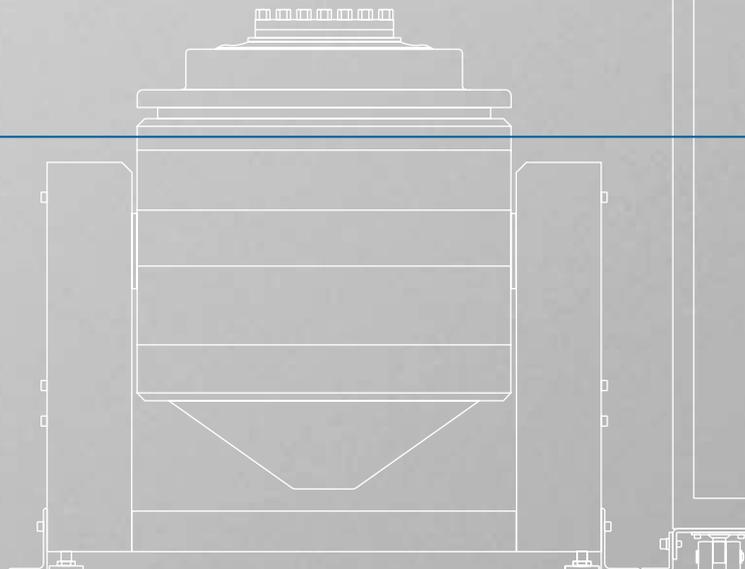


EMIC
VIBRATION
TESTING
SYSTEM



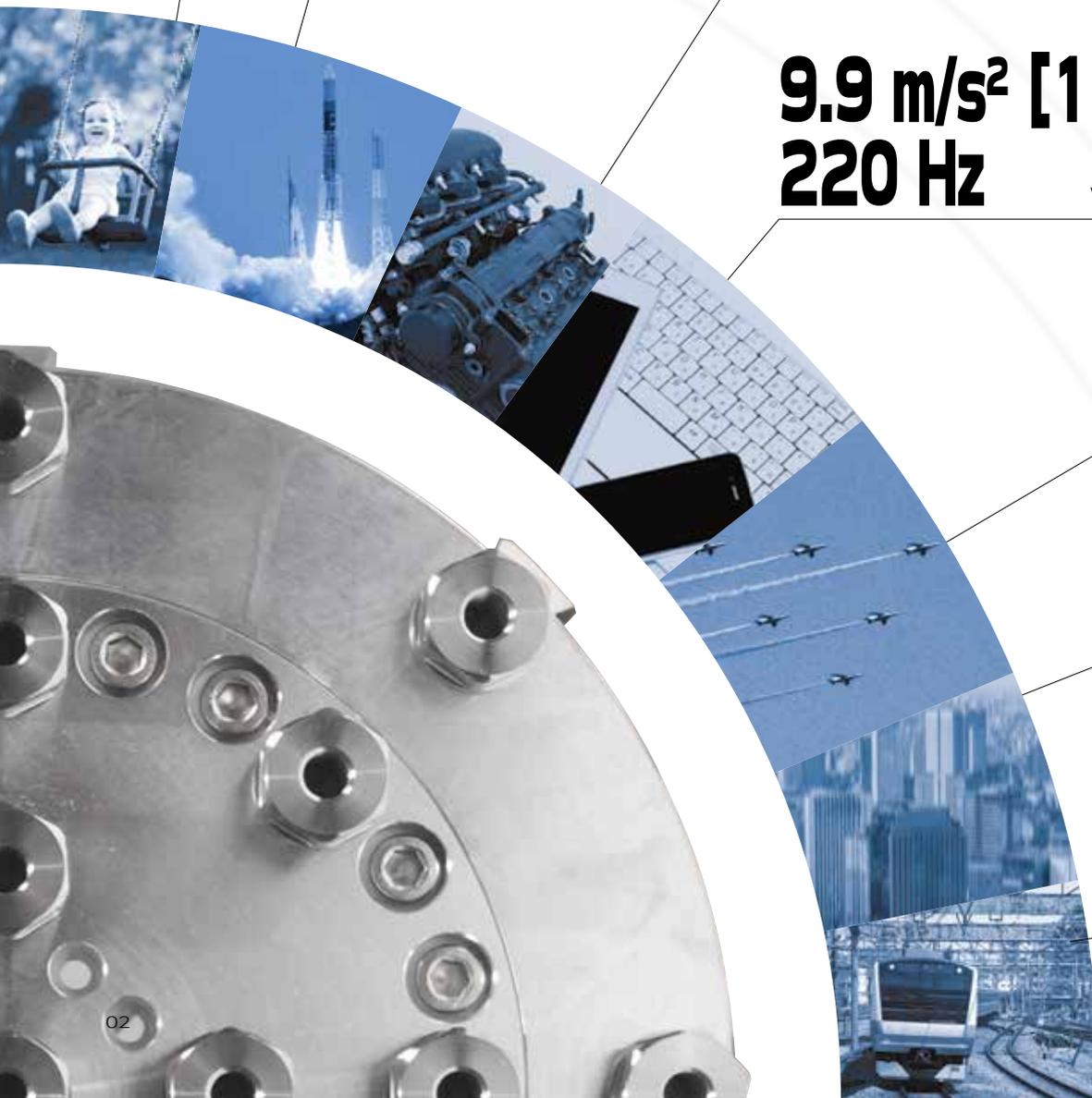
Every item in the world experiences vibrations!

9.8 m/s² [1 G] at 2.8 Hz Swing in the park

**70.7 m/s² [7.2 G] rms (137 dB)
from 20 Hz to 8 kHz** Launch of a rocket

**100,000 m/s² [10,000 G]
at 250 Hz** Motion of F1 engine piston

**9.9 m/s² [1.01 G] at
220 Hz** Vibrations of cell-phone



Partner for Your Quality.

Technological advances bring about rapidfire succession in each field of industry, and produce many epoch-making products.

Furthermore, reliability and safety with "Excellent Durability" guaranteed are necessary for highly advanced products.

It is EMIC that provides testing systems and solution to offer various tests such as vibration, combined environmental, quality assurance, quality control, reliability, durability, etc.

We support each customer with the highest product and quality and, as a partner, will contribute to people, society and the future.

43.4 m/s² [4.43 G] rms from 5 Hz to 500 Hz

Fighter Jets (Max. 9 G)

10.764 m/s² [1.09 G] from 2 Hz to 33 Hz

Equivalent to upper 6 seismic intensity

5.7 m/s² [0.58 G] rms from 2 Hz to 250 Hz

Vibrations in Commuter Express

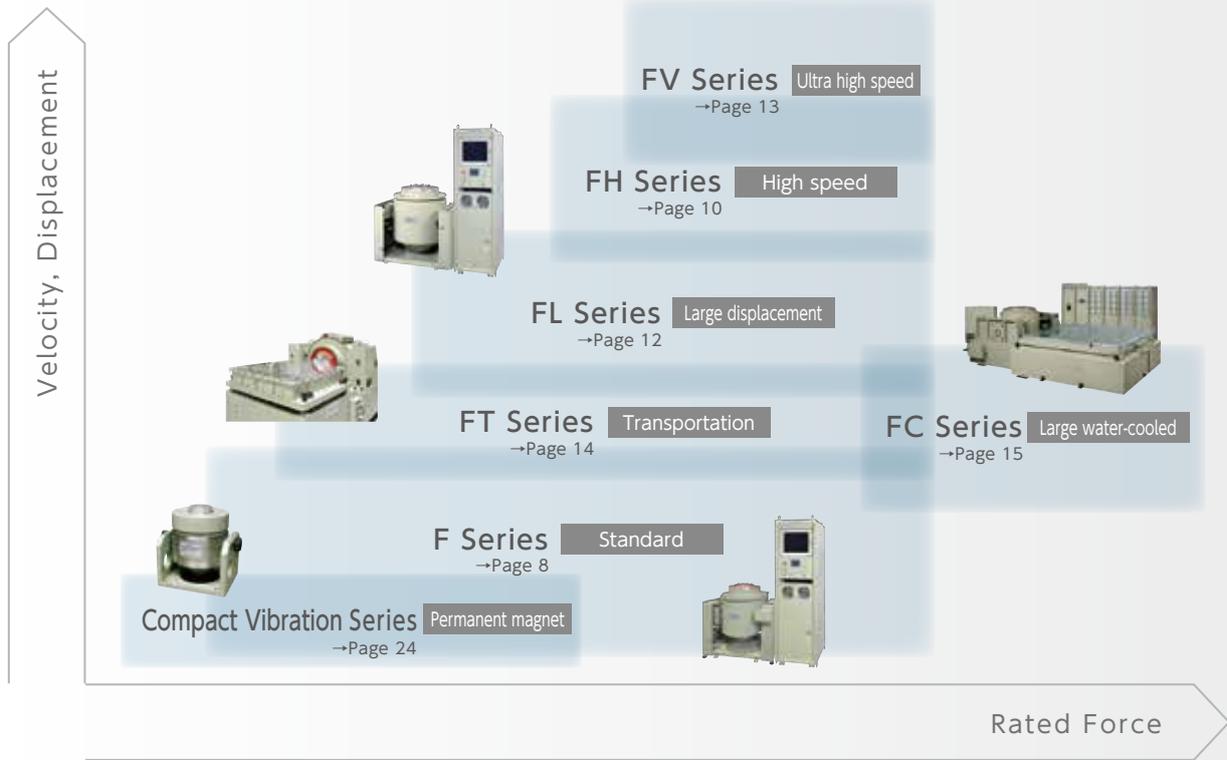
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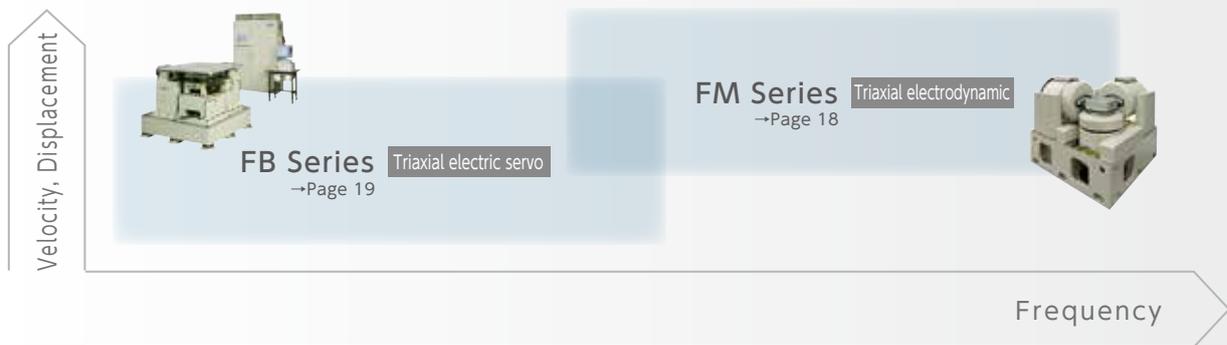
※The vibration level mentioned above introduces the representative level and maximum, not for specifying a real vibration environment.

Lineup

Uniaxial Vibration Testing System



Triaxial Vibration Testing System



Energy-saving Vibration Testing System





| | Electric, Electronic and Precision Equipment | | | | Automotive Equipment | | | | Railroad | | Aerospace | | | Transport (Truck) | | Building | | |
|--------------------------------------|--|------------------------------------|---|--------------------------------|---|---|--|---|-----------------------------------|---|---|------------------------------------|--|--|---|--|--|--|
| | Home electric appliance (television monitor, camera) | IT equipment (notebook PC, tablet) | Industrial electric apparatus (large motor, control unit, industrial robot, electricity meter, solar panel) | Measuring instruments (sensor) | Power train (engine, motor, catalyst, exhaust system) | Large battery (lithium ion battery, inverter) | In-vehicle electric apparatus (ECU, car navigation system, light, accessory for meter) | Body, interior finishing (seat, interior) | Collision damping device (airbag) | Rolling stock equipment (train security, inverter controller, master controller, brakes, bogie) | Railroad facilities (rail, turnout, signal) | Aircraft engine and airframe parts | Electronic device for aircraft (radar) | Space apparatus (rocket propulsion apparatus, satellite) | Daily necessities (drinking water, pharmaceutical products, food) | Delivery to home, baggage transportation (cardboard packing materials, transportation means) | Structure analysis (building, apartment, bridge, earthquake-related) | Damage evaluation (concrete structure, bridge) |
| Compact Vibration Series →Page 24 | 4 | 3 | 1 | 5 | | | 4 | | | | | 3 | | 4 | | 5 | 4 | |
| FP Series →Page 16 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 2 | 4 | 5 | 3 | 3 | 4 | 4 | 3 | 3 | |
| F Series →Page 8 | 5 | 5 | 5 | 5 | 3 | 3 | 4 | 2 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | |
| FH Series →Page 10 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 3 | 2 | 5 | 5 | 5 | 5 | 3 | 5 | 2 | | |
| FL Series →Page 12 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 2 | 5 | 4 | 5 | 4 | 5 | 3 | 3 | 2 | |
| FV Series →Page 13 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 1 | 5 | 2 | |
| FC Series →Page 15 | 2 | 2 | 4 | 1 | 5 | 5 | 3 | 5 | 2 | 5 | 5 | 5 | 5 | 5 | 2 | 2 | | |
| FT Series →Page 14 | 5 | 4 | 2 | | | | 4 | 4 | | | | | | 5 | 5 | | | |
| FM Series →Page 18 | 5 | 3 | 4 | 3 | 4 | 5 | 5 | 1 | | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 1 |
| FB Series →Page 19 | 5 | 2 | 4 | 3 | 3 | | 3 | 1 | | 3 | 1 | | | 4 | 4 | 5 | 1 | |
| FS Series →Page 20 | | | | 5 | | | | | 5 | | | | | | | | | |

(Adaptation level: 1 being the least efficient. 5 being the most efficient)

Endures vibrations.

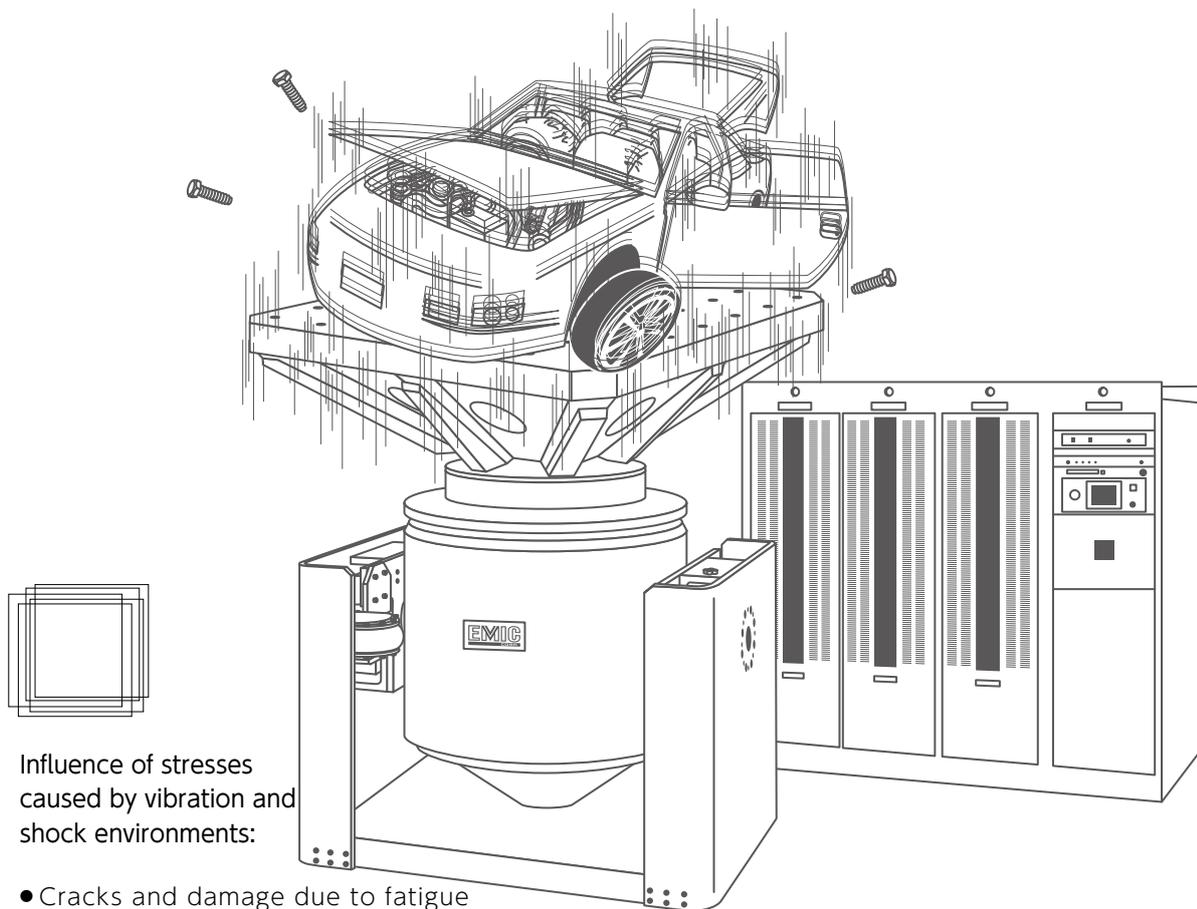
From a product that cannot be judged for reliability. To a product that cannot be broken due to reliability.

All industrial products shall be utilized safely and trouble free from the framework such as automobile, railroad, aerospace to an IT apparatus, and imminent household electrical appliance. The product must endure against the temperature of scorching heat and arctic weather, humidity, severe vibration and shock.

EMIC's testing systems can evaluate the function, performance, reliability and quality of various industrial products. In addition, the testing equipment will provide safety and security.

Vibration test and combined environmental test are used for evaluating products at the designing and experimental stage of products.

How you look at an example of how a vibration test is performed.



Influence of stresses caused by vibration and shock environments:

- Cracks and damage due to fatigue
- Electrical and mechanical characteristic change
- Wear of contact parts
- Surface change due to abrasion
- Loosening of screws and bolts
- Corrosion acceleration
- Interference between components

The vibration testing system is used for applying vibration stresses to a testing object by creating a fore rating. As an artificial vibration source, it is suitable for precise and severe loading.

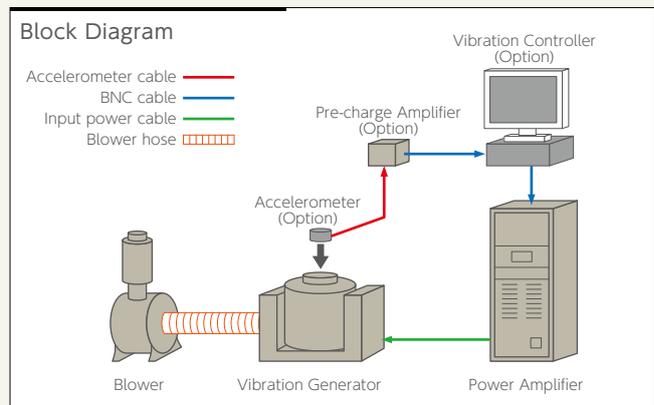
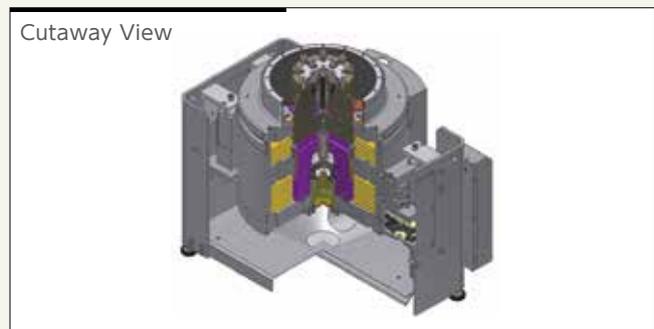


Configuration of Electrodynamic Vibration Testing System

EMIC's vibration testing system can perform various vibration tests by forcefully exciting a test object with frequency and acceleration set arbitrarily. The electrodynamic type uses electrical energy to create dynamic motion and the feature is that the waveform distortion is less and frequency higher compared with the servo-hydraulic and mechanical type.

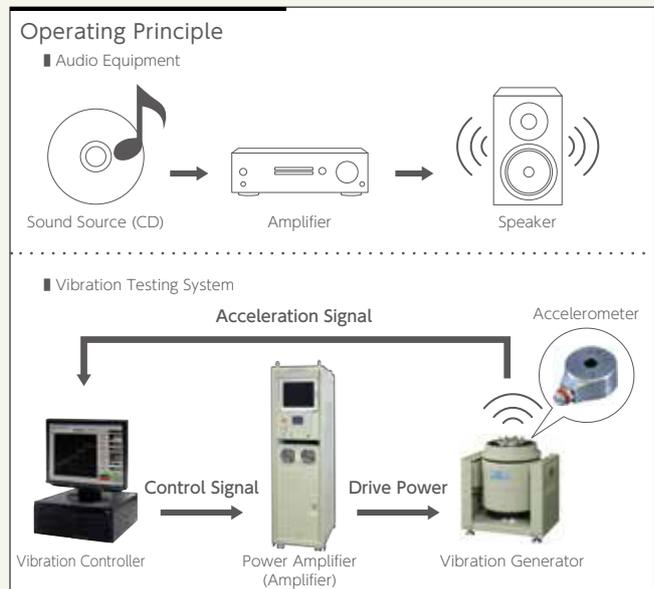
Names of Components:

- **Vibration Generator**
Generates vibrations for exciting a test object including a fixture which is attached to the top. The force is created with two kinds of coils, armature coils and field coil for magnet structure.
- **Power Amplifier**
Provides AC power for armature coil.
- **Console Rack**
Incorporates a power module, field power supply, vibration controller, operator panel and other (I/O).
- **Air Cooling Blower**
Cools moving element (armature) and field coil of a vibration generator with forced air.
- **Accelerometer**
Measures vibration acceleration.
- **Pre-charge Amplifier**
Converts the charge output from an accelerometer into a voltage signal, and then amplifies it.
- **Vibration Controller**
Controls the vibration on the vibration generator to match to the user defined frequency and amplitude specification.



