Complete
Instrumentation Solutions

Newsletter

Vibration & Shock Testing Systems

Newsletter on Vibration & Shock Test Systems

- **Air-cooled Vibration Test System**
- **Water-cooled Vibration Test System**
- **Standard Vibration Test System**
- **Power Amplifier & Control System**
- **Head Expander & Slip Table**
- **Environmental Test System**

Applications

Automotive

Vibration systems are crucial within this sector, contributing significantly to the development and production of diverse vehicle components and systems like engines, transmissions, frames, tires, and suspensions. Exploring these systems can enhance vehicle performance, reliability, and comfort, offering valuable insights for improvement.

Aviation

Vibration systems find extensive application in aircraft structures, engines, & control mechanisms to attain vibration dampening, noise mitigation, and enhanced operational safety. The precision and stability of aircraft control systems are paramount, and their vibration characteristics and can be assessed and refined via vibration simulation trials.

Aerospace

The intense vibrations generated by rocket motor ignition, operation, and interstage separation during launch pose a risk of structural deformation or harm to the spacecraft and its parts. Ground-based vibration testing of spacecraft ensures their suitability to withstand such environmental stresses.

Military

Vibration systems in defense serve various purposes within the military domain, particularly in testing and assessing military equipment and weaponry. The dependability and effectiveness of such gear significantly impact operational readiness, making vibration testing crucial for evaluating their resilience and stability in challenging conditions.

Vessel

Vibration systems are integral to marine engineering, aiding in the design and refinement of power and propulsion systems for ships, encompassing components like gas turbines, gearboxes, clutches, couplings, and propellers. Analyzing these systems contributes to enhancing the reliability and comfort levels of maritime vessels.

Rail Transport

Vibration systems are extensively utilized in the rail industry to develop and manufacture various components and systems for trains, metros, trams, etc. The examination of vibration systems can aid in reducing vibration and noise in rail transport, thereby enhancing the comfort and safety of trains and stations.

Electronic Equipment

Many electronic products undergo vibration exposure. Damage incurred by vibration is primarily linked to the dynamic attributes of the product and the alternating stresses produced by its dynamic reaction during vibration. Conducting vibration tests on electronic products is straightforward, with easily controlled test conditions.

Package

During the packaging phase, items must be enclosed in designated containers such as bottles, boxes, or jars. Utilizing vibration control systems can enhance packaging efficiency and quality. By regulating container vibrations, these systems ensure more uniform product distribution within the container, thereby reducing packaging errors and minimizing damages.

Air-cooled Vibration Test System

Features

Air-cooled Vibration Test System

- Superior performance ensured with upper and lower guidance structures and optimized armature.
- Optimized magnetic circuit design reduces flux leakage, enhances efficiency.
- Multi-interlock protection ensures safety for system and specimens, while maintaining force equivalence.

Air-cooled Vibration Test system

The air-cooled series electro-dynamic vibration test system offers a force range of 1kN to 70kN, featuring high operational frequency, reliability, and ease of use. It is commonly used in electronic components, automotive parts, aerospace, medical devices, and small to medium-scale tests. The system employs upper and lower guidance structures for superior performance and anti-eccentric moment. The optimized armature ensures light mass, high vibration resistance, and stiffness with a high first resonance frequency.

Magnetic circuit design is optimized for increased utilization and reduced flux leakage. Random exciting force is equivalent to sine exciting force, and multi-interlock protection ensures system and specimen safety.

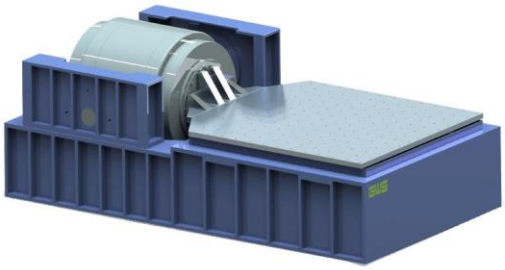
Air-cooled Series Models

TS1–150	TS1.5–150
TS2–150	TS3–150
TS6–230	TS10–240
TS10D–240	TS20–320
TS20–445	TS20LS3–340
TS30–370	TS30LS4–445
TS40–370	TS40LS4–445
TS50–445	TS50LS3–445
TS50LS4–445	TS60–445
TS60LS3–445	TS60LS4–445
TS70LS3–480	TS70LS3–550

