range	1 – 200 mA (Adjustable)	Real-time monitoring of lock status signals
Test Cycle Capacity	0 – 99,999 cycles	Programmable with non-volatile memory
Interval Timing	0 – 200 s (Resolution: 1 s)	Simulates diverse duty cycles and cooling periods
Control Logic	Mitsubishi PLC	Supports manual and fully automated modes

### 4. Testing Principle & Methodology

The tester replicates the mechanical and electrical interface between a vehicle inlet and a charging connector. By applying programmable forces to the electronic locking lever while simultaneously supplying a calibrated load current, the system evaluates the lock's performance under dynamic conditions.

Website: [www.kingpo.hk](http://www.kingpo.hk)

Tel: 0086 769 81627526

Address: No.9, University Rd., Songshan Lake, Dongguan, Guangdong, China

E-mail: [sales@kingpo.hk](mailto:sales@kingpo.hk)

Fax: 0086 769 89032367



The system continuously monitors:

- **Mechanical Integrity:** Detection of wear, deformation, or fracture during high-cycle operation.
- **Electrical Feedback:** Verification of signal consistency and response time for status reporting.
- **Emergency Safeguards:** Specialized routines for testing emergency manual unlocking forces under simulated fault scenarios.

## 5. Industrial Applications & Business Value

- **OEM & Connector Manufacturers:** Facilitates full life-cycle durability and force characteristic profiling during product development.
- **Certification & Third-Party Labs:** Provides traceable, standard-compliant data for international market entry (IEC/GB).
- **R&D Engineering:** Enables precision optimization of locking force vectors, stroke length, and response time.
- **Quality Assurance (QA):** Supports batch consistency verification and reliability assessments for production-grade components.

## 6. Metrological Integrity & Error Mitigation

To achieve maximum repeatability and data accuracy, KingPo recommends the following protocols:

- **Axial Alignment:** Ensure the force application device is strictly aligned with the locking lever to avoid side-loading errors.
- **Fixture Calibration:** Regularly verify that interchangeable fixtures are securely clamped and compatible with the specific connector geometry.
- **Environment Stabilization:** Maintain a stable laboratory environment to minimize thermal drift in displacement and force sensors.
- **Traceable Calibration:** Perform annual calibration of load cells, transducers, and current circuits to maintain traceable accuracy.