Operating Principle:

The vibration generator generates any desired vibration, but its operating principle is the same as audio equipment which plays music. The audio equipment amplifies the minute electrical signal of the sound source (CDs) with an amplifier and makes a sound with a dynamic loudspeaker with high power. In the same manner the electrodynamic vibration system also amplifies the minute electrical signal from the vibration controller with the power amplifier to generate the vibration with the vibration generator corresponding to the loudspeaker. However, one operating principle is different from the audio equipment because the vibration testing system controls the frequency and amplitude using the accelerometer and vibration controller.



F Series Vibration Testing System

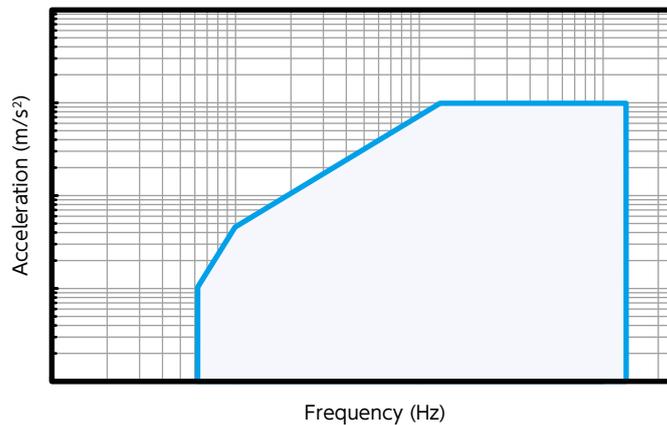
Standard



The standard F series vibration testing system has been sold for over 40 years. This system can generate force from 1.3 kN to 60 kN over the broad range of frequency and has high durability to perform various vibration tests.

※The vibration controller is mounted in the console rack. (Optional)

■ Maximum Rated Exciting Capability Curve of Standard System



※This performance curve is how you look at each system for comparison.



F Series Specifications

| | Model | F-1K/15 | F-2K/20 | F-2K/20A | F-3K/20 | F-3K/20A | F-6K/20 |
|--------------|-----------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Rated Force | Sine | kN _{0-p} 1.3 | 2.0 | 2.0 | 3.0 | 3.0 | 6.0 |
| | Random | kN _{rms} 1.3 | 2.0 | 2.0 | 3.0 | 3.0 | 6.0 |
| | Shock | kN _{0-p} 2.6 | 4 | 4 | 6 | 6 | 13.2(★4) |
| | Frequency range | Hz to 4000 | to 4000 | to 3000 | to 4000 | to 3000 | to 3500 |
| | Max. acceleration | m/s ² 1000 | 625 | 500 | 938 | 750 | 923 |
| | Max. velocity | m/s 1.4 | 1.4 | 1.4 | 1.6 | 1.6 | 1.8 |
| | Max. displacement | mm _{p-p} 15 | 20 | 20 | 20 | 20 | 20 |
| | Max. payload | kg 30 | 40 | 150 | 40 | 150 | 60 |
| | Input power | kVA 4.1 | 6.2 | 6.2 | 7.3 | 7.3 | 9.8 |
| | Armature Mass | kg 1.3 | 3.2 | 4.0 | 3.2 | 4.0 | 6.5 |
| | Allowable offset load | N·m 26 | 40 | 40 | 60 | 60 | 120 |
| | Cooling method | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Model | Vibration Generator | 902-FN | 903-FN | 903-FN/A | 903-FN | 903-FN/A | 906-FN |
| | Power Amplifier | 369A-0101A-02 | 369A-0101A-03 | 369A-0101A-03 | 369A-0101A-03 | 369A-0101A-03 | 369A-0101A-06 |
| | Console Rack | CRD-1500-02 | CRD-1500-03 | CRD-1500-03 | CRD-1500-03 | CRD-1500-03 | CRD-2000-06 |
| | Armature Size | mm ∅80 | ∅120 | ∅120 | ∅120 | ∅120 | □120 |
| Size | Vib. Generator | mm 460W×490H×490D | 630W×602H×528D | 630W×602H×528D | 630W×602H×528D | 630W×602H×528D | 720W×675H×628D |
| | Console Rack | mm 554W×1462H×1010D | 554W×1462H×1010D | 554W×1462H×1010D | 554W×1462H×1010D | 554W×1462H×1010D | 554W×2000H×1010D |
| | Blower | mm 474.5W×1040H×495D | 474.5W×1040H×495D | 474.5W×1040H×495D | 474.5W×1040H×753D | 474.5W×1040H×753D | 474.5W×1040H×674D |
| Mass approx. | Vib. Generator | kg 240 | 350 | 350 | 350 | 350 | 520 |
| | Console Rack | kg 285 | 290 | 290 | 290 | 290 | 420 |
| | Blower | kg 31 | 31 | 31 | 39 | 39 | 55 |

| | Model | F-6K/30 | F-10K/56 | F-15K/56 | F-22K/60 | F-25K/60 | F-28K/60 |
|--------------|-----------------------|----------------------------|------------------|------------------|------------------|------------------|------------------|
| Rated Force | Sine | kN _{0-p} 6.0 | 10.0 | 15.0 | 22.0 | 25.0 | 28.0 |
| | Random | kN _{rms} 6.0 | 10.0 | 15.0 | 22.0 | 25.0 | 28.0 |
| | Shock | kN _{0-p} 13.2(★4) | 22.0(★4) | 33.0(★4) | 48.4(★4) | 55.0(★4) | 61.6(★4) |
| | Frequency range | Hz to 2300 | to 3000 | to 3000 | to 2500 | to 2500 | to 2200 |
| | Max. acceleration | m/s ² 706 | 667 | 1000 | 846 | 961 | 848 |
| | Max. velocity | m/s 1.8 | 1.2 | 1.8 | 1.8 | 1.8 | 1.8 |
| | Max. displacement | mm _{p-p} 30 | 56 | 56 | 60 | 60 | 60 |
| | Max. payload | kg 200 | 200(300)(★2) | 200(300)(★2) | 400(500)(★2) | 400(500)(★2) | 400(500)(★2) |
| | Input power | kVA 9.8 | 19.3 | 22.6 | 26.8 | 28.4 | 37.5 |
| | Armature Mass | kg 8.5 | 15.0 | 15.0 | 26.0 | 26.0 | 33.0 |
| | Allowable offset load | N·m 120 | 500 | 500 | 700 | 700 | 900 |
| | Cooling method | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Model | Vibration Generator | 906-FN/A | 916-BP/LA | 916-AP/LA | 926-AP/LA | 926-AP/LA | 936-AP/LA |
| | Power Amplifier | 369A-0101A-06 | 369A-0501A-16BP | 369A-0502A-16AP | 369A-0503A-26AP | 369A-0504A-26AP | 369A-0504A-36AP |
| | Console Rack | CRD-2000-06 | CRD-2000-16 | CRD-2000-16 | CRD-2000-26 | CRD-2000-26 | CRD-2000-36 |
| | Armature Size | mm □120 | ∅230 | ∅230 | ∅270 | ∅270 | ∅330 |
| Size | Vib. Generator | mm 720W×675H×628D | 975W×885H×700D | 975W×885H×700D | 1106W×1047H×855D | 1106W×1047H×855D | 1224W×1107H×971D |
| | Console Rack | mm 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D |
| | Blower | mm 474.5W×1040H×674D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×996D | 707W×1666H×1072D |
| Mass approx. | Vib. Generator | kg 500 | 1200 | 1200 | 2200 | 2200 | 3100 |
| | Console Rack | kg 420 | 520 | 520 | 520 | 530 | 570 |
| | Blower | kg 55 | 220 | 220 | 220 | 255 | 260 |

| | Model | F-33K/60 | F-35K/60 | F-40K/60 | F-43K/60 | F-51K/60 | F-60K/60 |
|--------------|-----------------------|----------------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Rated Force | Sine | kN _{0-p} 33.0 | 35.0 | 40.0 | 43.0 | 51.0 | 60.0 |
| | Random | kN _{rms} 33.0 | 35.0 | 40.0 | 43.0 | 51.0 | 60.0 |
| | Shock | kN _{0-p} 72.6(★4) | 77.0(★4) | 88.0(★4) | 94.6(★4) | 112.2(★4) | 132.0(★4) |
| | Frequency range | Hz to 2200 | to 2200 | to 2200 | to 2500(★1) | to 2500(★1) | to 2500(★1) |
| | Max. acceleration | m/s ² 1000 | 1000(★3) | 1000(★3) | 623 | 739 | 869 |
| | Max. velocity | m/s 1.8 | 1.8 | 1.8 | 1.3 | 1.3 | 1.3 |
| | Max. displacement | mm _{p-p} 60 | 60 | 60 | 60 | 60 | 60 |
| | Max. payload | kg 400(500)(★2) | 400(500)(★2) | 400(500)(★2) | 500 | 500 | 500 |
| | Input power | kVA 42.2 | 47.8 | 57.0 | 61.8 | 64.8 | 68.3 |
| | Armature Mass | kg 33.0 | 33.0 | 36.0 | 69.0 | 69.0 | 69.0 |
| | Allowable offset load | N·m 900 | 900 | 900 | 1200 | 1200 | 1200 |
| | Cooling method | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Model | Vibration Generator | 936-AP/LA | 936-AP/LA | 936-AP/LA | 960-AP/LA | 960-AP/LA | 960-AP/LA |
| | Power Amplifier | 369A-0505A-36AP | 369A-0505A-36AP | 369A-1006A-36AP | 369A-1005A-60AP | 369A-1006A-60AP | 369A-1008A-60AP |
| | Console Rack | CRD-2000-36 | CRD-2000-36 | CRD-2000W-36 | CRD-2000W-60 | CRD-2000W-60 | CRD-2000W-60 |
| | Armature Size | mm ∅330 | ∅330 | ∅330 | ∅430 | ∅430 | ∅430 |
| Size | Vib. Generator | mm 1224W×1107H×971D | 1224W×1107H×971D | 1224W×1107H×971D | 1452W×1252H×1215D | 1452W×1252H×1215D | 1452W×1252H×1215D |
| | Console Rack | mm 554W×2000H×1010D | 554W×2000H×1010D | 1108W×2000H×1010D | 1108W×2000H×1010D | 1108W×2000H×1010D | 1108W×2000H×1010D |
| | Blower | mm 707W×1681H×946D | 869W×1856H×1094D | 869W×1856H×1094D | 1021W×2170H×1149D | 1021W×2170H×1149D | 1021W×2170H×1149D |
| Mass approx. | Vib. Generator | kg 3500 | 3500 | 3900 | 5000 | 5000 | 5000 |
| | Console Rack | kg 580 | 600 | 600 | 600 | 650 | 700 |
| | Blower | kg 260 | 325 | 380 | 400 | 400 | 450 |

※ Input power specification is for 3φ AC200 V 50/60 Hz. ※ Lower limit frequency should be determined by a performance of an available vibration control system. ※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details. (★1) The rated force is available up 500 Hz and the force level from 500 Hz to 2500 Hz is 70% of its maximum. (★2) We will customize per your instructions. (★3) Not a theoretical value, for limiting the maximum acceleration. (★4) Shock rated force can be increased by adding power modules.

FH Series Vibration Testing System

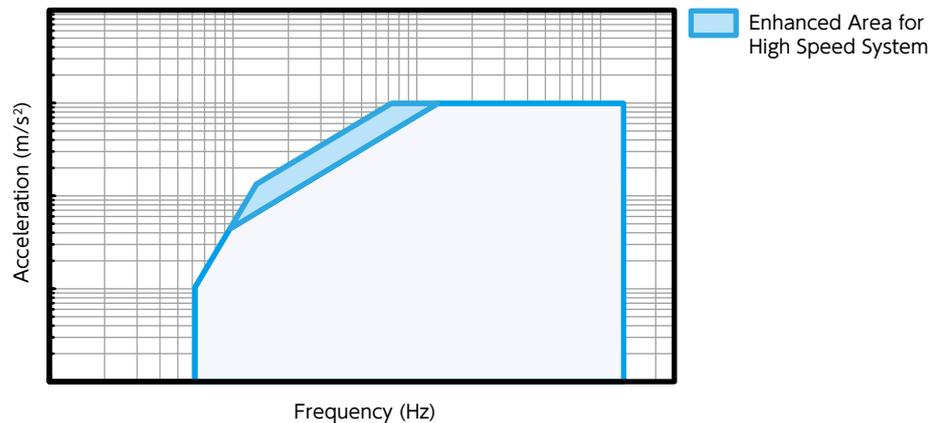
High Speed



When higher acceleration levels are required, especially around the frequencies from 20 to 80 Hz, a vibration testing system that can simulate high velocity is necessary. The FH series system is suitable for such test condition.

※The vibration controller is mounted in the console rack. (Optional)

■ Comparison of High Speed System with Standard System



※This performance curve is how you look at each system for comparison.



FH Series Specifications

| Model | | FH-8K/51S | FH-10K/56 | FH-15K/56 | FH-08K/56 | FH-12K/56 | FH-16K/56 |
|-----------------------|----------------|------------------------|------------------|------------------|------------------|------------------|------------------|
| Rated Force | Sine | kN _{0-p} 8.5 | 10.0 | 15.0 | 8.0 | 12.0 | 16.0 |
| | Random | kN _{rms} 8.5 | 10.0 | 15.0 | 8.0 | 12.0 | 16.0 |
| | Shock | kN _{0-p} 17.0 | 22.0(★3) | 33.0(★3) | 17.6(★3) | 26.4(★3) | 35.2(★3) |
| Frequency range | | Hz to 3000 | to 3000 | to 2000 | to 3000 | to 3000 | to 3000 |
| Max. acceleration | | m/s ² 850 | 667 | 1000 | 533 | 800 | 1000(★2) |
| Max. velocity | | m/s 2.0 | 2.0 | 2.0 | 2.3 | 2.3 | 2.3 |
| Max. displacement | | mm _{p-p} 51 | 56 | 56 | 56 | 56 | 56 |
| Max. payload | | kg 350 | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) |
| Input power | | kVA 19.5 | 22.9 | 25.9 | 23.5 | 27.6 | 31.8 |
| Armature Mass | | kg 10.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 |
| Allowable offset load | | N·m 500 | 500 | 500 | 500 | 500 | 500 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Vibration Generator | | S085-AW/LA | 916-BW/LA | 916-BW/LA | 916-AW/LA | 916-AW/LA | 916-AW/LA |
| Power Amplifier | | 369A-0202A-085SF | 369A-0502A-16BW | 369A-0503A-16BW | 369A-0502A-16AW | 369A-0503A-16AW | 369A-0504A-16AW |
| Console Rack | | CRD-1500-085 | CRD-2000-16 | CRD-2000-16 | CRD-2000-16 | CRD-2000-16 | CRD-2000-16 |
| Armature Size | | mm ø 230 | ø 230 | ø 230 | ø 230 | ø 230 | ø 230 |
| Vib. Generator | | mm 797W×775H×635D | 974W×1035H×700D | 974W×1035H×700D | 974W×1035H×700D | 974W×1035H×700D | 974W×1035H×700D |
| Console Rack | | mm 554W×1462H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D |
| Blower | | mm 411W×810H×525D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×908D |
| Mass approx. | Vib. Generator | kg 640 | 1200 | 1200 | 1200 | 1200 | 1200 |
| | Console Rack | kg 300 | 520 | 520 | 430 | 440 | 520 |
| | Blower | kg 60 | 220 | 220 | 220 | 220 | 220 |

| Model | | FH-22K/60 | FH-26K/60 | FH-28K/60 | FH-33K/60 | FH-35K/60 | FH-40K/60 |
|-----------------------|----------------|------------------------|------------------|------------------|------------------|------------------|------------------|
| Rated Force | Sine | kN _{0-p} 22.0 | 26.0 | 28.0 | 33.0 | 35.0 | 40.0 |
| | Random | kN _{rms} 22.0 | 26.0 | 28.0 | 33.0 | 35.0 | 40.0 |
| | Shock | kN _{0-p} 55 | 65 | 70 | 82.5 | 87.5 | 100 |
| Frequency range | | Hz to 2500 | to 2500 | to 2200 | to 2200 | to 2200 | to 2200 |
| Max. acceleration | | m/s ² 846 | 1000 | 848 | 1000 | 1000(★2) | 1000(★2) |
| Max. velocity | | m/s 2.3 | 2.3 | 2.0 | 2.0 | 2.0 | 2.0 |
| Max. displacement | | mm _{p-p} 60 | 60 | 60 | 60 | 60 | 60 |
| Max. payload | | kg 400(500)(★1) | 400(500)(★1) | 400(500)(★1) | 400(500)(★1) | 400(500)(★1) | 400(500)(★1) |
| Input power | | kVA 35.9 | 39.0 | 45.3 | 49.6 | 55.9 | 64.6 |
| Armature Mass | | kg 26.0 | 26.0 | 33.0 | 33.0 | 33.0 | 36.0 |
| Allowable offset load | | N·m 700 | 700 | 900 | 900 | 900 | 900 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Vibration Generator | | 926-AW/LA | 926-AW/LA | 936-AW/LA | 936-AW/LA | 936-AW/LA | 936-AW/LA |
| Power Amplifier | | 368A-0503B-26AW | 368A-0504B-26AW | 368A-0504B-36AW | 368A-0505B-36AW | 368A-0505B-36AW | 368A-0606B-36AW |
| Console Rack | | CRD-2000-26 | CRD-2000-26 | CRD-2000-36 | CRD-2000-36 | CRD-2000-36 | CRD-2000-36 |
| Armature Size | | mm ø 270 | ø 270 | ø 330 | ø 330 | ø 330 | ø 330 |
| Vib. Generator | | mm 1106W×1135H×880D | 1106W×1135H×880D | 1106W×1135H×880D | 1125W×1200H×965D | 1125W×1200H×965D | 1125W×1200H×965D |
| Console Rack | | mm 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D |
| Blower | | mm 707W×1681H×908D | 707W×1681H×908D | 946W×1681H×908D | 946W×1681H×908D | 869W×1856H×1094D | 869W×1856H×1094D |
| Mass approx. | Vib. Generator | kg 2200 | 2200 | 3500 | 3500 | 3500 | 3900 |
| | Console Rack | kg 600 | 600 | 600 | 600 | 600 | 600 |
| | Blower | kg 220 | 220 | 260 | 245 | 325 | 325 |

| Model | | FH-43K/60 | FH-51K/60 | FH-60K/60 |
|-----------------------|----------------|-------------------------|-------------------|-------------------|
| Rated Force | Sine | kN _{0-p} 43.0 | 51.0 | 60.0 |
| | Random | kN _{rms} 43.0 | 51.0 | 60.0 |
| | Shock | kN _{0-p} 107.5 | 127.5 | 150 |
| Frequency range | | Hz to 2500 | to 2500 | to 2500 |
| Max. acceleration | | m/s ² 623 | 739 | 869 |
| Max. velocity | | m/s 1.78 | 1.78 | 1.78 |
| Max. displacement | | mm _{p-p} 60 | 60 | 60 |
| Max. payload | | kg 500 | 500 | 500 |
| Input power | | kVA 68.2 | 72.2 | 82.6 |
| Armature Mass | | kg 69.0 | 69.0 | 69.0 |
| Allowable offset load | | N·m 1200 | 1200 | 1200 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled |
| Vibration Generator | | 960-AW/LA | 960-AW/LA | 960-AW/LA |
| Power Amplifier | | 368A-1005B-60AW | 368A-1006B-60AW | 368A-1007B-60AW |
| Console Rack | | CRD-2000W-60 | CRD-2000W-60 | CRD-2000W-60 |
| Armature Size | | mm ø 430 | ø 430 | ø 430 |
| Vib. Generator | | mm 1452W×1297H×1231D | 1452W×1297H×1231D | 1452W×1297H×1231D |
| Console Rack | | mm 1108W×2000H×1010D | 1108W×2000H×1010D | 1108W×2000H×1010D |
| Blower | | mm 1021W×2170H×1149D | 1021W×2170H×1149D | 869W×2016H×1147D |
| Mass approx. | Vib. Generator | kg 5000 | 5000 | 5000 |
| | Console Rack | kg 700 | 750 | 800 |
| | Blower | kg 450 | 450 | 450 |

* Input power specification is for 3φ AC200 V 50/60 Hz. * Lower limit frequency should be determined by a performance of an available vibration control system. * When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details. (★1) We will customize per your instructions. (★2) Not a theoretical value, for limiting the maximum acceleration. (★3) Shock rated force can be increased by adding power modules.

FL Series Vibration Testing System

Large Displacement



The FL series system expands the maximum displacement to 100 mm_{p-p}. In particular, it responds to the test condition of large displacement of less than 10 Hz.