TS400LS3-870 MP2525 VT2525

- Electro-dynamic vibration test system
- Max. exciting force (1~600 kN)
- Max. displacement (25, 51, 76, 100mm)
- Head expander (square, round optional)
- Slip table (LP, MP, HP optional)
- Armature Diameter (150~870mm)

Water-cooled Vibration Test System



Water-cooled Vibration Test System

The water-cooled series electro-dynamic vibration test system provides a force range of 25kN to 400kN, ideal for large specimen tests. Its features include high cooling efficiency, large force, and excellent guiding capacity. The optimized armature ensures high strength, vibration resistance, and stiffness. Additionally, the system employs water-cooling design for improved efficiency, high-strength materials for armature winding, and parallel water circuit design to enhance cooling efficiency. It also boasts optimized magnetic circuit design for increased utilization and reduced flux leakage. Safety measures such as multi-interlock protection ensure system and specimen safety.

Water-cooled Series Models

TS25WLS3–340	TS35WLS3–340
TS50W–445	TS50WLS3–445
TS50WLS4–445	TS60W–445
TS60WLS3–445	TS60WLS4–445
TS70W–445	TS70WLS3–445
TS70WLS4–445	TS80W–445
TS80WLS3–445	TS80WLS4–445
TS100–550	TS100LS3–550
TS120–550	TS120LS3–550
TS160–650	TS160LS3–650
TS180–650	TS180LS3–650
TS200–650	TS200LS3–650
TS300LS3-870	TS350LS3-870
TS400LS3-870	

The above list of water-cooled systems is available with compatible power amplifiers & cooling units.

Features

Water-cooled Vibration

- Capable of exerting forces from 25kN to 400kN, suitable for diverse test specimen sizes.
- Water-cooling design for the short circuit ring and parallel water circuit design ensure efficient heat dissipation, maintaining system integrity.
- Optimized for high strength, vibration resistance, and stiffness, providing reliability during rigorous testing scenarios.

Standard Vibration Test System

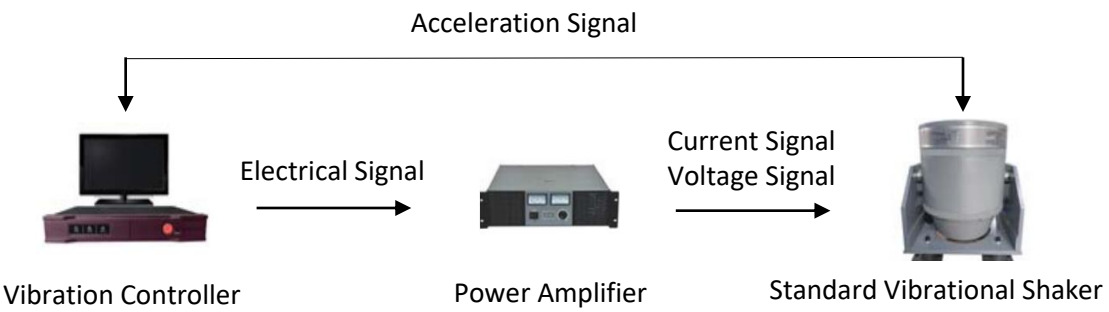
Features

Standard Vibration Test System

- Tailored for designers with small size and low energy consumption.
- Versatile applications including vibration resistance and fatigue tests.
- Two categories: Permanent Magnet Type (TSM) and Field Coil Type (TSF).
- TSM utilizes permanent magnets, while TSF relies on field coils for magnetic field generation.

Standard Vibration Test System

The Standard series vibration test system offers tailored solutions for designers, featuring a small footprint, compact design, minimal energy consumption, straightforward installation, operation, and portability, making it ideal for educational, research, and laboratory settings. It is extensively employed for conducting vibration resistance, fatigue, and mechanical impedance tests on small-scale components. This series is divided into two categories: the Permanent Magnet Type (TSM) and the Field Coil Type (TSF), distinguished by their respective exciting sources. The primary difference lies in how they generate the magnetic field environment: TSM utilizes a permanent magnet component to establish a stable magnetic field, while TSF employs field coils to energize and create the magnetic field. Vibration or shock motion is generated by the shaker in response to an amplified drive signal that originates at the controller. The accelerometer will provide the collected signal to the controller for real-time correction, and send back to the power amplifier.