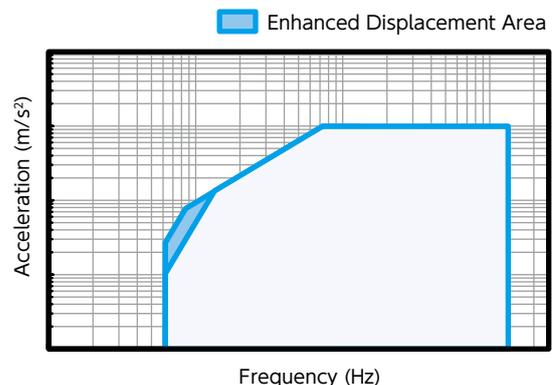
※The vibration controller is mounted in the console rack. (Optional)

FL Series Specifications

| Model | | FL-08K/100 | FL-12K/100 | FL-16K/100 | FL-22K/100 | FL-26K/100 | FL-28K/100 |
|-----------------------|----------------|----------------------------|------------------|------------------|------------------|------------------|------------------|
| Rated Force | Sine | kN _{o-p} 8.0 | 12.0 | 16.0 | 22.0 | 26.0 | 28.0 |
| | Random | kN _{rms} 8.0 | 12.0 | 16.0 | 22.0 | 26.0 | 28.0 |
| | Shock | kN _{o-p} 17.6(★2) | 26.4(★2) | 35.2(★2) | 55.0 | 65.0 | 70.0 |
| Frequency range | | Hz to 2000 | to 2000 | to 2000 | to 2000 | to 2000 | to 2000 |
| Max. acceleration | | m/s ² 320 | 480 | 640 | 647 | 765 | 667 |
| Max. velocity | | m/s 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Max. displacement | | mm _{p-p} 100 | 100 | 100 | 100 | 100 | 100 |
| Max. payload | | kg 200(300)(★1) | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) |
| Input power | | kVA 23.5 | 27.6 | 31.8 | 35.9 | 39.0 | 45.3 |
| Armature Mass | | kg 25.0 | 25.0 | 25.0 | 34.0 | 34.0 | 42.0 |
| Allowable offset load | | N·m 350 | 350 | 350 | 500 | 500 | 700 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Vibration Generator | | 916-AW/SLS | 916-AW/SLS | 916-AW/SLS | 926-AW/SLS | 926-AW/SLS | 936-AW/SLS |
| Power Amplifier | | 369A-0502A-16SLS | 369A-0503A-16SLS | 369A-0504A-16SLS | 368A-0503B-26SLS | 368A-0504B-26SLS | 368A-0504B-36SLS |
| Console Rack | | CRD-2000-16 | CRD-2000-16 | CRD-2000-16 | CRD-2000-26 | CRD-2000-26 | CRD-2000-36 |
| Armature Size | | mm ø 230 | ø 230 | ø 230 | ø 270 | ø 270 | ø 330 |
| Vib. Generator | | mm 974W×1035H×700D | 974W×1035H×700D | 974W×1035H×700D | 1082W×1163H×866D | 1082W×1163H×866D | 1125W×1200H×965D |
| Console Rack | | mm 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D | 554W×2000H×1010D |
| Blower | | mm 707W×1681H×996D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×908D | 707W×1681H×908D | 869W×1856H×1094D |
| Mass approx. | Vib. Generator | kg 1300 | 1300 | 1300 | 2500 | 2500 | 3400 |
| | Console Rack | kg 430 | 440 | 450 | 600 | 600 | 600 |
| | Blower | kg 255 | 220 | 220 | 220 | 220 | 325 |

| Model | | FL-35K/100 | FL-60K/100 |
|-----------------------|----------------|------------------------|-------------------|
| Rated Force | Sine | kN _{o-p} 35.0 | 60.0 |
| | Random | kN _{rms} 35.0 | 60.0 |
| | Shock | kN _{o-p} 87.5 | 150 |
| Frequency range | | Hz to 2000 | to 2000 |
| Max. acceleration | | m/s ² 833 | 750 |
| Max. velocity | | m/s 2.0 | 1.78 |
| Max. displacement | | mm _{p-p} 100 | 100 |
| Max. payload | | kg 200(300)(★1) | 300 |
| Input power | | kVA 55.9 | 82.6 |
| Armature Mass | | kg 42.0 | 80.0 |
| Allowable offset load | | N·m 700 | 1000 |
| Cooling method | | Air-cooled | Air-cooled |
| Vibration Generator | | 936-AW/SLS | 960-AW/SLS |
| Power Amplifier | | 368A-0505B-36SLS | 368A-1007B-60SLS |
| Console Rack | | CRD-2000-36 | CRD-2000W-60 |
| Armature Size | | mm ø 330 | ø 430 |
| Vib. Generator | | mm 1125W×1200H×965D | 1452W×1297H×1231D |
| Console Rack | | mm 554W×2000H×1010D | 1108W×2000H×1010D |
| Blower | | mm 869W×1856H×1094D | 869W×2016H×1147D |
| Mass approx. | Vib. Generator | kg 3400 | 5000 |
| | Console Rack | kg 600 | 1800 |
| | Blower | kg 325 | 400 |

Comparison of Large Displacement System with Standard System

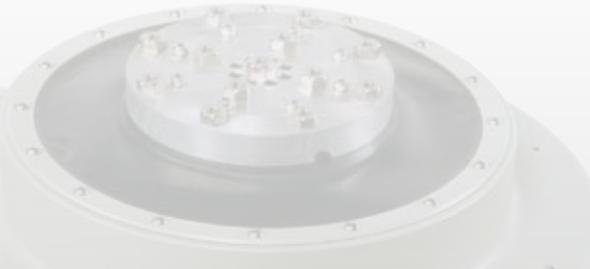


※This performance curve is how you look at each system for comparison.

※ Input power specification is for 3φ AC200 V 50/60 Hz. ※ Lower limit frequency should be determined by a performance of an available vibration control system. ※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details.

FV Series Vibration Testing System

Ultra High Speed



The FV series system responds to shock test conditions;
Shock Pulse Duration 11 ms & Level 980 m/s² (100 G)

※The vibration controller is mounted in the console rack. (Optional)

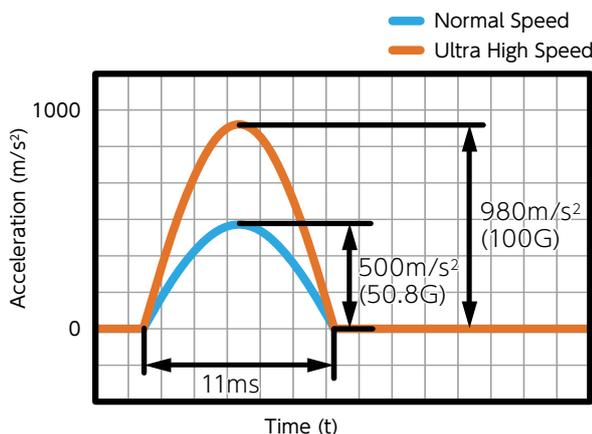
FV Series Specifications

| Model | | FV-15K/100 | FV-26K/100 | FV-35K/100 | FV-60K/100 | |
|------------------------|---------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Rated Force | Sine | kNo-p | 15.6 | 26.0 | 35.0 | 60.0 |
| | Random | kNrms | 15.6 | 26.0 | 35.0 | 60.0 |
| | Shock (6ms) | kNo-p | 46 | 68 | 90 | 150 |
| | Shock (11ms) | kNo-p | 46 | 68 | 90 | 150 |
| | Frequency range | Hz | to 2000 | to 2000 | to 2000 | to 2000 |
| Max. accel. (Sine) | m/s ² | 636 | 765 | 833 | 750 | |
| Max. accel. (Shock) | m/s ² | 1470(★2) | 1470(★2) | 1470(★2) | 1470(★2) | |
| Max. velocity. (Sine) | m/s | 2.0 | 2.0 | 2.0 | 1.8 | |
| Max. velocity. (Shock) | m/s | 3.5 | 3.5 | 3.5 | 3.5 | |
| Max. displacement | mm _{p-p} | 100 | 100 | 100 | 100 | |
| Max. payload (Sine) | kg | 200(300)(★1) | 200(300)(★1) | 200(300)(★1) | 200 | |
| Max. payload (Shock) | kg | 22 | 35 | 50 | 73 | |
| Input power | kVA | 31.6 | 43.6 | 68.1 | 148.7 | |
| Armature Mass | kg | 24.5 | 34.0 | 42.0 | 80.0 | |
| Allowable offset load | N-m | 500 | 500 | 500 | 500 | |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled | |
| Model | Vibration Generator | 916-AW/SLS | 926-AW/SLS | 936-AW/SLS | 960-AW/SLS | |
| | Power Amplifier | 369A-1212B-16SLS | 368A-1212B-26SLS | 368A-2016B-36SLS | 369A-4040B-60SLS | |
| | Console Rack | CRD-2000W-16SLS | CRD-2000T-26SLS | CRD-2000T-36SLS | CRD-2000Q-60SLS | |
| Size | Armature Size | mm | ∅ 230 | ∅ 270 | ∅ 330 | ∅ 430 |
| | Vib. Generator | mm | 974W×1035H×700D | 1106W×1135H×880D | 1225W×1200H×965D | 1452W×1297H×1231D |
| | Console Rack | mm | 1108W×2000H×1010D | 1662W×2059H×1010D | 1662W×2059H×1010D | 2770W×2059H×1010D |
| | Blower | mm | 707W×1681H×908D | 707W×1681H×908D | 869W×1856H×1094D | 869W×2016H×1147D |
| Mass approx. | Vib. Generator | kg | 1300 | 2500 | 3400 | 5000 |
| | Console Rack | kg | 800 | 1150 | 1300 | 2000 |
| | Blower | kg | 220 | 220 | 325 | 400 |

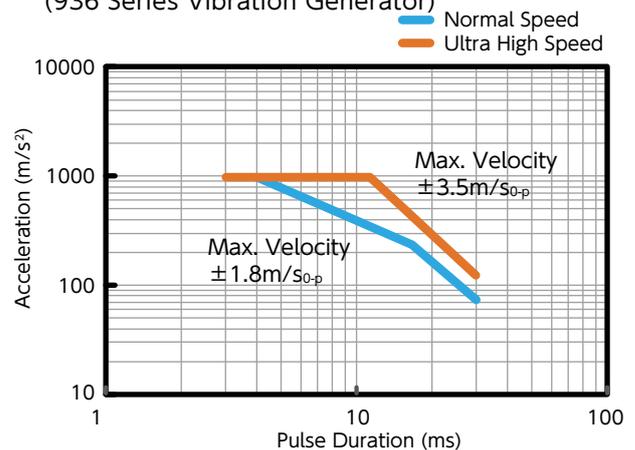
※ Input power specification is for 3φ AC200 V 50/60 Hz. ※ Lower limit frequency should be determined by a performance of an available vibration control system. ※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details.

(★1) We will customize per your instructions. (★2) Not a theoretical value, for limiting the maximum acceleration.

■ Duration: 11 ms, peak acceleration: 980 m/s²



■ Peak acceleration: 980 m/s²
Maximum Rated Shock Excitation Capability
(936 Series Vibration Generator)



※This performance curve is how you look at each system for comparison.

FT Series Vibration Testing System

Transportation



The FT series vibration testing system is specialized for "Safe Transportation of Packaged Products". It can be equipped with a reinforcement mechanism against the offset or heavy load so that a stacked or large product may be mounted. In order to easily attach the packaged products with fixing bands, the fixture of honeycomb structure and or slip table with hooks are available. Moreover, the oilless slip table reduces the burden of maintenance.



FT Series Specifications

| Model | FT-3K/30 | FT-8K/51 | FT-10K/80 | FT-16K/80 | FT-18K/80 | FT-26K/80 | |
|-----------------------|----------------|-------------------|------------------|------------------|------------------|------------------|------------------|
| Rated Force | Sine | 3.0 | 8.5 | 10.0 | 16.0 | 18.0 | |
| | Random | 3.0 | 8.5 | 10.0 | 16.0 | 18.0 | |
| | Shock | 6.0 | 17.0 | 20.0 | 32.0 | 39.6(★3) | 57.2(★3) |
| Frequency range(★1) | to 2500 | to 3000 | to 2000 | to 2000 | to 2000 | to 2000 | |
| Max. acceleration | 667 | 850 | 400 | 640 | 529 | 764 | |
| Max. velocity | 1.6 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| Max. displacement | 30 | 51 | 80 | 80 | 80 | 80 | |
| Max. payload(★2) | 200+α | 350+α | 200+α | 200+α | 200+α | 200+α | |
| Input power | 7.3 | 19.5 | 22.6 | 27.8 | 26.8 | 32.0 | |
| Armature Mass | 4.5 | 10 | 25 | 25 | 34 | 34 | |
| Allowable offset load | 60 | 500 | 350 | 350 | 500 | 500 | |
| Cooling method | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | |
| Model | 903-FN/FA | S085-AW/LA | 916-AP/SLA | 916-AP/SLA | 926-AP/SLA | 926-AP/SLA | |
| Power Amplifier | 369A-0101A-03 | 369A-0202A-0855F | 369A-0502A | 369A-0503A | 369A-0503A | 369A-0504A | |
| Console Rack | CRD-1500-03 | CRD-1500-085 | CRD-2000-16 | CRD-2000-16 | CRD-2000-26 | CRD-2000-26 | |
| Armature Size | ∅ 120 | ∅ 230 | ∅ 230 | ∅ 230 | ∅ 270 | ∅ 270 | |
| Size | Vib. Generator | 630W×693H×588D | 797W×775H×625D | 950W×1029H×665D | 950W×1029H×665D | 1082W×1163H×866D | 1082W×1163H×866D |
| | Console Rack | 554W×1462H×1010D | 554W×1500H×1010D | 554W×2009H×1010D | 554W×2009H×1010D | 554W×2009H×1010D | 554W×2009H×1010D |
| | Blower | 474.5W×1040H×753D | 411W×810H×525D | 707W×1681H×850D | 707W×1681H×850D | 707W×1681H×850D | 707W×1681H×850D |
| Mass approx. | Vib. Generator | 350 | 640 | 1300 | 1300 | 2500 | 2500 |
| | Console Rack | 290 | 300 | 430 | 440 | 520 | 530 |
| | Blower | 39 | 60 | 220 | 220 | 220 | 220 |
| Compatible Fixture | VHT-060 | ● | ● | ● | ● | ● | |
| | VHT-080 | ● | ● | ● | ● | ● | |
| | VHT-100 | - | ● | ● | ● | ● | |
| | VHT-120 | - | - | ● | ● | ● | |

| Model | FT-28K/80 | FT-35K/80 | FT-60K/80 | |
|-----------------------|----------------|------------------|------------------|-------------------|
| Rated Force | Sine | 28.0 | 35.0 | 60 |
| | Random | 28.0 | 35.0 | 60 |
| | Shock | 61.6(★3) | 77.0(★3) | 132.0(★3) |
| Frequency range(★1) | to 2000 | to 2000 | to 2500 | |
| Max. acceleration | 667 | 833 | 750 | |
| Max. velocity | 1.0 | 1.0 | 1.0 | |
| Max. displacement | 80 | 80 | 80 | |
| Max. payload(★2) | 200+α | 200+α | 200+α | |
| Input power | 37.5 | 47.8 | 68.3 | |
| Armature Mass | 42 | 42 | 80 | |
| Allowable offset load | 700 | 700 | 1000 | |
| Cooling method | Air-cooled | Air-cooled | Air-cooled | |
| Model | 936-AP/SLA | 936-AP/SLA | 960-AP/SLA | |
| Power Amplifier | 369A-0504A | 369A-0505A | 369A-1007A | |
| Console Rack | CRD-2000-36 | CRD-2000-36 | CRD-2000W-60 | |
| Armature Size | ∅ 330 | ∅ 330 | ∅ 430 | |
| Size | Vib. Generator | 1186W×1255H×971D | 1186W×1255H×971D | 1461W×1375H×1115D |
| | Console Rack | 554W×2009H×1010D | 554W×2009H×1010D | 1108W×2009H×1010D |
| | Blower | 707W×1681H×946D | 869W×1856H×1094D | 1461W×1375H×1115D |
| Mass approx. | Vib. Generator | 3400 | 3400 | 5000 |
| | Console Rack | 570 | 580 | 800 |
| | Blower | 245 | 325 | 450 |
| Compatible Fixture | VHT-060 | ● | ● | ● |
| | VHT-080 | ● | ● | ● |
| | VHT-100 | ● | ● | ● |
| | VHT-120 | ● | ● | ● |

Option



● VHT Series Honeycomb Table

| Model | VHT-060-XX | VHT-080-XX | VHT-100-XX | VHT-120-XX |
|-------------|------------|------------|------------|------------|
| Size | 600×600 | 800×800 | 1000×1000 | 1200×1200 |
| Freq. range | to 200 | to 200 | to 200 | to 200 |
| Table mass | 33 | 53 | 115 | 230 |



● Bearing Line Slip Table

| Model | BT-060-XX | BT-080-XX | BT-100-XX | BT-120-XX |
|-------------|-----------|-----------|-----------|-----------|
| Size | 600×600 | 800×800 | 1000×1000 | 1200×1200 |
| Freq. range | to 200 | to 200 | to 200 | to 200 |
| Table mass | 42 | 65 | 93 | 150 |

※Table mass changes with the available vibration generator.

※Frequency range and max. payload can be enhanced by a special order.

- Reinforcing Mechanism against Offset Load (Page No. 34)
- Load Support Enhancement Mechanism (Page No. 34)
- Data Logger

※ Input power specification is for 3φ AC200 V 50/60 Hz. ※ Lower limit frequency should be determined by a performance of an available vibration control system. ※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details.

(★1) The highest usable frequency depends on an available fixture. As for the details, ask your local.

(★2) The maximum payload can be increased using options, a reinforcing mechanism against offset load, load support enhancement mechanism. Contact us if any.

FC Series Vibration Testing System

Large Water-cooled



The FC series is a large system most suitable for testing a large specimen with high rated force. Because the water-cooled type is more efficient than the air-cooled, a larger rated force can be generated. It copes with vibration tests for large electronic equipment, automobile parts, airplane parts, airborne electronic apparatus, artificial satellites, aerospace and defense system. This series is designed to perform the vibration test specified in the military or international standards including MIL, NDS, ASTM, IEC, ISO, BS, JIS.

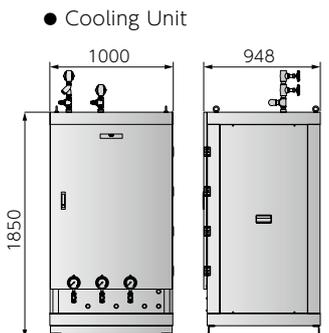


FC Series Specifications

| Model | FC-060K/60 | FC-080K/60 | FC-100K/60 | FC-200K/60 | |
|-----------------------|----------------------|-----------------------|--------------------|--------------------|-------------------|
| Rated Force | Sine | kN _{0-p} 60 | 80 | 100 | 200 |
| | Random | kN _{rms} 60 | 80 | 100 | 160 |
| | Shock | kN _{0-p} 150 | 200 | 250 | 400 |
| Frequency range | Hz to 2000 | to 2000 | to 2000 | to 2000 | |
| Max. acceleration | m/s ² 667 | 889 | 1000(★1) | 1000(★1) | |
| Max. velocity | m/s 1.8 | 1.8 | 1.8 | 1.78 | |
| Max. displacement | mm _{0-p} 60 | 60 | 60 | 51 | |
| Max. payload | kg 1000 | 1000 | 1000 | 2000 | |
| Input power | kVA 88 | 100 | 154 | 351.5 | |
| Armature Mass | kg 90 | 90 | 90 | 130 | |
| Allowable offset load | N·m 1500 | 1500 | 1500 | 5000 | |
| Cooling method | Water-cooled | | Water-cooled | Water-cooled | |
| Cooling water flow | L/min 140(★2) | 162(★2) | 305(★2) | 688(★2) | |
| Model | Vibration Generator | 9100-AWW/LA | 9100-AWW/LA | 9100-AWW/LA | 9200-AWW/LA |
| | Power Amplifier | 368A-1610B-3BAY100 | 368A-1612B-3BAY100 | 368A-1614B-3BAY100 | 368A-3232A-200K |
| | Console Rack | CRD-2000T | CRD-2000T | CRD-2000T | CRD-2000F-200K |
| Size | Armature Size | mm ø 450 | ø 450 | ø 450 | ø 590 |
| | Vib. Generator | mm 1489W×1338H×1149D | 1489W×1338H×1149D | 1489W×1338H×1149D | 1905W×1348H×1473D |
| | Console Rack | mm 1662W×2059H×1030D | 1662W×2059H×1030D | 1662W×2059H×1030D | 3324W×2059H×1030D |
| Mass approx. | Vib. Generator | kg 4800 | 4800 | 4800 | 8182 |
| | Console Rack | kg 1650 | 1650 | 1650 | 3950 |
| | Cooling Unit | kg 700 | 700 | 700 | 700 |

※ Input power specification is for 3φ AC400 V 50/60 Hz. ※ Lower limit frequency should be determined by a performance of an available vibration control system.
 ※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details.
 (★1) Not a theoretical value, for limiting the maximum acceleration. (★2) The water temperature is 32°C.

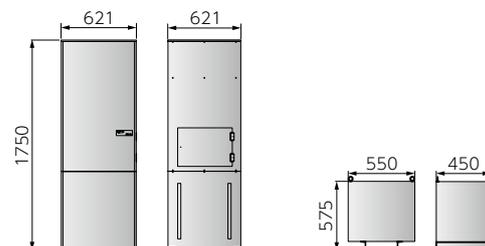
Dimensions (approx.) mm



Option

200 VAC 3-phase 50/60 Hz Input Power
Hydraulic Power Supply

- Chiller
- Transformer for Chiller



FP Series Vibration Testing System

Permanent Magnet



- Ultimate energy saving vibration generator without field coil and power supply
- Industry's first adoption of permanent magnet for more than 10 kN sine force system

"Ultimate Energy Saving" for a conventional medium-sized vibration testing system can be realized by eliminating the field coil and power supply. In addition, the cooling blower is downsized approximately 70% and its rotating speed is controlled according to the temperature of the vibration generator to drastically reduce the required input power and sound level.

※The vibration controller is mounted in the console rack. (Optional)

[Energy-saving Effect]

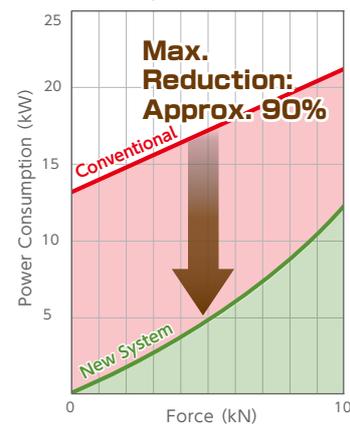
Reduction of electric charge:

Approx. \$13820.00/year at 25% of rated output
(Approx. JPY1,520,000.00/year at 25% of rated output)
Approx. \$14550.00/year at 10% of rated output
(Approx. JPY1,600,000.00/year at 10% of rated output)

Reduction of CO₂:

Approx. 42,200 kg/year at 25% of rated output
Approx. 79,716 kg/year at 10% of rated output
※Compared to our 916 series system for 70% of operating time
※The discharge of CO₂ emission assumes it to be 0.555 kg-CO₂/kWh.
(according to law enforcement order about the promotion of global warming countermeasures, Article 3)

Reduction effect of power consumption for new drive system



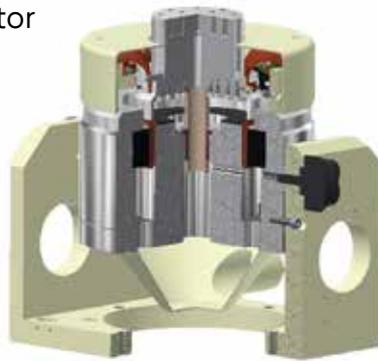
FP Series Specifications

| Model | | FP-01K/30 | FP-02K/25 | FP-02K/30A | FP-10K/51 | FP-10K/76 | FP-20K/51 |
|-----------------------|--------------------------------|------------------------|-------------------|-------------------|------------------|-------------------|------------------|
| Rated Force | Sine | kN _p 1.2 | 2.0 | 2.0 | 10.0 | 10.0 | 20.0 |
| | Random | kN _{rms} 0.48 | 1.4 | 1.4 | 10.0 | 10.0 | 20.0 |
| | Shock | kN _p 1.5 | 3.0 | 3.0 | 22.0(★1) | 20.0 | 36.0 |
| Frequency range | | Hz to 2500 | to 3000 | to 2500 | to 3000 | to 2500 | to 2500 |
| Max. acceleration | | m/s ² 500 | 800 | 444 | 1000 | 606 | 833 |
| Max. velocity | | m/s 1.6 | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 |
| Max. displacement | | mm _{p-p} 30 | 25 | 30 | 51 | 76.2 | 51 |
| Max. payload | | kg 150 | 40 | 100 | 350 | 300 | 350 |
| Input power | | kVA 1.4 | 6.2 | 6.2 | 11.5 | 16 | 27 |
| Armature Mass | | kg 2.4 | 2.5 | 4.5 | 10 | 16 | 24 |
| Allowable offset load | | N·m 3 | 5 | 4 | 500 | 500 | 500 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled | Air-cooled |
| Model | Vibration Generator | P01-AB/AS | Σ9515-AB/SD | Σ9515-AB/AS | P10-AW/LA | P10-AW/SLS | P20-A |
| | Power Amplifier | 375-D/P012 | 369A-0101A-Σ15 | 369A-0101A-Σ15 | 369A-0202A-P10 | 369A-0202A-P10SLS | 369A-0606A-P20 |
| | Console Rack | - | CRD-1500-Σ15 | CRD-1500-Σ15 | CRD-1500-P10 | CRD-1500-P10 | CRD-2000-P20 |
| Size | Armature Size | mm ø 120 | ø 120 | ø 120 | ø 230 | ø 230 | ø 330 |
| | Vib. Generator | mm 384W×391.5H×360D | 442W×360H×340D | 442W×360H×340D | 702W×763H×572D | 702W×948H×625D | 982W×1000H×750D |
| | Power Amplifier · Console Rack | mm 480W×189H×450D | 554W×1462H×1010D | 554W×1462H×1010D | 554W×1462H×1010D | 554W×1462H×1010D | 554W×2000H×1010D |
| | Blower | mm 365.5W×700H×434D | 474.5W×1040H×495D | 474.5W×1040H×495D | 411W×810H×525D | 411W×810H×525D | 707W×1681H×946D |
| Mass approx. | Vib. Generator | kg 75 | 160 | 165 | 690 | 760 | 1650 |
| | Power Amplifier · Console Rack | kg 35 | 290 | 290 | 300 | 300 | 600 |
| | Blower | kg 16 | 31 | 31 | 60 | 60 | 245 |

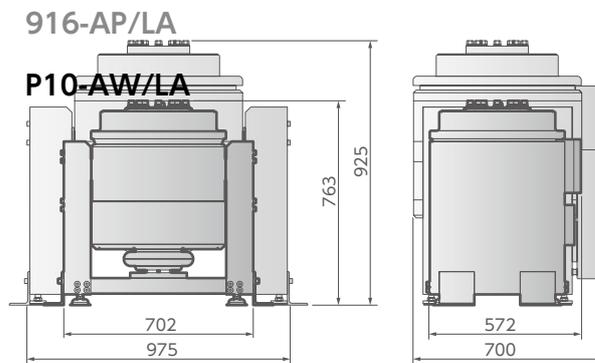
※ Input power specification is for 1φ AC100 V 50/60 Hz. or 3φ AC200 V 50/60 Hz. ※ Lower limit frequency should be determined by a performance of an available vibration control system. ※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details. (★1) Shock rated force can be increased by adding power modules.



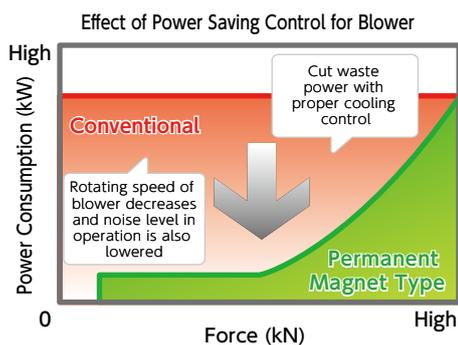
Cutaway View of Permanent Magnet Type Vibration Generator



Realization of Vibration Generator Downsizing compared with Same Class



Energy-saving Effect with Input Power (Rotating Speed) Control for Blower



FM Series Vibration Testing System

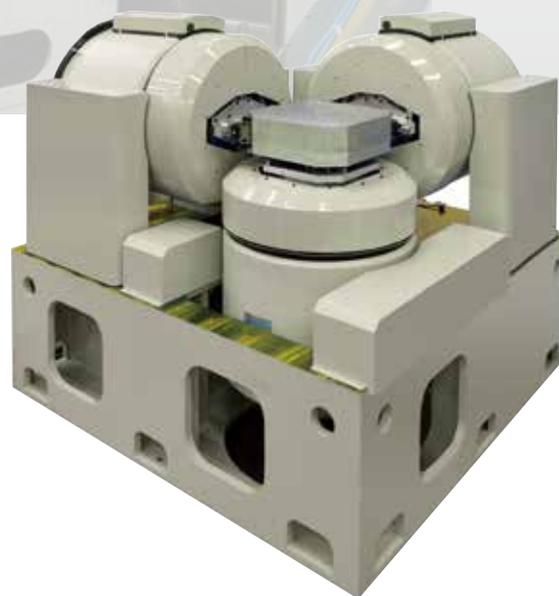
Triaxial Electrodynamic



- The FM series electrodynamic exciting system makes it possible to simultaneously excite a specimen in three directions
- According to the military standard MIL-STD-810G
- Responding to the frequency range from 5 Hz to 2000 Hz



- Multi-axis vibration test system that can excite a specimen in three axes simultaneously, which unites the electrodynamic vibration generator cultivated by EMIC for a long time with linear bearing guide mechanism manufactured by KOKUSAI Co., Ltd.
- The eco-friendly vibration test system is equipped with a energy saving drive system “ECO-Vibe neo”. It is possible to reduce power consumption after performed range selection of the rated force for application.
- The FM series can be combined with a temperature/humidity chamber for environmental reliability tests.



FM Series Specifications

| Model | | FM-20K/60-3D-040 | FM-30K/60-3D-040 | FM-40K/60-3D-050 | FM-60K/60-3D-050 |
|-----------------------------|--------------------|------------------|------------------|------------------|------------------|
| Rated force | kN _{r.p.} | 20 | 30 | 40 | 60 |
| Random force | kN _{rms} | 20 | 30 | 40 | 60 |
| Upper limit frequency | Hz | 2000 | 2000 | 2000 | 2000(★1) |
| Max. acceleration (No Load) | m/s ² | 133 | 188 | 235 | 316 |
| Max. velocity | m/s | 1.2 | 1.2 | 1.2 | 1.2 |
| Max. displacement | mm _{p.p.} | 60 | 60 | 60 | 60 |
| Max. payload | kg | 100 | 100 | 100 | 100 |
| Input power | kVA | 80.4(26.8/axis) | 126.6(42.2/axis) | 171.0(57.0/axis) | 204.9(68.3/axis) |
| Armature Mass | kg | 150 | 160 | 170 | 190 |
| Table size | mm | 400×400 | 400×400 | 500×500 | 500×500 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled |

※ Input power specification is for 3φ AC200 V 50/60 Hz.

※ Lower limit frequency should be determined by a performance of an available vibration control system.

※ The table size of 600×600 mm is also available. Please contact us.

※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details.

(★1) The rated force is available up 500 Hz and the force level from 500 Hz to 2000 Hz is 70% of its maximum.

FB Series Vibration Testing System

Triaxial Electric Servo

EMIC
VIBRATION
TESTING
SYSTEM



- Multiaxial vibration testing system for transportation test or aseismic performance evaluation
- A new type of vibration testing system superior in cost performance



- Specialized for transportation test
- Reproduction of actual vibration with triaxial simultaneous excitation
- Both vertical and horizontal vibration tests can be performed by switching among three axes in a sequential manner. Since there is no need to switch the thrust axis of the vibration generator, transferring a specimen becomes unnecessary, thus the test period can be reduced.



FB Series Specifications

| Model | | FB-10K/50-3D-100 | FB-20K/50-3D-120 | FB-30K/50-3D-050 | FB-60K/50-3D-050 |
|----------------------|-------------------|------------------|------------------|------------------|------------------|
| Rated force | kN _{0,p} | 9.8 | 19.6 | 29.4 | 59.5 |
| Random force | kN _{rms} | 6.9 | 13.7 | 20.6 | 41.7 |
| Frequency range | Hz | to 200 | to 200 | to 200 | to 200 |
| Max. acceleration | m/s ² | 20 | 20 | 30 | 30 |
| Max. velocity | m/s | 0.7 | 0.7 | 0.7 | 0.7 |
| Max. displacement | mm _{p,p} | 50 | 50 | 50 | 50 |
| Max. payload | kg | 200 | 300 | 500 | 1000 |
| Table size | mm | 1000×1000 | 1200×1200 | 1500×1500 | 1500×1500 |
| Input power | kVA | 84 | 102 | 126 | 264 |
| Power supply voltage | V | 200 | 200 | 200/400 | 200/400 |
| Moving element | kg | 130 | 210 | 300 | 400 |
| Cooling method | | Air-cooled | Air-cooled | Air-cooled | Air-cooled |

※ The maximum random acceleration is about 1/3 of the maximum sine acceleration.

※ Lower limit frequency should be determined by a performance of an available vibration control system.

※ When exporting Vibration Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as rated force. Please contact us for details.

FS Series Shock Test System

Shock



The FS series is specialized in high performance shock tests designed for developing air bag sensors.

The reliability of the sensor to be incorporated into an air bag system needs to be extremely sensitive in its nature. To succeed in controlling the characteristics of each sensor, the test system itself must be highly reliable and accurate. The outstanding response characteristics and control technology of an electrodynamic actuator allows success in manufacturing the test system that can meet the above requirements. We have a large selection of shock test systems depending on your application such as development, inspection in-production line and head-on and flank crash simulation.



FS Series Specifications

| Model | | FS-1022/05 | FS-1240B/13 | FS-1040B/19 | FS-2078B/29 | FS-3055B/15 | |
|-----------------|-------------------------|--|-------------------------|--------------------------|---------------------------|---------------------------|--------------------------|
| Configuration | Shock Generator | 905-SH/10 | 912-SH/12 | 922-SH/10 | 922-SH/20H | 922-SH/30 | |
| | Power Amplifier | 369A-0503-S05 | 369A-0907-1/S | 369A-0906-1/S | 369A-0909-3/S | 369A-0907-2/S | |
| | Control System | 271-C | 271-C | 271-C | 271-C | 271-C | |
| Rating | Shock Force | kN _{0-p} (kgf _{0-p}) | 4.9 (500) | 13.72 (1400) | 19.62 (2000) | 29.43 (3000) | 15.69 (1600) |
| | Maximum Acceleration | m/s ² | 608(62G) at 2kg load | 980(100G) at 5kg load | 980(100G) at 10kg load | 2451(250G) at 2kg load | 980(100G) at 5kg load |
| | Maximum Displacement | mm _{0-p} | 100 | 120 | 100 | 200 | 300 |
| | Maximum Velocity | m/s | ±2.2 | ±4.0 | ±4.0 | ±7.8 | ±5.5 |
| | Maximum Velocity Change | m/s | 4.4 | 6 | 6 | 10 | 7 |
| | Power Consumption | kVA | 9 | 30 | 33 | 97 | 50 |
| | Maximum Payload | kg | 10 | 10 | 10 | 10 | 10 |
| | Moving Element | kg | 6(including table) | 9(including table) | 10(including table) | 10(including table) | 11(including table) |
| Shock Generator | Table Dimensions | mm | 250W×280D | 250W×280D | 200W×200D | 200W×200D | |
| | Table Screw | mm | 36-M6 depth9 | 36-M6 depth9 | 16-M6 depth9 | 16-M6 depth8 | |
| | Outline Dimensions | mm | 620W×920D×610H | 760W×1200D×810H | 900W×1260D×930H | 900W×1460D×950H | |
| | Mass | kg | 450 | 860 | 1470 | 1680 | |
| Console Rack | Outline Dimensions | mm | 630W×891D×1912H | 1220W×956D×2150H | 1830W×956D×2150H | 2440W×956D×2150H | |
| | Mass | kg | 390 | 1000 | 1500 | 2500 | |

| Model | | FS-3050B/22 | FS-3093B/30H | FS-5080/16 | FS-60160/20 | |
|-----------------|-------------------------|--|---------------------------|---------------------------|--------------------------|--------------------------|
| Configuration | Shock Generator | 922-SH/30 | 922-SH/30H | 950-SH | 960-SH | |
| | Power Amplifier | 369A-0907-2/S | 369A-0908-4/S | 369A-0907-2/S | 369A-0907-3/S | |
| | Control System | 271-C | 271-C | 271-C | 271-C | |
| Rating | Shock Force | kN _{0-p} (kgf _{0-p}) | 22.07 (2250) | 29 (2957) | 15.69 (1600) | 19.61 (2000) |
| | Maximum Acceleration | m/s ² | 1470(150G) at 4kg load | 1870(190G) at 4kg load | 980(100G) at 2kg load | 980(100G) at 2kg load |
| | Maximum Displacement | mm _{0-p} | 300 | 300 | 500 | 600 |
| | Maximum Velocity | m/s | ±5.0 | ±9.3 | ±6.0 | ±10.0 |
| | Maximum Velocity Change | m/s | 6 | 16 | 8 | 16 |
| | Power Consumption | kVA | 56 | 115 | 64 | 100 |
| | Maximum Payload | kg | 10 | 5 | 5 | 5 |
| | Moving Element | kg | 11(including table) | 11.5(including table) | 14(including table) | 18(including table) |
| Shock Generator | Table Dimensions | mm | 200W×200D | 200W×200D | 200W×200D | |
| | Table Screw | mm | 16-M6 depth9 | 16-M8 depth8 | 16-M6 depth9 | 16-M6 depth9 |
| | Outline Dimensions | mm | 900W×1660D×990H | 900W×1660D×990H | 1180W×2446D×1215H | 1180W×2469D×1215H |
| | Mass | kg | 1900 | 1900 | 3400 | 3520 |
| Console Rack | Outline Dimensions | mm | 1830W×956D×2150H | 3660W×956D×2150H | 1830W×956D×2150H | 2444W×975D×1956H |
| | Mass | kg | 1500 | 3000 | 1500 | 2900 |

Power Amplifier

The power amplifier of EMIC's vibration testing system adopts the high-power D class digital switching amplifier which is most suitable for an electrodynamic vibration testing system. (On the other hand, the Linear amplifier is used for the compact vibration generator system.)

- Equip high-power D class digital switching amplifier.
- Attain much space saving (our conventional products).
- Reduction of approx. 40% of consumption electricity (our conventional products).
- Electro-magnetic compatibility in accordance with both FCC and VDE rule
- Flexible built-in design using power modules of 8 kVA and 12 kVA
- Realization of wide band frequency response from DC to 4 kHz with low distortion
- Test article protection with soft start feature from shock due to overshooting
- Complete protection with multiple interlocking features.



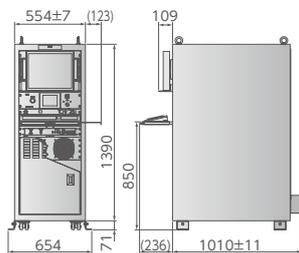
Power Amplifier Specifications

Specifications of Switching Amplifier Module

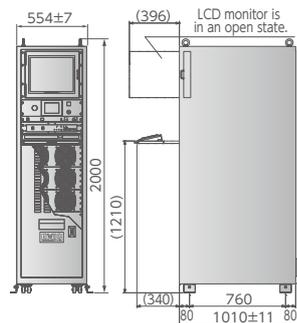
| Model | | 368A | 369A |
|-------------------------|------------------|-----------|-----------|
| Amplifier circuit | | Switching | Switching |
| Apparent power | kVA | 12.0 | 8.0 |
| Frequency range | Hz | 0 to 4000 | 0 to 4000 |
| Input voltage | Vrms | 1.5 | 1.8 |
| Output voltage | Vrms | 120 | 160 |
| Output current (Sine) | Arms | 100 | 50 |
| Output current (Random) | A _{0-P} | 350 | 170 |

Outline Drawing

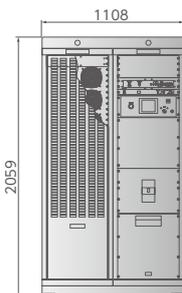
● CRD-1500



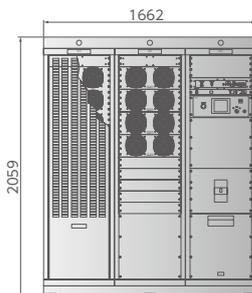
● CRD-2000



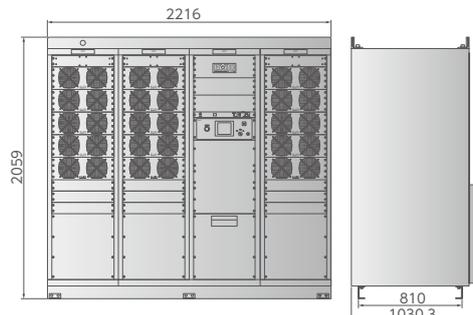
● CRD-2000W



● CRD-2000T



● CRD-2000Q



Energy Saving Drive System [ECO-Vibe neo]

Originally
Equipped



"ECO-Vibe neo" is an energy saving drive system designed to be environmentally-friendly.

The vibration test condition changes with the test specifications. Generally, the required rated force can be calculated by the product of the mass such as test article, fixture, table, etc. and testing acceleration. On generic models for the other manufacturers, if the required excitation force for a test is less than the maximum force specified, the ratio of power output will be at 100% with the FCO vive NFO, power consumption can be reduced by choosing the excitation force required for the specified test. The user chooses the force range and power output of the system.

Energy Saving Drive Mode

- NORMAL ... System Output **100%**
- MODE1 ... System Output **70%**
- MODE2 ... System Output **50%**

Energy Saving Effect

✿ Reduction of Electric Charge:

Approx. **\$7080.00**/year
(Approx. JPY790,000.00/year)
(Estimation at 25% of rated output for 70% of operating time)

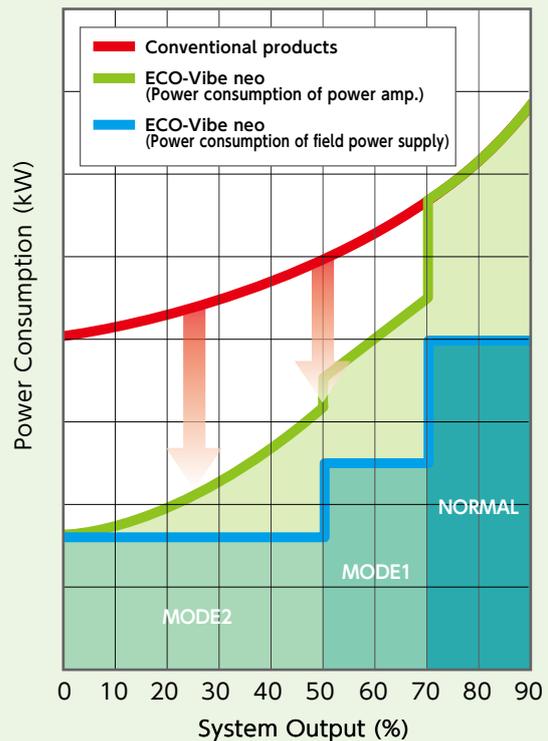
✿ Reduction of CO₂

Approx. **38** ton/year
(Estimation at 25% of rated output for 70% of operating time)

※On March 29, 2006, estimated based on the Ministry of Economy, Trade and Industry, environment departmental order third.