Power Amplifier & Control System

Power Amplifier

The PWA is equipped with power exchange, electric control, signal modulation, protection, driving, power amplification, and human-machine interface units. Notable features include high reliability, efficiency, energy-saving, flexibility, and compactness. It adopts a modular design for space-efficiency and incorporates auto-saving functions for operation and failure codes. The user-friendly interface facilitates accessibility, and coding/decoding technology minimizes output ripple. Signal and power separation adhere to EMC/EMI requirements, with optional remote control via wireless network or GPRS. Additionally, it includes self-diagnostic capabilities for intelligent monitoring of key parameters such as temperature, current, and voltage.

Control System

The control system implemented in power amplifiers and other testing systems is highly efficient and user-friendly. It features Ethernet communication facilitated by a smart PLC, enabling convenient extensions like remote control and centralized monitoring. Additionally, it offers an energy-saving mode suitable for small-scale tests on medium and large force shakers, reducing noise and energy consumption. The system further enhances user experience with a human-friendly interface, incorporating a high-reliability touch screen and intelligent design crafted by a professional UI design company.

Features

Power Amplifier

- Modular design for space efficiency and convenience.
- User-friendly interface for enhanced accessibility.
- Self-diagnostic capabilities for intelligent parameter monitoring.

Control System

- Ethernet communication with smart PLC for remote control and centralized monitoring.
- Energy-saving mode for small-scale tests on medium and large force shakers.
- Human-friendly interface with high-reliability touch screen and professional UI design.

Head Expander & Slip Table

Features

Head Expander

- Tailored head expanders for varying specimen sizes and operating frequencies.
- Optional aluminum/magnesium alloy construction for enhanced stiffness and performance.
- Choice between welded and integral types, both offering excellent vibration damping and reduced resonance at high frequencies.

Slip Table

- Supports horizontal motion transmission for test pieces.
- Customizable options include low, medium, and high-pressure models.
- Strong transmission rigidity with inclined hole connection method.

Head Expander

When the dimensions of the specimen surpass the surface area of the shaker armature, head expanders become necessary. The choice of head expander depends on both the specimen's size and the upper operating frequency. Additional models beyond those listed are accessible to accommodate specific customer needs. Optional materials include aluminum/magnesium alloy, renowned for its robustness and superior performance. Customers may also choose between welded and integral types, both offering commendable vibration damping and a reduced resonance rate, particularly at higher frequencies.

Slip Table

The slip table, an essential component of the vibration shaker, transmits motion horizontally to the test piece or supports larger specimens during horizontal vibration tests. Selection depends on specimen size, load, and testing conditions, with customization options available such as low, medium, and high-pressure models, as well as standalone, combo type, and dual-slip table configurations. The slip table offers robust rigidity, easy installation, and adjustment, connecting to the armature via an inclined hole connection method. Additionally, it features specially designed key groove thread inserts for strength and reliability.

Environmental Test System

Features

Environmental Test System

- Simultaneous simulation of temperature, humidity, and vibration.
- Compatibility with various applied tests including stress screening and reliability evaluation.
- Rapid temperature change capability, up to 15℃/min.
- Precise control with temperature fluctuation ≤ 0.5℃.
- Energy-efficient operation with stepless temperature regulation via electronic expansion valve.

Environmental Test System

The chamber is designed to conduct combined tests by simulating temperature, humidity, and vibration simultaneously, effectively integrating with a vibration shaker. It facilitates various applied tests including high temperature, low temperature, temperature & humidity, high-low temperature, high-low temperature & humidity, environment stress screening, reliability evaluation, and acceptance tests. Key features include rapid temperature change capability, with a maximum mechanical refrigeration rate of up to 15℃/min, and further enhancement by a liquid nitrogen refrigeration system achieving a cooling rate of 30℃/min. The electronic expansion valve enables precise control of cooling capacity, offering stepless temperature regulation for energy efficiency. Additionally, the chamber ensures high control precision, with temperature fluctuation ≤ 0.5℃ and temperature deviation ≤ ±1.5 ℃, ensuring accurate and reliable testing conditions.

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