※Data of random excitation with our F-33000BD/LA36AP (33,000 N)

Reduction of power consumption/ Difference from conventional products





Correspondence to presence/absence of ECO-Vibe neo

| New Model | Former Model | ●Supported × Non-supported | New Model | Former Model | ●Supported × Non-supported |
|-----------|--------------------|-------------------------------|------------------|--------------------|-------------------------------|
| F-1K/15 | F-01000BM | × | FH-60K/60 | F-60000BDH/LA60AW | ● |
| - | F-01300BM | × | FL-08K/100 | F-08000BDH/SLS16 | ● |
| F-2K/20 | F-02000BM | × | FL-12K/100 | F-12000BDH/SLS16 | ● |
| F-2K/20A | F-02000BM/A | × | FL-16K/100 | F-16000BDH/SLS16 | ● |
| - | F-02000BM/FA | × | - | F-15000BDH/SLS26 | ● |
| - | F-02500AM/A | × | FL-22K/100 | F-22000BDH/SLS26 | ● |
| - | F-02500AM/FA | × | FL-26K/100 | F-26000BDH/SLS26 | ● |
| F-3K/20 | F-03000BM | × | FL-28K/100 | F-28000BDH/SLS36 | ● |
| F-3K/20A | F-03000BM/A | × | FL-35K/100 | F-35000BDH/SLS36 | ● |
| FT-3K/30 | F-03000BM/FA | × | FL-60K/100 | F-60000BDH/SLS60 | ● |
| F-6K/20 | F-06000BM | × | FV-15K/100 | F-15600BDHH/SLS16 | ● |
| F-6K/30 | F-06000BM/A | × | FV-26K/100 | F-26000BDHH/SLS26 | ● |
| - | F-06000BM/FA | × | FV-35K/100 | F-35000BDHH/SLS36 | ● |
| F-10K/56 | F-10000BD/LA16BP | ● | FV-60K/100 | F-60000BDHH/SLS60 | ● |
| F-15K/56 | F-15000BD/LA16AP | ● | FT-8K/51 | - | ● |
| - | F-15000BD/LA26AP | ● | FT-10K/80 | - | ● |
| F-22K/60 | F-22000BD/LA26AP | ● | FT-16K/80 | - | ● |
| F-25K/60 | F-25000BD/LA26AP | ● | FT-18K/80 | - | ● |
| F-28K/60 | F-28000BD/LA36AP | ● | FT-26K/80 | - | ● |
| F-33K/60 | F-33000BD/LA36AP | ● | FT-28K/80 | - | ● |
| F-35K/60 | F-35000BD/LA36AP | ● | FT-35K/80 | - | ● |
| F-40K/60 | F-40000BD/LA40AP | ● | FT-60K/80 | - | ● |
| F-43K/60 | F-43000BD/LA60AP | ● | FC-060K/60 | F-060kBDH/LA100AWW | × |
| F-51K/60 | F-51000BD/LA60AP | ● | FC-080K/60 | F-080kBDH/LA100AWW | × |
| F-60K/60 | F-60000AD/LA60AP | ● | FC-100K/60 | F-100kBDH/LA100AWW | × |
| FH-8K/51S | F-08500BDH/LA085SF | ● | FC-200K/60 | F-200kBDH/LA200AWW | × |
| FH-10K/56 | F-10000BDH/LA16BW | ● | FP-01K/30 | P01 | × |
| FH-15K/56 | F-15000ADH/LA16BW | ● | FP-02K/25 | Σ9515-AB/SD | × |
| FH-08K/56 | F-08000BDH/LA16AW | ● | FP-02K/30A | Σ9515-AB/AS | × |
| FH-12K/56 | F-12000BDH/LA16AW | ● | FP-10K/51 | - | ● |
| FH-16K/56 | F-16000BDH/LA16AW | ● | FP-20K/51 | - | ● |
| - | F-15000BDH/LA26AW | ● | FM-20K/60-3D-050 | - | ● |
| FH-22K/60 | F-22000BDH/LA26AW | ● | FM-30K/60-3D-050 | - | ● |
| FH-26K/60 | F-26000BDH/LA26AW | ● | FM-40K/60-3D-050 | - | ● |
| FH-28K/60 | F-28000BDH/LA36AW | ● | FM-60K/60-3D-050 | - | ● |
| FH-33K/60 | F-33000BDH/LA36AW | ● | FB-10K/50-3D-100 | - | × |
| FH-35K/60 | F-35000BDH/LA36AW | ● | FB-20K/50-3D-120 | - | × |
| FH-40K/60 | F-40000BDH/LA40AW | ● | FB-30K/50-3D-150 | - | × |
| FH-43K/60 | F-43000BDH/LA60AW | ● | FB-60K/50-3D-150 | - | × |
| FH-51K/60 | F-51000BDH/LA60AW | ● | | | |

※ Some former models not listed above are provided with the ECO-Vibe neo. Please contact us for more information.

Compact Vibration Generator System 510 Series

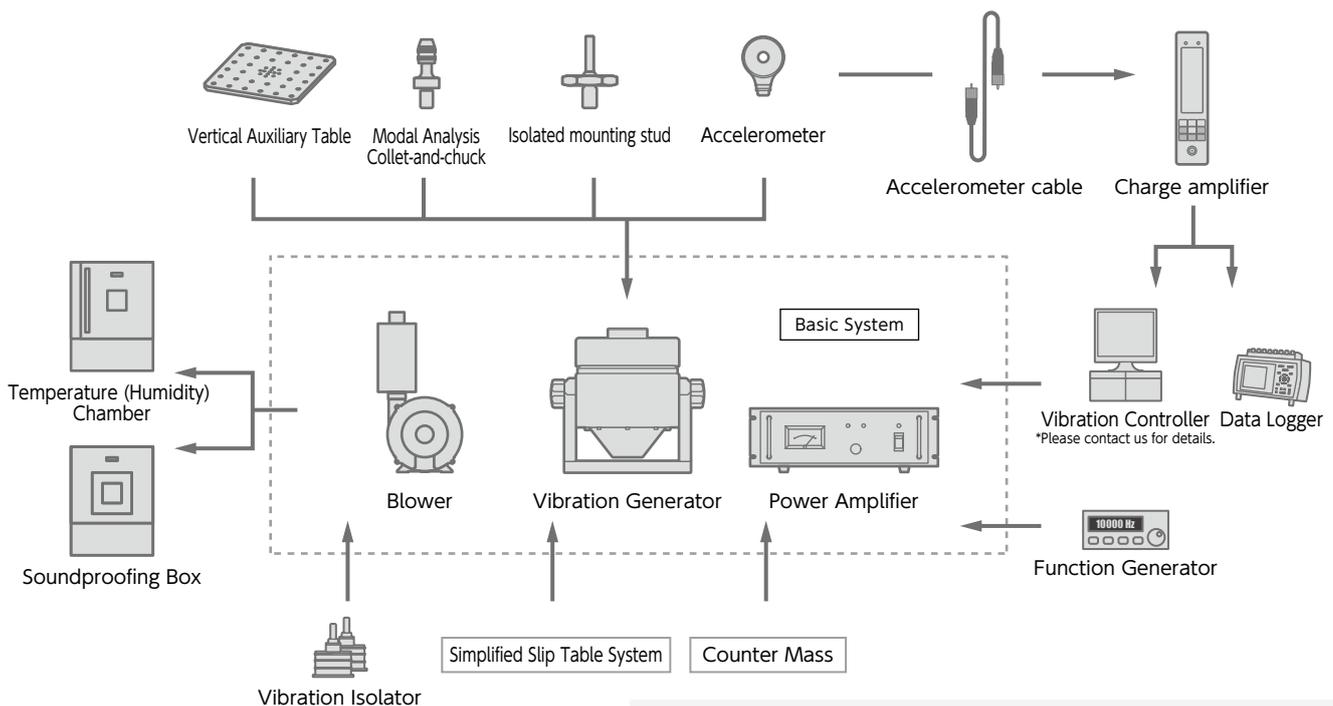


The compact vibration generator is used for vibration meter calibration, mechanical impedance measurement, modal analysis excitation source and small light weight component vibration-proof test. Particularly, concerning the Model:512-D and 513-D vibration generator, ceramic materials are used for their armatures becoming the first in the world, making excitation up to 30 kHz possible (up to 24 kHz for Model:513-D).

- Highly accurate vibration meter calibration, mechanical impedance measurement and modal analysis excitation source
- Vibration-proof test of various sensors and small light weight specimens such as electronic and electric components
- Educational material for fundamental experiment in vibration engineering



System Configuration



Control System or Oscillator Required:

In addition to the compact vibration generator and power amplifier unit, a vibration control system or function generator, accelerometer and charge amplifier may be required for your application. An optional oscillator is available for the power amplifier unit. As for details, please contact our sales department.



511·512 Series Specifications

| Model | 511-A | 512-A | 512-A/A | 512-D | 512-D/A |
|-----------------------|-----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Type | Modal Analysis | Standard | High Force:64N | High Frequency:30kHz | High Frequency:30kHz·High Force:64N |
| Rated force | N 15 | 49 | 64 | 49 | 64 |
| Frequency range | Hz 2 to 5k | 2 to 20k | 2 to 20k | 2 to 30k | 2 to 30k |
| Max. acceleration | m/s ² 230.7 | 376.9 | 492.3 | 272.2 | 355.5 |
| Max. velocity | m/s 1.26 | 1.14 | 1.31 | 1.00 | 1.14 |
| Max. displacement | mm _{p-p} 5.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Axial Resonance | More than 3.9kHz | More than 16kHz | More than 16kHz | More than 32kHz | More than 32kHz |
| Moving Element | kg 0.065 | 0.13 | 0.13 | 0.18 | 0.18 |
| Armature Material | Aluminum | Magnesium | Magnesium | Ceramic | Ceramic |
| Stiffness | N/mm 5 | 12 | 12 | 12 | 12 |
| Armature Size | mm M6 L=20 | ∅40 | ∅40 | ∅40 | ∅40 |
| Maximum Payload | kg — | 2.0 | 2.0 | 2.0 | 2.0 |
| Stray Field | — | — | — | — | — |
| Field Power | Permanent Magnet | Permanent Magnet | Permanent Magnet | Permanent Magnet | Permanent Magnet |
| Operating Environment | ℃ -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop |
| Cooling | Natural | Natural | Forced air | Natural | Forced air |
| Dimensions | mm 120W×190H×100D | ∅150×178(★1) | ∅150×178(★1) | ∅150×178(★1) | ∅150×178(★1) |
| Mass | kg 4.2 | 9.5 | 9.5 | 9.5 | 9.5 |
| Matched Amplifier | 371-A | 371-A | 372-A | 371-A | 372-A |
| Blower | — | — | Yes | — | Yes |
| Accessory | Trunnion Stand | Interconnecting Cable×1 Grip × 2 |
| Option | — | Trunnion Stand (Mass 2.4kg) | Trunnion Stand (Mass 2.4kg) | Trunnion Stand (Mass 2.4kg) | Trunnion Stand (Mass 2.4kg) |

(★1) Except for grip.

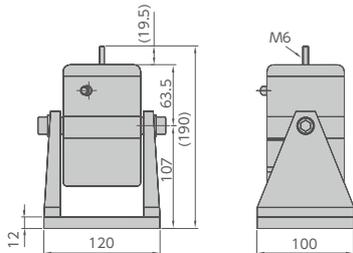
513 Series Specifications

| Model | 513-B | 513-B/A | 513-D | 513-D/A |
|-----------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|
| Type | Standard | High Force:147N·196N | High Frequency:24kHz | High Frequency:24kHz·High Force:147N |
| Rated force | N 98 | 147 196 | 98 | 147 |
| Frequency range | Hz 3 to 13k | 3 to 13k | 3 to 24k | 3 to 24k |
| Max. acceleration | m/s ² 264.8 | 397.2 529.7 | 175 | 262.5 |
| Max. velocity | m/s 1.17 | 1.43 1.67 | 0.92 | 1.14 |
| Max. displacement | mm _{p-p} 10 | 10 | 10 | 10 |
| Axial Resonance | More than 12kHz | More than 12kHz | More than 23kHz | More than 23kHz |
| Moving Element | kg 0.37 | 0.37 | 0.56 | 0.56 |
| Armature Material | Magnesium | Magnesium | Ceramic | Ceramic |
| Stiffness | N/mm 14.0 | 14.0 | 14.0 | 14.0 |
| Armature Size | mm ∅79 | ∅79 | ∅79 | ∅79 |
| Maximum Payload | kg 3.0 | 3.0 | 3.0 | 3.0 |
| Stray Field | — | — | — | — |
| Field Power | Permanent Magnet | Permanent Magnet | Permanent Magnet | Permanent Magnet |
| Operating Environment | ℃ -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop |
| Cooling | Natural | Forced air | Natural | Forced air |
| Dimensions | mm ∅215×230H(★1) | ∅215×230H(★1) | ∅215×230H(★1) | ∅215×230H(★1) |
| Mass | kg 26 | 26 | 26 | 26 |
| Matched Amplifier | 371-A | 372-A 374-A | 372-A | 374-A |
| Blower | — | Yes | — | Yes |
| Accessory | Interconnecting Cable×1 Grip × 2 |
| Option | Trunnion Stand (Mass 4.0kg) | Trunnion Stand (Mass 4.0kg) | Trunnion Stand (Mass 4.0kg) | Trunnion Stand (Mass 4.0kg) |

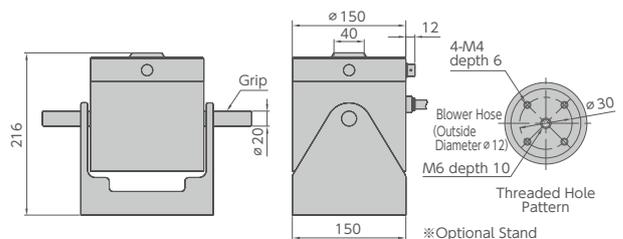
(★1) Except for grip.

Dimensions

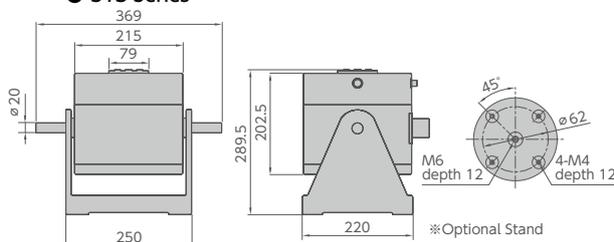
● 511 Series



● 512 Series



● 513 Series



Compact Vibration Generator System 9514 Series



Our new standard compact vibration generator system is able to cover various type of test.

The compact vibration generator systems, the 9514 Series, communize the major components for the vibration generator. In addition, standard specifications, increased payload specifications, through type specifications, and heat resistant specifications can apply to this system, so this enables these high-performance vibration generators to be used in various purposes. These systems also have the extensibility to handle rattle noise measurements and other required specifications, and have the capability of performing various kinds of test by combining peripheral equipment.



9514-A Series

All-weather Type used in Workspace of Environmental Chamber



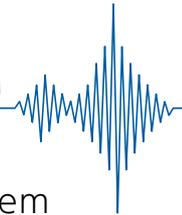
9514 Series

9514 Series Specifications

| Model | 9514-AN/SD | 9514-AB/SD | 9514-AN/AS | 9514-AB/AS |
|-----------------------|---|---|--|---|
| Type | Standard | High Force:500N | Integrated Pneumatic Support Large Displacement30mm _{p-p} | Integrated Pneumatic Support Large Displacement30mm _{p-p} High Force500N |
| Rated force | N 300 | 500 | 300 | 500 |
| Frequency range | Hz 5 to 5k | 5 to 5k | 5 to 3k | 5 to 3k |
| Max. acceleration | m/s ² 250 | 416.7 | 230.8 | 384.6 |
| Max. velocity | m/s 1.2 | 1.2 | 1.2 | 1.2 |
| Max. displacement | mm _{p-p} 15(★1) | 25 | 30 | 30 |
| Axial Resonance | More than 4350Hz | More than 4350Hz | More than 3600Hz | More than 3600Hz |
| Moving Element | kg 1.2 | 1.2 | 1.3 | 1.3 |
| Armature Material | Aluminum | Aluminum | Aluminum | Aluminum |
| Suspension & Guide | Half Loop Flexure Sleeve Shaft | Half Loop Flexure Sleeve Shaft | Pneumatic Payload Support Roller Bearing and Sleeve Shaft | Pneumatic Payload Support Roller Bearing and Sleeve Shaft |
| Stiffness | N/mm 25.0(★1) | 25.0 | — | — |
| Armature Size | mm ø75 | ø75 | ø75 | ø75 |
| Maximum Payload | kg 12 | 12 | 12 | 12 |
| Thrust Axis | Vertical | Vertical | Vertical | Vertical |
| Stray Field | Less than 3mT(★2) | Less than 3mT(★2) | Less than 3mT(★2) | Less than 3mT(★2) |
| Field Power | Permanent Magnet | Permanent Magnet | Permanent Magnet | Permanent Magnet |
| Operating Environment | ℃ -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop |
| Cooling | Natural | Forced air (Blower) | Natural | Forced air (Blower) |
| Dimensions(★4) | mm 283W×270H×200D | 283W×270H×200D | 283W×276H×200D | 283W×276H×200D |
| Mass | kg 25 | 26 | 27 | 27 |
| Matched Amplifier | 373-A | 375-D | 373-A/Z12 | 375-D |
| Blower | — | Yes | — | Yes |
| Accessory | — | — | ● Air Pump ● Midpoint Adjuster Block | ● Air Pump ● Midpoint Adjuster Block |
| Option | Accelerometer Counter Mass(★3) Isolation (Rubber) Pad | Accelerometer Counter Mass(★3) Isolation (Rubber) Pad Muffler for Air Cooling Blower | Accelerometer Counter Mass(★3) Isolation (Rubber) Pad | Accelerometer Counter Mass(★3) Isolation (Rubber) Pad Muffler for Air Cooling Blower |
| Model | 9514-AN/MD | 9514-AB/WF | 9514-AB/AW | |
| Type | Modal Analysis | High Frequency | All-weather Type used in Workspace of Environmental Chamber | |
| Rated force | N 300 | 500 | 300 | 500 |
| Frequency range | Hz 5 to 2.5k | 5 to 10k | 5 to 3.0k | 5 to 3.0k |
| Max. acceleration | m/s ² 300 | 277.7 | 250.0 | 416.7 |
| Max. velocity | m/s 1.2 | 1.2 | 1.2 | 1.2 |
| Max. displacement | mm _{p-p} 15 | 20(★1) | 10 | 10 |
| Axial Resonance | More than 3600Hz | More than 6500Hz | More than 4300Hz | More than 4300Hz |
| Moving Element | kg 1.0 | 1.8 | 1.2 | 1.2 |
| Armature Material | Aluminum | Aluminum | Aluminum | Aluminum |
| Suspension & Guide | Half Loop Flexure Sleeve Shaft | Half Loop Flexure Sleeve Shaft | Half Loop Flexure Sleeve Shaft | Half Loop Flexure Sleeve Shaft |
| Stiffness | N/mm 25.0 | 28.0 | 30.0 | 30.0 |
| Armature Size | mm ø50 | ø75 | ø83 | ø83 |
| Maximum Payload | kg 8.0 | 12 | 10 | 10 |
| Thrust Axis | Vertical (Any direction by using flexure) | Vertical | Vertical | Vertical |
| Stray Field | Less than 3mT(★2) | Less than 3mT(★2) | Less than 3mT(★2) | Less than 3mT(★2) |
| Field Power | Permanent Magnet | Permanent Magnet | Permanent Magnet | Permanent Magnet |
| Operating Environment | ℃ -10 to +40 w/o dewdrop | -10 to +40 w/o dewdrop | -40 to +125 (less than 98%RH) | |
| Cooling | Natural | Forced air (Blower) | Forced air (Blower) | |
| Dimensions(★4) | mm 283W×270H×200D | 283W×270H×200D | 382.5W×205H×333.5D | |
| Mass | kg 26 | 26 | 31 | 31 |
| Matched Amplifier | 373-A/Z13 | 375-A/Z22 | 373-FW | 375-D |
| Blower | — | Yes | Yes | Yes |
| Accessory | Collet-and-chuck Set(ø1.0, ø1.5, ø2.0, ø2.35, ø3.0) | | Built-in Accelerometer Model : 731-B, T-wrench (M5) | |
| Option | Accelerometer Counter Mass(★3) Isolation (Rubber) Pad Model : 9514-AN/MD/Z12 Reinforced Stiffness : 50 N/mm (limited to max. 10 mm _{p-p}) Model : 9514-AN/MD/Z13 Low level acceleration with low distortion (limited to max. 10 mm _{p-p}) | Accelerometer Isolation (Rubber) Pad Muffler for Air Cooling Blower | Interconnection compatibility with chamber whose wall thickness is other than 70 to 100 mm Muffler for Air Cooling Blower | |

(★1) 25 mm_{p-p} displacement is available by changing axial stiffness to 15 N/mm. (★2) At 50 mm above table center.

(★3) When attempting to drive the vibration generator at its rated force, vibration generator should be secured to reaction mass, rigid base or floor. (★4) Without any projection.



Air-suspension mechanism ensures displacement 9514 Series

Relationship between payload, decreased displacement, and maximum displacement

Since the test object is supported by a spring, the increased mass of the loaded object will result in a lower neutral position thus reducing the maximum displacement for the armature of the compact vibration generator. As part of our 9514 series, we offer an optional "air suspension mechanism" that eliminates any reduction in the maximum displacement.

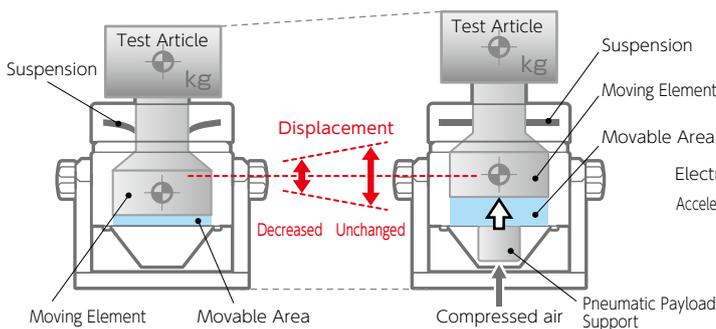
※Please contact our sales dept for details.

● Standard

When a heavy test object is loaded, the support spring extends and causes the moveable range to decrease.
→Maximum displacement decreases

● Air suspension mechanism

When a heavy test object is loaded, the air suspension raises the armature equivalent to the increase in mass.
→Maximum displacement is maintained

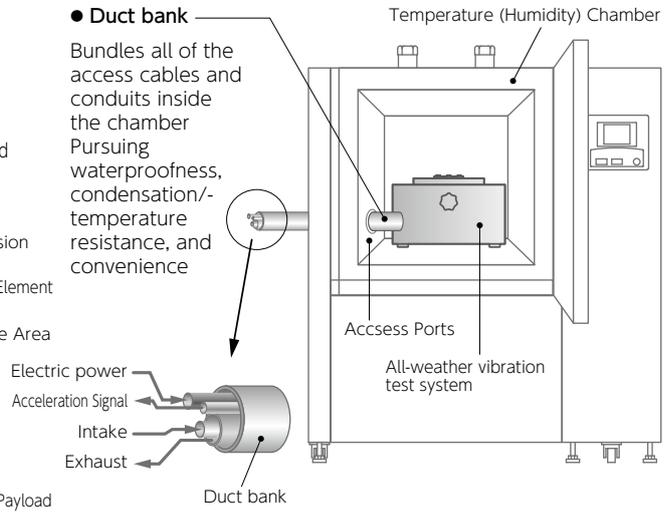


All-weather vibration test system

The compact all-weather vibration test system can be placed in temperature and humidity test chambers to enable combined environmental reliability testing. Compact, light-weight, waterproof, and highly resistant to condensation and temperature, this test system can be placed in temperature and humidity test chambers for use as a combined environmental reliability test system. The test chamber access ports can be used to connect the devices, thus, eliminating the need to modify the testing chamber. This system can also be used as a stand-alone vibration test system, therefore allowing for the effective use of various testing equipment.

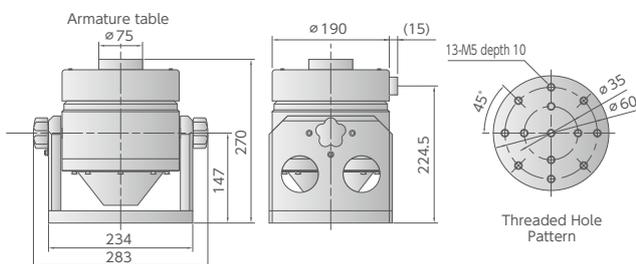
● Duct bank

Bundles all of the access cables and conduits inside the chamber Pursuing waterproofness, condensation/-temperature resistance, and convenience

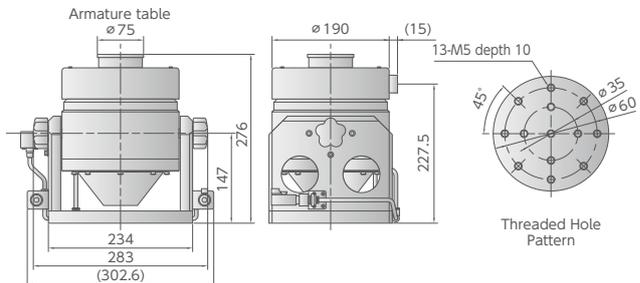


Dimensions

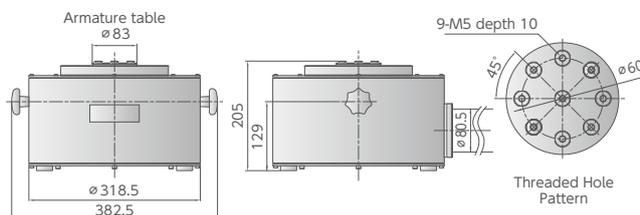
● 9514-AN/SD 9514-AB/SD 9514-AB/WF



● 9514-AN/AS 9514-AB/AS



● 9514-AB/AW



Compact Vibration Generator System Power Amplifier

This power amplifier is specialized for compact vibration generators.

This specialized vibration testing power amplifier is optimally designed for compact vibration generator systems and can also supply power for air-cooling blowers.

In addition, many options, such as transmitters, constant current mode, remote start and stop, duct silencers, and fan stop functions can apply, so this gives it the extensibility to suit all types of testing conditions.



Power Amplifier Specifications

| Model | 371-A | 372-A | 373-A | 373-A/Z12 | 373-A/Z13 |
|-----------------------|---|--|--|--|--|
| Apparent power VA | 110 | 220 | 330 | 330 | 330 |
| Output voltage Vrms | 20.0 | 27.5 | 20.0 | 20.0 | 20.0 |
| Output current Arms | 5.5 | 8.0 | 16.5 | 16.5 | 16.5 |
| Frequency range Hz | 2 to 30k | 2 to 30k | 2 to 10k | 2 to 10k | DC to 10k(★1) DC to 4k(★2) |
| Input Impedance Ω | 10k | 10k | 10k | 10k | 10k |
| Input voltage Vrms | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Matching Impedance Ω | 3.64 | 3.44 | 1.21 | 1.21 | 1.21 |
| Load Impedance Ω | 1.82 | 1.72 | 0.67 | 0.67 | 0.67 |
| S/N dB | 80 | 80 | 80 | 80 | 80 |
| Distortion | Less than 0.5% | Less than 0.5% | Less than 0.5% | Less than 0.5% | Less than 0.5% |
| Meter Arms | 7.5 | 10.0 | 20.0 | 20.0 | 20.0 |
| Input Connector | BNC | BNC | BNC | BNC | BNC |
| Input to Blower VA | — | 200Max. | — | — | — |
| Protector | Over current Transistor temperature | Over current Transistor temperature | Over current Transistor temperature | Over current Transistor temperature Air pressure | Over current Over voltage Transistor temperature |
| Input Power | AC100V 50/60Hz | AC100V 50/60Hz | AC100V 50/60Hz | AC100V 50/60Hz | AC100V 50/60Hz |
| Maximum Power VA | 300 | 800 | 1.1k | 1.1k | 1.1k |
| Dimensions mm | 480W×149H×350D | 480W×149H×350D | 480W×249H×400D | 480W×249H×400D | 480W×249H×400D |
| Mass kg | 15 | 15 | 37.0 | 37.0 | 37.0 |
| Operating Environment | Temp.: 0 to 40°C, hum.: 20 to 85%RH w/o dewdrop | | | | |

| Model | 373-FW | 374-A | 375-A/Z22 | 375-D |
|-----------------------|---|---|---|---|
| Apparent power VA | 360 | 440 | 840 | 840 |
| Output voltage Vrms | 30.0 | 40.0 | 35 | 35 |
| Output current Arms | 12.0 | 11.0 | 24 | 24 |
| Frequency range Hz | 2 to 5k | 2 to 20k | DC to 10.0k | DC to 5.0k |
| Input Impedance Ω | 50k | 10k | 10k | 10k |
| Input voltage Vrms | 1.0 | 1.0 | 1.5 | 1.5 |
| Matching Impedance Ω | 1.21 | 3.64 | 1.25 | 1.46 |
| Load Impedance Ω | 0.67 | 1.82 | 0.63 | 0.73 |
| S/N dB | 70 | 80 | 80 | 70 |
| Distortion | Less than 0.5% | Less than 0.5% | Less than 0.5% | Less than 1.0% |
| Meter Arms | 20.0 | 20 | 25.0 | 25.0 |
| Input Connector | BNC | BNC | BNC | BNC |
| Input to Blower VA | 200Max. | 300Max. | 400Max. | 200Max. |
| Protector | Over current Transistor temperature | Over current Transistor temperature Leakage Protector | Over current Transistor temperature Leakage Protector | Over current Over voltage Transistor temperature Overdisplacement Interlock |
| Input Power | AC100V 50/60Hz | AC100V 50/60Hz | AC200V 50/60Hz | AC200V 50/60Hz |
| Maximum Power VA | 1.1k | 1.5k | 2.4k | 1.8k |
| Dimensions mm | 480W×249H×400D | 480W×249H×400D | 480W×249H×602D | 480W×199H×450D |
| Mass kg | 37.0 | 37.0 | 52.0 | 35.0 |
| Operating Environment | Temp.: 0 to 40°C, hum.: 20 to 85%RH w/o dewdrop | | | |



Oscillator Option for Power Amplifier Unit

| | |
|---------------------|--|
| Model | Power Amplifier Model/G |
| Frequency range | 2 ranges, 1 to 1kHz and 100 to 100kHz |
| Frequency Adjust | COARSE : Resolution 2Hz from 1 to 1kHz 200Hz from 100 to 100kHz |
| | FINE : more than 5Hz adjustable from 1 to 1kHz more than 50Hz adjustable from 100 to 100kHz |
| Frequency Accuracy | ±2% (+2 scale) @ min FINE |
| Frequency Stability | 0.5Hz/°C TYP at 1kHz (from 1 to 1kHz) |
| Output Waveform | Sinusoidal waveform |
| Output voltage | ±1.0dB (within same range) |
| | 500 Hz standard from 1 to 1kHz 5 kHz standard from 100 to 100kHz |
| Distortion | less than 0.3% from 5 to 1kHz(1 to 1kHz range) |
| | less than 0.5% from 100 to 50kHz(100 to 100kHz range) |
| | less than 0.7% from 50k to 100kHz(100 to 100kHz range) |

| | |
|-------------------|-------------|
| Frequency Counter | |
| Frequency range | 1 to 100kHz |
| Display | 6 digits |
| Resolution | 1Hz |
| Accuracy | ±1Hz |
| Gate Time | 1s fixed |

Miscellaneous (Option Feature)

- Manual Operation of Blower
- DC 12 V Input Power with Pressure Alarm Switch
- Constant Current Mode
- Remote Start/Stop with Remote Control Box
- Remote Start/Stop with Timer and Remote Control Box
- Duct Silencer
- Stop Function of Fan
- Oscillator, Vibration Meter, Timer, Remote Control Switch

Application

The following introduces several application examples using compact vibration generators. We offer many kinds of testing systems by adding various applications to our products corresponding to clients' requirement.

Horizontal Testing Solution and Reinforcement against Offset Load

The figure shows the add-on features, horizontal slip table with linear bearing and enforcement against offset load in vertical vibration mode. The table size can be changed according to the customer's needs.



Rattle Noise Check System

Used for measuring and evaluating very low abnormal noise (rattle noise) from audio equipment such as CD, DVD player, etc. mainly used for car audio systems. The system consists of a vibration controller and sound-proof box to deaden ambient noise as well as compact vibration generator and associated power amplifier.



Model : EM-983

Ultra High Frequency Vibration Generator

The EM-983 is a high performance vibration generator of ultra high frequency and small cross-talk. Designed for primarily measuring the high frequency characteristic of head suspension for a hard disk.

- Upper Operating Frequency : 100kHz
- Ceramic armature structure
- Use : Measuring frequency characteristic of head suspension for hard disk and accelerometer, and spurious of crystal for cellular phone.



Raised Type for Horizontal Application



Equipped with Degaussing Coil

Vibration Control System DCS-98000MJ



DCS-98000MJ provides extensive software along with its hardware, which is most suitable for the vibration control of an electrodynamic vibration testing system. The vibration controller executes the vibration test profile that the customer requires and is designed to be able to easily perform a complicated vibration test. It carries DSP performing high-speed digital signal processing and is comprised of the industrial use PC main body of high reliability, the controller is equipped with the latest Microsoft Windows OS which it is easy to operate, and the control software standardized on the random, sine and shock and provide rich option software.

※ When exporting Software of Vibration Control System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan is required. Please contact us for details.

Typical Software Package Specifications

| Random vibration control package | | |
|----------------------------------|--|---|
| Model | ESP-121ME (English) / ESP-121MJ (Japanese) | |
| Major Specifications | ■ Control method: | PSD profile |
| | ■ Frequency range: | Max. 5000 Hz |
| | ■ Frequency resolution: | Max. 3200 line |
| | ■ Control dynamic range: | 144 dB (Theoretical value) |
| | ■ Loop time: | Less than 200 ms @ 400 line and 2000 Hz |
| | ■ Max. input number: | 16 ch |
| | ■ Random setup profile: | Breakpoint (Hz), power spectral density (PSD), slope |
| | ■ Max. test time: | 9999 hours 59 minutes 59 seconds |
| | ■ Data I/O function: | Text format output (CSV), Microsoft Excel form (xlsx) |



| Sine vibration control package | | |
|--------------------------------|--|--|
| Model | ESP-221ME (English) / ESP-221MJ (Japanese) | |
| Major Specifications | ■ Control method: | Maximum acceleration level Minimum acceleration level Average acceleration level |
| | ■ Frequency range: | 0.1 to 10000 Hz |
| | ■ Preset parameter: | Frequency, Acceleration, Velocity, Displacement. |
| | ■ Frequency control: | Sweep mode (LIN or LOG mode), Fixed mode, Manual setting mode. |
| | ■ Time and cycle: | Duration (Max. 999 h 59 m 59 s) Cycle (Max. 10 ¹⁰ cycles) |
| | ■ Control system: | Max. 2 systems |
| | ■ Input channel: | Max. 16 ch |
| | ■ Monitor parameter: | Acceleration, Vibration level, Frequency, Output voltage. |
| | ■ Graphic function: | Preset acceleration, Input response, Output response. |
| | ■ Analysis feature: | Transfer function, Response spectrum. |

| User-defined waveform long period equalization | | |
|--|--|---|
| Model | ESP-421ME (English) / ESP-421MJ (Japanese) | |
| Major Specifications | ■ Control method: | Equalizing transfer function |
| | ■ Frequency range: | Max. 1000 Hz |
| | ■ Freq. resolution: | Max. 1600 line |
| | ■ Permissible data: | Max. 4096000 (app. 4.5 h/app. 100 sample) |
| | ■ Monitor function: | Target waveform, Control waveform, Output waveform. |
| ■ Graphic function: | Spectrum, Transfer function. | |

| Shock control package | | |
|-----------------------|--|---|
| Model | ESP-321ME (English) / ESP-321MJ (Japanese) | |
| Major Specifications | ■ Control method: | Classical shock pulse (Half sine, sawtooth, trapezoidal), Arbitrary shock waveform, Output level and spectrum. |
| | ■ Pulse duration: | 0.5 to 150 ms |
| | ■ Freq. resolution: | Max. 25600 line |
| | ■ Preset parameter: | Shock waveform. Pulse duration. |

| Software Package Option | Model |
|--|--|
| Random-on-Random (ROR) Software (10 band) | ESP-122ME (English) / ESP-122MJ (Japanese) |
| Sine-on-Random (SOR) Software (28 tone) | ESP-123ME (English) / ESP-123MJ (Japanese) |
| Limit Channels Control (Random) | ESP-124ME (English) / ESP-124MJ (Japanese) |
| PSD Conversion | ESP-125ME (English) / ESP-125MJ (Japanese) |
| Resonant Search and Dwell Control | ESP-222ME (English) / ESP-222MJ (Japanese) |
| Sound Skip Check | ESP-223ME (English) / ESP-223MJ (Japanese) |
| Limit Channels Control (Sine) | ESP-224ME (English) / ESP-224MJ (Japanese) |
| Swept Triangular Control | ESP-225ME (English) / ESP-225MJ (Japanese) |
| Shock Response Spectrum (SRS) | ESP-322ME (English) / ESP-322MJ (Japanese) |
| Sine Beat Control | ESP-323ME (English) / ESP-323MJ (Japanese) |
| CERT Program Software | ESP-621ME (English) / ESP-621MJ (Japanese) |
| LAN Remote Monitor Package | ESP-821ME (English) / ESP-821MJ (Japanese) |
| e-mail Control Package (ESP-821ME(English) / ESP-821MJ(Japanese) required) | ESP-822ME (English) / ESP-822MJ (Japanese) |
| Watch Dog Timer Control Package | ESP-823ME (English) / ESP-823MJ (Japanese) |

※ As for the detailed information of Software Package, please contact us.

| Model | Language | Input |
|---------------------|----------|-------|
| DCS-98104ME(G)-W10 | English | 4ch |
| DCS-98104MJ(G)-W10 | Japanese | 4ch |
| DCS-98104ME(GS)-W10 | English | 4ch |
| DCS-98104MJ(GS)-W10 | Japanese | 4ch |
| DCS-98108ME(G)-W10 | English | 8ch |
| DCS-98108MJ(G)-W10 | Japanese | 8ch |
| DCS-98112ME(G)-W10 | English | 12ch |
| DCS-98112MJ(G)-W10 | Japanese | 12ch |
| DCS-98116ME(G)-W10 | English | 16ch |
| DCS-98116MJ(G)-W10 | Japanese | 16ch |

Option Horizontal Testing Solution



The slip table system is the most familiar option to perform horizontal testing of a bulky unit or an article, which the mounted configuration cannot be changed. It has many uses for various tests such as: transportation test of electrical appliances, computers and office equipment, durability test of railway rolling stocks, signaling equipment and automobile parts, and environmental test of aeronautical equipment.

The general purpose ST series slip table system incorporates oil film slip table technology of circulating oil between a sliding slab and a slip table, which applies to most commonly applied operated range.

The oil circulating linear bearing strongly restrains and supports a specimen against eccentric moment. Therefore, a high center of gravity and off-center loads can be excited safely. The ST series slip table system is the most practical because of its high restraint while maintaining high accuracy.

Specification

| Model | ST-050-06 | ST-050-16 | ST-050-26 | ST-050-36 | ST-060-06 | ST-060-16 | ST-060-26 | ST-060-36 |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Working Area mm | 500×500 | 500×500 | 500×500 | 500×500 | 600×600 | 600×600 | 600×600 | 600×600 |
| Screw Size | 25-M10 | 25-M10 | 25-M10 | 25-M10 | 36-M10 | 36-M10 | 36-M10 | 36-M10 |
| Screw Hole Pattern mm | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Operating Frequency Hz | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| Maximum Payload kg | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Table & Joint Mass kg | 28 | 32 | 34 | 44 | 35 | 40 | 41 | 52 |
| Matched Shaker | 906 | 916 | 926 | 936 | 906 | 916 | 926 | 936 |

| Model | ST-070-06 | ST-070-16 | ST-070-26 | ST-070-36 | ST-080-06 | ST-080-16 | ST-080-26 | ST-080-36 |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Working Area mm | 700×700 | 700×700 | 700×700 | 700×700 | 800×800 | 800×800 | 800×800 | 800×800 |
| Screw Size | 49-M10 | 49-M10 | 49-M10 | 49-M10 | 64-M10 | 64-M10 | 64-M10 | 64-M10 |
| Screw Hole Pattern mm | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Operating Frequency Hz | 1800 | 1800 | 1800 | 1800 | 1700 | 1700 | 1700 | 1700 |
| Maximum Payload kg | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| Table & Joint Mass kg | 46 | 51 | 52 | 65 | 59 | 64 | 65 | 80 |
| Matched Shaker | 906 | 916 | 926 | 936 | 906 | 916 | 926 | 936 |

| Model | ST-100-06 | ST-100-16 | ST-100-26 | ST-100-36 | ST-120-16 | ST-120-26 | ST-120-36 |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Working Area mm | 1000×1000 | 1000×1000 | 1000×1000 | 1000×1000 | 1200×1200 | 1200×1200 | 1200×1200 |
| Screw Size | 100-M10 | 100-M10 | 100-M10 | 100-M10 | 144-M10 | 144-M10 | 144-M10 |
| Screw Hole Pattern mm | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Operating Frequency Hz | 1500 | 1500 | 1500 | 1500 | 1200 | 1200 | 1200 |
| Maximum Payload kg | 1000 | 1000 | 1000 | 1000 | 2000 | 2000 | 2000 |
| Table & Joint Mass kg | 100 | 105 | 106 | 110 | 147 | 148 | 152 |
| Matched Shaker | 906 | 916 | 926 | 936 | 916 | 926 | 936 |

Option Vertical Auxiliary Table



The vertical auxiliary table is the fixture most commonly used in various vibration tests to expand a mounting surface of the vibration generator for performing the transportation package test such as food, drink, chemicals, and large products as home electric appliances, and OA apparatus. Specifications in this fixture are important, but there is close relationship among table area, upper limit of frequency, and mass. In consideration of convenience and versatility, the vertical auxiliary table has various table sizes, threaded hole pattern for attaching a specimen and L-type hook (option) available.

Specification

| Model | VT-060-16-N-A | | VT-060-26-N-A | | VT-060-36-N-A | | VT-080-16-N-A | | VT-080-26-N-A | | VT-080-36-N-A | | |
|-------------------|---------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|
| Working Area | mm | 600Wx75H x600D | 600Wx175H x600D | 600Wx75H x600D | 600Wx175H x600D | 600Wx75H x600D | 600Wx175H x600D | 800Wx75H x800D | 800Wx175H x800D | 800Wx75H x800D | 800Wx175H x800D | 800Wx75H x800D | 800Wx175H x800D |
| Table Size | mm | 600 | 600 | 600 | 600 | 600 | 600 | 800 | 800 | 800 | 800 | 800 | 800 |
| Maximum Frequency | Hz | 500 | 1000 | 500 | 1000 | 500 | 1000 | 200 | 500 | 200 | 500 | 200 | 500 |
| Mass | kg | 30.5 | 58.0 | 31.0 | 58.5 | 31.5 | 59.0 | 48.5 | 81.0 | 49.0 | 81.5 | 49.5 | 82.0 |
| Screw Size | | 36-M10, DP:15 | | 32-M10, DP:15 | | 36-M10, DP:15 | | 64-M10, DP:15 | | 60-M10, DP:15 | | 64-M10, DP:15 | |
| Screw Pitch | mm | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Compatible Model | | 916/P10/S-085 | | 926 | | 936 | | 916/P10/S-085 | | 926 | | 936 | |
| P.C.D | | 100-200 | | 80-160-240 | | 100-200-300 | | 100-200 | | 80-160-240 | | 100-200-300 | |
| Part Number | | B3-J-4870 | B3-J-4873 | B3-J-4871 | B3-J-4874 | B3-J-4872 | B3-J-4875 | B3-J-4876 | B3-J-4879 | B3-J-4877 | B3-J-4880 | B3-J-4878 | B3-J-4881 |

| Model | VT-100-16-N-A | | VT-100-26-N-A | | VT-100-36-N-A | | VT-120-16-N-A | | VT-120-26-N-A | | VT-120-36-N-A | | |
|-------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|--|
| Working Area | mm | 1000Wx125H x1000D | | 1000Wx125H x1000D | | 1000Wx125H x1000D | | 1200Wx150H x1200D | | 1200Wx150H x1200D | | 1200Wx150H x1200D | |
| Table Size | mm | 1000 | | 1000 | | 1000 | | 1200 | | 1200 | | 1200 | |
| Maximum Frequency | Hz | 200 | | 200 | | 200 | | 200 | | 200 | | 200 | |
| Mass | kg | 90.0 | | 91.5 | | 92.0 | | 126.0 | | 126.5 | | 127.0 | |
| Screw Size | | 100-M10, DP:15 | | 96-M10, DP:15 | | 100-M10, DP:15 | | 144-M10, DP:15 | | 140-M10, DP:15 | | 144-M10, DP:15 | |
| Screw Pitch | mm | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| Compatible Model | | 916/P10/S-085 | | 926 | | 936 | | 916/P10/S-085 | | 926 | | 936 | |
| P.C.D | | 100-200 | | 80-160-240 | | 100-200-300 | | 100-200 | | 80-160-240 | | 100-200-300 | |
| Part Number | | B3-J-4882 | | B3-J-4883 | | B3-J-4884 | | B3-J-4885 | | B3-J-4886 | | B3-J-4887 | |

※ Fixture is made of Aluminum. Magnesium alloy fixture is also available.
 ※ Auxiliary tables for special specimens or special vibration conditions are available. Please contact us for details.

Option Cubic Style Fixture



The JSA series cubic style fixture is used for performing vibration test of relatively small and light specimen such as various sensors, electrical components including electronic parts, printed circuit boards. In addition, we design and produce fixtures that meets the requirements for strength, stiffness, resonance frequency by taking the mass of a test article and frequency range of the vibration testing system into consideration.

Specification

| Model | JSA-150 | | | JSA-200 | | | JSA-300 | | | |
|-------------------|---------|----------------|-----------|-----------|----------------|-----------|-----------|----------------|------------|-------------|
| Cube Size | mm | 150Wx150Hx150D | | | 200Wx200Hx200D | | | 300Wx300Hx300D | | |
| Maximum Frequency | Hz | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 1000 | 1000 | 1000 |
| Mass | kg | 6 | 6 | 6 | 11 | 15 | 11 | 31 | 31 | 30 |
| Screw Size | | M5, DP:10 | M5, DP:10 | M5, DP:10 | M6, DP:12 | M6, DP:12 | M6, DP:12 | M10, DP:20 | M10, DP:20 | M10, DP:20 |
| Compatible Model | | 916/P10/S-085 | 926 | 936 | 916/P10/S-085 | 926 | 936 | 916/P10/S-085 | 926 | 936 |
| P.C.D | | 100 | 80-160 | 100 | 100-200 | 80-160 | 100-200 | 100-200 | 80-160-240 | 100-200-300 |
| Part Number | | B3-J-5100 | B3-J-5101 | B3-J-5102 | B3-J-5103 | B3-J-5104 | B3-J-5105 | B3-J-5106 | B3-J-5107 | B3-J-5108 |

※ Parts mounting plate for X, Y and Z axes of test allows for tailoring of its feature to fit to your specimen.
 ※ Cube mass does not include specimen mounting board. Fixture is made of Aluminum. Magnesium alloy fixture is also available.
 ※ Auxiliary tables for special specimens or special vibration conditions are available. Please contact us for details.

Option

Add-on Mechanism for Vibration Generator

Reinforcing Mechanism against Offset Load

This mechanism enables the mounting of a load whose center of gravity is not on the centerline of the armature table. The guide mechanism added to the vibration generator can respond to vibrations causing a large eccentric moment.



Load Support Enhancement Mechanism

The addition of a pneumatic spring to the reinforcing mechanism against the offset load makes it possible to increase the payload mass capability of the vibration generator.



Counter Mass

The counter mass is necessary for exciting large and heavy test specimens by suppressing shaking of the vibration generator body.



Electrical Towing Mechanism

This mechanism is convenient for moving a vibration generator placed on the rails.



Option

Add-on Mechanism for Slip Table System

Electric Rollover Mechanism

This mechanism rotates the vibration generator body to easily change the thrust axis.



Table Liftup Mechanism

This mechanism is used for moving the vertical auxiliary table up and down for easy attachment and removal. The work for this operation can be reduced to utilize a narrow working space effectively.



Duct switching for Thrust Axis

This duct eliminates the handling of a blower hose in changing the thrust axis of the vibration generator.



Fixture Transfer Mechanism

Installing and removing of the vertical auxiliary table can be performed by putting it on the movement base. The work for this operation can be reduced.



Option

Others

CE Marking

It is possible to fit our product in the CE marking process specified in Europe (EU).



New Addition Options

We are manufacturing new convenient option so that we can proceed with vibration test smartly.



Stand Automatic Lock Mechanism

A mechanism for fixing the vibration generator automatically when changing the thrust axis between vertical and horizontal.

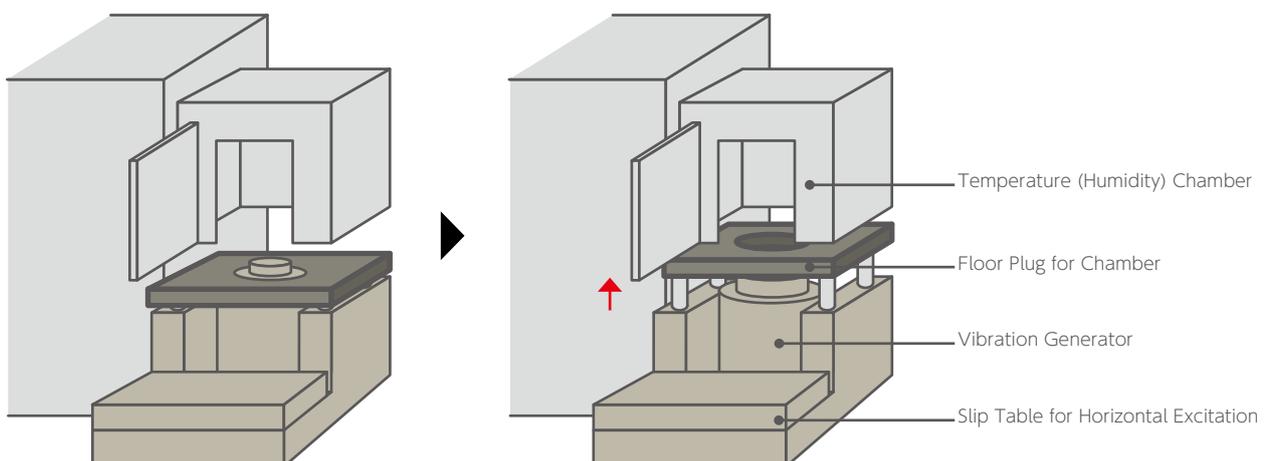
It automatically changes the thrust axis and fixes the vibration generator with one button (In case of using an electric rotating mechanism together).

In case of installing a temperature chamber, it is possible to drastically reduce the burden of narrow space work and manual work.

Chamber Floor Plug Lifting Device

This mechanism for raising and lowering the floor plug of the chamber, makes it easy to change the vibration direction and install the chamber.

This mechanism allows operators to combine the vibration testing system and chamber without the necessity of physically placing the floor plug on the VTS. In addition, since the floor plug can be lifted to the chamber, the installation space for the entire system will be smaller.



Vibration-Temperature (Humidity) Combined Environmental Reliability Test System

VC Series General Purpose Vib-Tech Chamber®



※The vibration controller is mounted in the console rack. (Optional)

A combined environmental reliability test system is designed for performing vibration test under specified temperature and humidity conditions. The combined reliability tests have been performed to evaluate reliability of equipment from early days in the field of aerospace industry. But in recent years, electronic devices such as semi-conductors, etc. are rapidly advanced in technology and complex materials made of plastic are used in the automobile industry. The combined reliability test today becomes indispensable to assure product reliability. Until now, temperature, humidity, vibration, these three tests have been done separately. But, EMIC's combined environmental reliability test system enables simultaneous performance, therefore, the required test time can be reduced drastically, and the reliability of a test unit can be checked under more severe combined environmental condition than conventional test methods.

Vib-Tech Chamber® is a trademark of EMIC CORPORATION.

Vib_Tech Chamber® Specification

| Selection Item | Code | Specification |
|---------------------------|--------------|--|
| Base Model | VC-062 | 600W×700H×600D mm Volume [252ℓ] |
| | VC-082 | 800W×800H×800D mm Volume [512ℓ] |
| | VC-102 | 1000W×1000H×1000D mm Volume [1000ℓ] |
| Category | A | Oven |
| | B | Temperature Chamber |
| | D | Temperature Humidity Chamber |
| Refrigerator Condensation | A | Air-cooled |
| | W | Water-cooled |
| | | Not applicable |
| Moving Mechanism | F | Fixed to Floor Type |
| | M | Moving on Rail Type |
| | X | Drawer Type |
| Combination with Shaker | Y | Detachable Diaphragm Floor Plug Type |
| | Z | Through Hole Type |
| | | |
| Temperature Range | (01)(02)(03) | 01 (RT+10°C to 100°C) 02 (RT+10°C to 150°C) 03 (RT+10°C to 180°C)※ |
| | (21)(22)(23) | 21 (-25°C to 100°C) 22 (-25°C to 150°C) 23 (-25°C to 180°C)※ |
| | (31)(32)(33) | 31 (-40°C to 100°C) 32 (-40°C to 150°C) 33 (-40°C to 180°C)※ |
| | (41)(42)(43) | 41 (-55°C to 100°C) 42 (-55°C to 150°C) 43 (-55°C to 180°C)※ |
| | (51)(52)(53) | 51 (-70°C to 100°C) 52 (-70°C to 150°C) 53 (-70°C to 180°C)※ |
| Programmer/Controller | M1 | Manually Operated Digital Controller |
| | P3 | LCD Touch Screen Controller |
| Recorder | T | 5.7" TFT Color LCD, 6 CH Input, SD Card, Option: 12CH Input |
| | X | 5.7" TFT Color LCD, 10CH Input (Expandable up to Max. 100 CH), SD Card, LAN Connection |

※ Upper limit of 200°C: Option

※ When exporting Combined Environmental Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as temperature range and rated force. Please contact us for details.



Chamber Transfer Mechanism for switching Vibration Axis between Horizontal and Vertical Direction (Optional)

This mechanism is used for combining a chamber with the vibration testing system which a slip table is attached. The chamber can be easily joined with the vibration generator and slip table through a special interface using a lift mechanism to move the chamber up and down and the rails to move it horizontally. In addition, they can be used independently from each other by separating the vibration testing system from the chamber.



Cantilever Type Chamber

The cantilever type temperature/humidity chamber has no frame around its test room to make the setup of a test article easier, therefore, the operating efficiency can be greatly improved. The test room can be moved with the test article mounted on the vibration generator.



※Crane is an option.

Vibration-Temperature (Humidity) Combined Environmental Reliability Test System

EHVC Series Rapid Vib-Tech Chamber®



※The vibration controller is mounted in the console rack. (Optional)

The EHVC Series Rapid Vib-Tech Chamber® is designed for highly accelerated life testing, the demand is increasing today. This is a joint system of the AGREE chamber and thermal shock chamber that we have manufactured and makes the temperature rate up to 16.8°C/min feasible with a compressor only. With this feature, the highly accelerated life test such as AGREE tests, most thermal shock tests can be done with one unit. Also the area requirement for installing the unit is about a half the space compared with the thermal shock test chamber composed of three compartments made by us until now.

Vib-Tech Chamber® is a trademark of EMIC CORPORATION.

Specification

| Model | EHVC-1118BWFY(53H13) | EHVC-1372BWFY(53H18) | EHVC-1118DWFY(53H11) | EHVC-1372DWFY(53H15) |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| Interior Dimensions | 1118W×914H×1118D mm | 1372W×1016H×1372D mm | 1118W×914H×1118D mm | 1372W×1219H×1372D mm |
| Dimensions | 1981W×2440H×2845D mm | 1980W×2540H×2972D mm | 1981W×2440H×2845D mm | 1980W×2795H×3300D mm |
| Temperature Range | -73 to +180°C | -73 to +180°C | -73 to +180°C | -73 to +180°C |
| Temperature Rise Rate | 13°C/min | 18°C/min | 10°C/min | 15°C/min |
| | 20°C/min | 25°C/min | 18°C/min | 18°C/min |
| Temperature Decrease Rate | 13°C/min | 18°C/min | 11°C/min | 15°C/min |
| | 20°C/min | 25°C/min | 18°C/min | 18°C/min |
| Temperature Decrease w/ LN2 | 60°C/min | 60°C/min | 60°C/min | 60°C/min |
| Humidity Range | — | — | 10 to 98%RH | 10 to 98%RH |
| Option | LN2 | LN2 | LN2 | LN2 |

※ The above temperature change rate is achieved under the condition of room temperature + 26°C, power supply frequency 60 Hz, regulated coolant temperature and specified flow rate. When the power supply frequency is 50 Hz, the temperature change rate is different from the above value, so please contact us.

※ It is the average temperature change rate at the vent without a test specimen over the temperature range from -40°C to +85°C.

※ When exporting Combined Environmental Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as temperature range and rated force. Please contact us for details.

Vibration-Temperature (Humidity) Combined Environmental Reliability Test System
HALT/HASS EVTC Series
 Highly Accelerated Life Test System



HALT/HASS testing challenges the design, components, sub-assemblies and final assemblies of today's manufactured products. Stresses are applied through a number of conditions to set operational limits and ultimately precipitate failure in the HALT/HASS test environment. Rapid thermal change rate is one of the classic conditions that facilitate product stress.

- Six-degree-of-freedom (6DoF), pseudo-random vibration
- Temperature range: -100 to +200 °C
- Temperature transition rate: 60 °C per minute (average)

※ To limit the usage of LN2 gas, Hybrid models equipped with refrigerators are available.

Specification

| Model | EVTC-4 | EVTC-6 | EVTC-9 | EVTC-16 | EVTC-25 | EVTC-36 |
|----------------------|---|---|---|---|---|---|
| Interior Dimensions | 762W×914H×762D mm | 914W×914H×914D mm | 1067W×965H×1067D mm 1067W×1270H×1067D mm | 1372W×965H×1372D mm 1372W×1270H×1372D mm | 1676W×965H×1676D mm 1676W×1270H×1676D mm | 1930W×965H×1930D mm 1930W×1270H×1930D mm |
| Table Dimensions | 610 mm×610 mm | 762 mm×762 mm | 914 mm×914 mm | 1220 mm×1220 mm | 1524 mm×1524 mm | 1778 mm×1778 mm |
| Temperature Range | -100 to +200°C |
| Transition Rate | 60 °C/min(average) |
| Maximum Acceleration | 588 m/s ² (59.9G) Pseudo-random |
| Frequency Range | 10 to 10 kHz |
| Maximum Payload | 315 kg | 315 kg | 315 kg | 225 kg | 225 kg | 225 kg |
| Access Ports | ∅ 152 mm×2 ∅ 25.4 mm×1 | ∅ 152 mm×2 ∅ 25.4 mm×1 | ∅ 152 mm×3 ∅ 25.4 mm×1 |
| Door | 2 | 2 | 2(Front & Rear) | 2(Front & Rear) | 2(Front & Rear) | 2(Front & Rear) |
| Viewing Window | 2 | 2 | 4 | 4 | 4 | 4 |
| Exterior Dimensions | 1524W×2413H×1118D mm | 1676W×2438H×1245D mm | 1829W×2712H×1397D mm | 2134W×2712H×1702D mm | 2438W×2717H×2007D mm | 2692W×2717H×2260D mm |
| Uncrated Weight | 855 kg | 1125 kg | 1800 kg | 2250 kg | 2700 kg | 3150 kg |
| Input Power | 3∅AC 415V 70A | 3∅AC 415V 70A | 3∅AC 415V 145A | 3∅AC 415V 145A | 3∅AC 415V 202A | 3∅AC 415V 214A |

※ As for the detailed utilities (LN2, compressed air, ventilation, exhaust), please contact us.

※ When exporting Combined Environmental Testing System from Japan to overseas, Export License from the Ministry of Economy, Trade and Industry in Japan may be required depending on the specifications such as temperature range and rated force. Please contact us for details.

Application Product

Agree Type Combined Environmental Reliability Test System

Combined Environmental Reliability Test (CERT) system is to test equipment for aircraft according to the MIL-STD-781C standard.

- Rapid heating and cooling performance from 5°C/min to 10°C/min
- Temperature range: -55°C to +177°C



Heat Durability of Material Surface with Infrared Ray Irradiation/vibration Cert System

CERT with Infrared Ray Irradiation for testing Heat Durability of Material Surface Combined Environmental Reliability Test System for testing inner packaging material such as instrumentation panels, cut-out bodies, doors and bumpers. In addition to a customary vibration-temperature combined environmental stress, the surface of a specimen can be simultaneously subjected to heat stress due to sunlight.

- Temperature range : -45°C to +150°C
- Humidity range : 30 to 90%RH
- Surface Temperature range : +50°C to +150°C



CERT with Rotation Added

Vibration - Temperature/Humidity Combined Environmental Reliability Test System which forcefully rotates an actually configured specimen such as: water pumps, dynamos, alternators, etc. for a car.

- Temperature range:-40°C to +150°C
- Humidity range : 30 to 95%RH
- Rotation : 0 to 12000rpm
- Rotation torque : 0.4N·m



Details of Rotating Feature



CERT with Hose Pressure Testing

Combined Environmental Reliability Test System for testing a pressure-proof hose or radiator hose for a car. It tests the durability of a pressure-proof hose in its actual configuration under heating and circulating anti-freeze or oil while pressurizing statistically or dynamically with a controlled temperature and vibration stress.

- Ambient temperature : -40°C to +150°C
- Hose pressurizing specification :
 - Maximum compression : 80kN
 - Maximum displacement : ±75mm
 - Pressurizing force : 19MPa
 - Circulating quantity : Maximum 40ℓ /min



Configuration of Hose in Workspace





CERT for Exhaust Catalyst

Combined Environmental Reliability Test System for exhaust catalyst (catalyzer) of a car. The hot air of 1000°C generated with gas burner and the open air are supplied alternatively into the specimen on a shaker armature table. In addition, the water is also sprayed simulating the conditions of water pools and rain.

- Hot air temperature : RT to 1000°C
- Available gas : City gas, LP gas



Low Frequency and Acceleration CERT

Combined Environmental Reliability Test System for calibration and characteristic measurement at low frequency, it can be applied to test a low frequency acceleration sensor, riding comfort sensor, sensitive instrument to earthquakes, heater safety device against earthquakes.

- Frequency range : 0.1 to 100Hz
- Max. displacement : 300mm_{p-p}
- Rated force : 49N
- Temperature range : -50°C to +100°C



Vacuum CERT

Vacuum CERT simulates the vibration generated by launching rockets to test aerospace components such as bearings, gears, harmonic drives, and valves. Specimen characteristics are sequentially evaluated under temperature/vacuum combined environments.

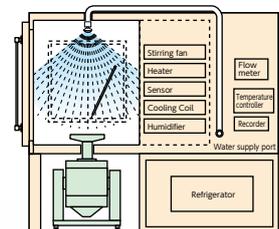
- Vacuum Chamber Dimensions : ø 1000mm×L1000mm
- Attainable pressure : Less than 1×10^{-5} Pa
- Temperature range : -150°C to +100°C
- Force : 80,000N(Sine)57,700N rms(Random)



CERT with Rain and Water Spray

Combined Environmental Reliability Test System for parts around the wheel of a car and those for motorcycle. In addition to ordinary temperature and humidity tests, the water can be also sprayed simulating the conditions of water pools and rain.

- Water Splashing : Maximum 50L/min
- Water Splashing Port : Spray nozzle
- Temperature range to -40°C to +150°C



Application Product

Model : EMS-224 Angular Electrodynamic Shock Test System

EMS-224 is designed for testing the characteristic of an overturn angular velocity sensor (angular accelerometer for a reference acceleration signal) to be installed in a car. It is one of the various sensors used for cars and recently high performance test system for its development has been required. This shock test system is developed on an electrodynamic rotating actuator, and its control technology enables the reproductions of a haversine shock pulse and any angular velocity waveform as well as a half-sine shock pulse.



Model : EMS-225 Dual Angular Electrodynamic Shock Test System

EMS-225 is designed for testing the characteristic of an angular velocity and acceleration sensor. A specimen-mounting table moves back and forth along a circular arc to generate angular velocity or angular acceleration according to a reference profile. It is used for measuring the frequency characteristic of sensors loaded on a car and gyro sensor for AV equipment. It is constructed to be easily combined with an environmental chamber to add temperature or humidity, which is an important environment for measuring characteristics.



Model : EM-852 Rotating Type Shock Test System

The EM-852 applies rotating shock force to various storage devices such as: hard disk for servers, magnetic tapes, DVD drive units, vehicle-mounted equipment that has a rotor, gyro, sensor.

- Produced Energy : 60J
- Maximum Acceleration : 100krad/s² (for pulse width of 0.5 ms)
- Table Size : ø 250mm



Model : EM-983 Ultra High Frequency Vibration Generator

The EM-983 is a high performance vibration generator of ultra high frequency and small cross-talk. Designed for primarily measuring the high frequency characteristics of head suspension for a hard disk.

- Upper Operating Frequency : 100kHz(f_0 :Higher than 60kHz)
- Ceramic armature structure
- Use : Measuring frequency characteristic of head suspension for hard disks and accelerometers, and spurious of crystals for cellular phone.

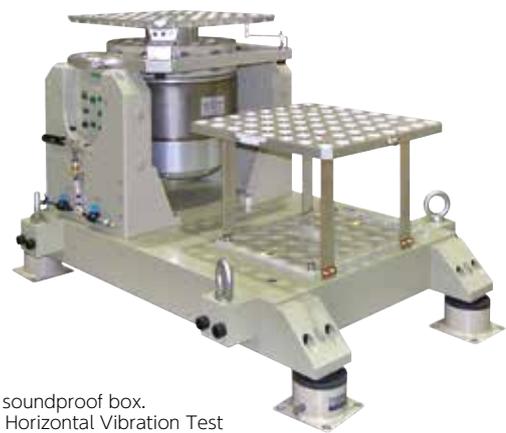


Base for setting thrust axis to horizontal direction (left) and degaussing device (right) are option for EM-772.



Rattle Noise Check System

The system is designed for measuring and evaluating faint unusual sounds (commonly called "Rattle Noise") generated from audio equipment such as a CD player mounted mainly on a car audio. A sound-proof box for attenuating surrounding noise and vibration test system matching to the usage shall be custom designed.



Stored in soundproof box.
Vertical / Horizontal Vibration Test
Equipment for Rattle Noise Evaluation.

Bridge Model Exciting And Attenuating Test System

The system is designed for analyzing its structure by exciting the model of a large bridge before construction. Its attenuation constant can be measured by switching it into attenuation mode after excited with an electrodynamic shaker. The moving element is supported by the bearings, thus mechanical friction is reduced as much as possible to realize a more accurate test.



Model : VC-101DWFX(31)P2R-070BM/PAZ Vibration-temperature/humidity Characteristic Inspection System

This is the latest system installed in an inspection agency for the purpose of inspecting and measuring vibrometers and vibration sensors. The system is designed for inspecting according to the qualification system of the industrial research institute specified in the ISO/IEC directive 25 (ISO/IEC17025). Measuring accuracy is set high and the measuring features meet customer specifications. The measuring accuracy is especially determined by how to force the armature to behave in a particular way. Due to the advanced armature constraint method, the pneumatic air support will increase the clearance, lower distortion, will have low waverse sensitivity.



Inside View of
Workspace



※ Because these products are custom ordered, EMIC may no longer manufacture these systems.

Vibration Measuring Instruments

Slim & High-Performance Charge Amplifier

Measuring a wide variety of vibrations: automotive, rail transportation equipment vibration, motor/pump vibration, vibration response during vibration test. Also available for a vibration test device for calibration of equipment.

Compatible with input of piezoelectric accelerometers and accelerometers with built-in pre-amplifiers.

Various options are available: PC communication port, etc.

| Specification | | |
|--------------------|--|--|
| Model | 6001-AHD | 6002-A |
| Input channel | 1ch | 2ch |
| Types | Piezoelectric accelerometers (Front Connector) Accelerometers w/built-in pre-amplifier (Rear Connector) | |
| Measuring Mode | Acceleration: m/s ² | Acceleration: m/s ² |
| | Velocity: mm/s | |
| | Displacement: mm | |
| Measuring Range | Acceleration: 0.1 to 10000m/s ² | Acceleration: 0.1 to 10000m/s ² |
| | Velocity: 0.1 to 10000mm/s | |
| | Displacement: 0.01 to 1000mm | |
| Input power | DC9 to 15V | |
| Dimension | 36W×149H×240D | |
| Mass | 1.0 kg | |
| Ambient Conditions | -10 to +50°C (No condensation) | |



6001-AHD

6002-A



AC Power Supply, USB Port

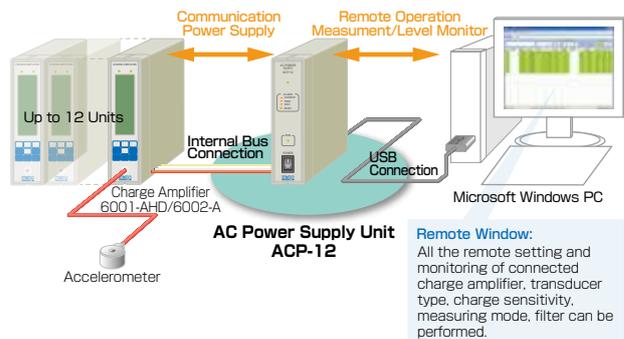
| Model | ACP-12 |
|--------------------------|----------------------------|
| Input power | AC 85 to 265 V 47 to 66 Hz |
| Output | DC+12V±5% 4A |
| Combined Number of Units | Max. 12 units |
| USB port | USB2.0 |
| Dimension | 36(W)×149(H)×240(D) |
| Mass | 1.0 kg |

SVM Remote Software

The software can operate the 6001-AHD charge amplifier and 6002-A 2-channel charge amplifier by making it possible to remotely set the operator panel through a USB interface. The ACP-12 can connect up to 12 units in total enabling the remote operation of up to 24 channels.

- ※ It is also possible to configure the 6001-AHD up to 24 units (24 channels) using two ACP-12 units (one of them has no communication function).
- ※ As for the configuration from 25 to 99 channels, please contact us.

Model: ACP-12 AC Power Supply Unit and Remote Software



4 Channel Constant Current Power Supply Unit for Accelerometer with Integral Electronics

Power Supply Unit for Accelerometer with Integral Electronics



Power Supply Unit for Accelerometer with integral Electronics

| Model | PS-504 |
|------------------------|---|
| Input channel | 4 channels |
| I/O connector | BNC receptacle |
| I/O gain | ×1 (fixed) |
| Lower limit freq. | 0.2 Hz(within -3 dB), 0.7 Hz(within -5%) |
| Upper limit freq. | For accelerometer with integral electronics |
| Max. voltage | DC 24 V |
| Output current | DC 4mA |
| Input power | AC100V±10% |
| Max. power consumption | 10 VA |
| Operating environments | Temp.: 0 to 50 °C, hum.: 95%RH w/o dewdrop |
| Outline dimensions | 200W×55H×140D mm |
| Mass | 1.3 kg |

Pre-charge Amplifier

Pre-charge Amplifier 504 Series

The 504 series pre-charge amplifier is a signal conditioner for converting high impedance charge input into a low impedance voltage signal from a piezo-electric type accelerometer. One(1) input channel unit, two(2) input channel unit and four(4) input channel unit are available for your specific vibration control/measuring purpose. As any input charge sensitivity can be exactly set to the 504 series pre-charge amplifier within its preset range, the general purpose accelerometer in various sizes are available. A unit with a power supply is also available for various measuring purposes including vibration other than for a vibration test system as a general purpose pre-charge amplifier.



504-E



504-E-2



504-E-4



504-E-4-PS

504 Series Pre-charge Amplifier Specifications

| Model(★1) | 504-E | 504-E-2 | 504-E-4 | 504-E/Z01 | 504-E-4/Z18 |
|---------------------|---|---|---|---|---|
| Input channel | 1 | 2 | 4 | 1 | 4 |
| Sensitivity range | 0.100 to 0.999 1.00 to 9.99 |
| Maximum input(★2) | 2200pC (0.100 to 0.999pC/(m/s ²)) 22000pC (1.00 to 9.99pC/(m/s ²)) | 2200pC (0.100 to 0.999pC/(m/s ²)) 22000pC (1.00 to 9.99pC/(m/s ²)) | 2200pC (0.100 to 0.999pC/(m/s ²)) 22000pC (1.00 to 9.99pC/(m/s ²)) | 2200pC (0.100 to 0.999pC/(m/s ²)) 22000pC (1.00 to 9.99pC/(m/s ²)) | 2200pC (0.100 to 0.999pC/(m/s ²)) 22000pC (1.00 to 9.99pC/(m/s ²)) |
| Frequency range | 5 to 5000 | 5 to 5000 | 5 to 5000 | 5 to 5000 | 1 to 5000 |
| Output voltage | 5 | 5 | 5 | 1 | 5 |
| Max. output voltage | ±10 | ±10 | ±10 | ±10 | ±10 |
| Input power | DC±15V ±15% 30mA |
| Mass | 0.6 | 0.6 | 1.0 | 0.45 | 1.0 |

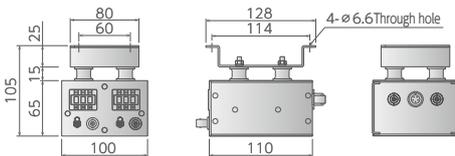
| Model(★1) | 504-CB/TKS | 504-CB/TKS-2 | 504-CB/TKS-4 |
|---------------------|------------------|------------------|------------------|
| Input channel | 1 | 2 | 4 |
| Sensitivity range | 0.100 to 9.999 | 0.100 to 9.999 | 0.100 to 9.999 |
| Maximum input(★2) | 100000pC | 100000pC | 100000pC |
| Frequency range | 0.25 to 5000 | 0.25 to 5000 | 0.25 to 5000 |
| Output voltage | 10 | 10 | 10 |
| Max. output voltage | ±10 | ±10 | ±10 |
| Input power | DC±15V ±15% 30mA | DC±15V ±15% 30mA | DC±15V ±15% 30mA |
| Mass | 0.45 | 0.65 | 1.0 |

(★1) The model with a code "-PS" that can receive the input power of AC 100 V±0 V 50/60 Hz is also available.

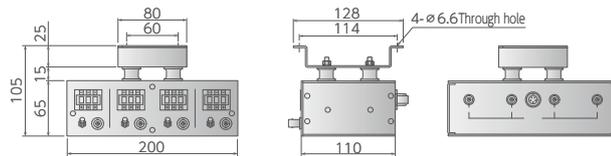
(★2) The maximum input charge is limited by the maximum output voltage.

Outline Drawing

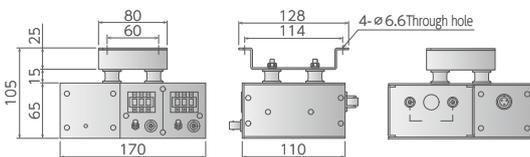
● 504-E-2



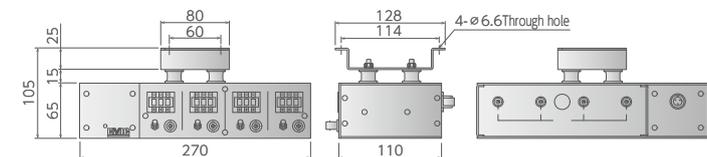
● 504-E-4



● 504-E-2-PS



● 504-E-4-PS



Accelerometer

Accelerometer

EMIC offers many kinds of accelerometers available for various vibration measurements. They are ultra small, light weight accelerometers for highly precise measurements. A special tri-axial accelerometer for simultaneously measuring a vibration in three orthogonal axes is available. A large output accelerometer for measuring earthquakes and a suitable accelerometer for measuring and analyzing building structures.



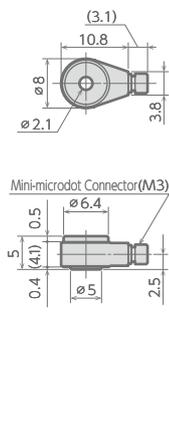
Specification

| Model | 710-D | 712-B3 | 720-BW | 731-B | 760-B | 541-DSH |
|---|--|---|--|--|---|--|
| Type | Small/Light Weight | Tri-axial | Water-proof | General Purpose | Large Output | High Temperature |
| Dimensions mm | ø8×5 | 17.5W×9HX17.5D | ø15×8 | ø17.5×9.8 | 24 _{HEX} ×30 | 14 _{HEX} ×29 |
| Feature | Vibration measurement and modal analysis on small object | Simultaneous dynamic measurement in three orthogonal axes on small object | Center hole type suited to narrow space. Water-proof against 0.6 MPa | Center hole type suited to attach to narrow space. Side connector for easily routing cable | Most suited to low acceleration measurement on building and structure | Most suited to measurement at high temperature such as combined environmental test |
| Sine Vibration Limit m/s ² | 5000 | 5000 | 5000 | 5000 | 1250 | — |
| Shock Limit m/s ² | 10000 | 10000 | 10000 | 15000 | 2500 | 16000 |
| Mass g | 1.9 | 14 | 11 | 13.5 | 98.6 | 35 |
| Frequency Response* Hz | Up to 20k±3dB | Up to 8k±1dB | Up to 8k±1dB | Up to 7k±1dB | Up to 3.5k±1dB | Up to 5k |
| Charge Sensitivity pC/(m/s ²) | 0.2±15% | 0.347±20% | 1.33±20% | 3.67±20% | 35±20% | 5.0±25% |
| Mounted Resonance Hz | More than 60k | More than 25k | More than 26k | 38k±5 | 13.5k±4 | More than 27k |
| Temperature Range °C | -50 to +160 | -50 to +160 | -20 to +120 | -50 to +160 | -20 to +120 | -20 to +250 |
| Construction | Piezoelectric Shear | Piezoelectric Shear | Piezoelectric Shear | Piezoelectric Shear | Piezoelectric Shear | Piezoelectric Compression |
| Capacitance pF | 1200±20% | 750±25% | 1900±25% | 1900±25% | 1500±25% | 1000±25% |
| Transverse sensitivity | Less than 5% | Less than 5% | Less than 5% | Less than 5% | Less than 5% | Less than 5% |
| Piezoelectric material | Pb(Zr·Ti)O ₃ | Pb(Zr·Ti)O ₃ | Pb(Zr·Ti)O ₃ | Pb(Zr·Ti)O ₃ | Pb(Zr·Ti)O ₃ | Pb(Zr·Ti)O ₃ |
| Case Material | Stainless | Titanium | Stainless | Titanium | Stainless | Stainless |
| Mounting | M2 thru, adhesive | M2 thru, adhesive | M4 thru | M4 thru | M8×5 Internal thread | M6×5 Internal thread |
| Cable/Adapter(Micro BNC) | AC-7020-BM(BLM-001) | AC-8030-AB×3 | Integral 10m BNC w/plug | AC-8030-AB | AC-8030-AB | AC8020-ABH High temp. |

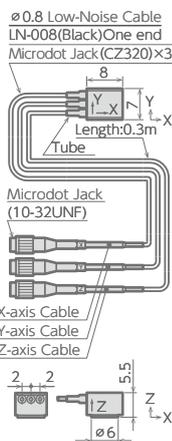
* Low-frequency response frequency is dependent on the charge vibration meter.

Outline View

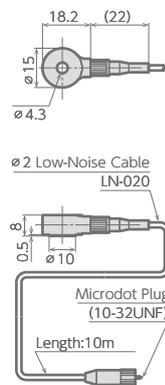
● 710-D



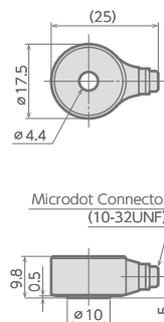
● 712-B3



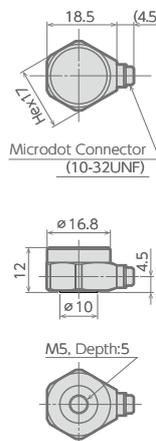
● 720-BW



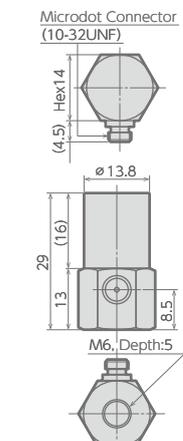
● 731-B



● 760-B



● 541-DSH



Accelerometer Cable

| Product Description | Model | Cable Outline |
|--|-------------|--|
| Microdot Plug - BNC Plug Accelerometer Cable (2 m) | AC-8020-AB |  |
| Microdot Plug - BNC Plug High Temp. Acc. Cable (2 m) | AC-8020-ABH | |
| Microdot Plug - BNC Plug Accelerometer Cable (3 m) | AC-8030-AB | |
| Microdot Plug - BNC Plug High Temp. Acc. Cable (3 m) | AC-8030-ABH | |
| Microdot Plug - BNC Plug Accelerometer Cable (5 m) | AC-8050-AB | |
| Microdot Plug - BNC Plug High Temp. Acc. Cable (5 m) | AC-8050-ABH |  |
| Microdot Plug - BNC Plug Accelerometer Cable (10 m) | AC-8100-AB | |
| Microdot Plug - BNC Plug High Temp. Acc. Cable (10 m) | AC-8100-ABH | |
| Microdot Plug - Microdot Plug Accelerometer Cable (2 m) | AC-8020-AM | |
| Microdot Plug - Microdot Plug High Temp. Acc. Cable (2 m) | AC-8020-AMH | |
| Microdot Plug - Microdot Plug Accelerometer Cable (3 m) | AC-8030-AM |  |
| Microdot Plug - Microdot Plug High Temp. Acc. Cable (3 m) | AC-8030-AMH | |
| Microdot Plug - Microdot Plug Accelerometer Cable (5 m) | AC-8050-AM | |
| Microdot Plug - Microdot Plug High Temp. Acc. Cable (5 m) | AC-8050-AMH | |
| Microdot Plug - Microdot Plug Accelerometer Cable (6 m) | AC-8060-AM | |
| Microdot Plug - Microdot Plug High Temp. Acc. Cable (6 m) | AC-8060-AMH | |
| Microdot Plug - Microdot Plug Accelerometer Cable (10 m) | AC-8100-AM | |
| Microdot Plug - Microdot Plug High Temp. Acc. Cable (10 m) | AC-8100-AMH | |
| Mini-microdot Plug - Microdot Plug Acc. Cable (2 m) | AC-7020-BM | |
| Extension Cable (Every 1 m) | - | |
| Conversion Adapter (BNC Plug - Microdot Jack) | BLM-001 | |

Insulated Mounting Stud

| Product Description | Model |
|---------------------------|-----------|
| Insulated Stud for 540-DT | RS-171D |
| Insulated Stud for 710-D | TJ-1026AC |

| Product Description | Model |
|-------------------------------|-------------|
| Insulated Stud (M5) for 731-B | RS-171B14C6 |
| Insulated Stud (M6) for 731-B | RS-171B14D6 |

Accelerometer Set

In addition to the accelerometer body, this set includes all required accessories such as dedicated cables and insulators.



Accelerometer Set

| Product Description | 731-B Accelerometer Set 3 m | | 731-B Accelerometer Set 6 m | |
|---------------------|-----------------------------|-------------|-----------------------------|-------------|
| Model | 731-B(FSET3m) | | 731-B(FSET6m) | |
| Contents of Set | Accelerometer | 731-B | Accelerometer | 731-B |
| | Accelerometer Cable | AC-8030-AM | Accelerometer Cable | AC-8060-AM |
| | Microdot - BNC Adapter | BLM-001 | Microdot - BNC Adapter | BLM-001 |
| | Insulated Stud | RS-171B14C6 | Insulated Stud | RS-171B14C6 |

| Product Description | Built-in Set for 902 Vibration Generator | | Built-in Set for 903 Vibration Generator | |
|---------------------|--|------------|--|------------|
| Model | BIN-PU902SET | | BIN-PU903SET | |
| Contents of Set | Accelerometer | 540-DS | Accelerometer | 540-DS |
| | Accelerometer Cable | AC-8030-AM | Accelerometer Cable | AC-8030-AM |
| | Microdot - BNC Adapter | BLM-001 | Microdot - BNC Adapter | BLM-001 |
| | Insulator | | Insulator | 541AR-5100 |
| | Set Screw | | Set Screw | M6x10 |

| Product Description | Built-in Set for 906 Vibration Generator | | Built-in Set for BD Vibration Generator | |
|---------------------|--|------------|---|-------------|
| Model | BIN-PU906SET | | BIN-PUBDSET | |
| Contents of Set | Accelerometer | 540-DS | Accelerometer | 731-B |
| | Accelerometer Cable | AC-8030-AM | Accelerometer Cable | AC-8030-AM |
| | Microdot - BNC Adapter | BLM-001 | Microdot - BNC Adapter | BLM-001 |
| | Set Screw | M6x10 | Insulated Stud | RS-171B14C6 |
| | | | | |

Modernization Program

The modernization program is the renewal program of an old type vibration testing system that you currently use.

BEFORE



AFTER

Renewal of Power Amplifier

This program replaces an old type power amplifier with the latest switching amplifier of high output and efficiency. The power amplifier can be reduced in size and the service life of the vibration testing system can be extended.



Overhaul of Vibration Generator

Although the cleaning of the inside of the vibration generator body and replacement or adjustment of some deteriorated parts cannot be performed in usual inspection. An overhaul can allow the system to operate in an optimum working mode for the long term.



Renewal of Vibration Controller

This program replaces your vibration controller with the state-of-the-art vibration controller. As a result, operations can be easily executed and the latest vibration control including the basic operations such as sine, random, shock becomes available.



Addition of Chamber

An existing vibration testing system can be enhanced to a combined environmental reliability test system by adding a temperature (humidity) chamber.



Addition of Slip Table

The addition of the slip table enables horizontal vibration tests by changing the thrust axis. It also enables testing of heavy equipment.



ECO-Vibe neo Modification for Energy-saving Drive Mode

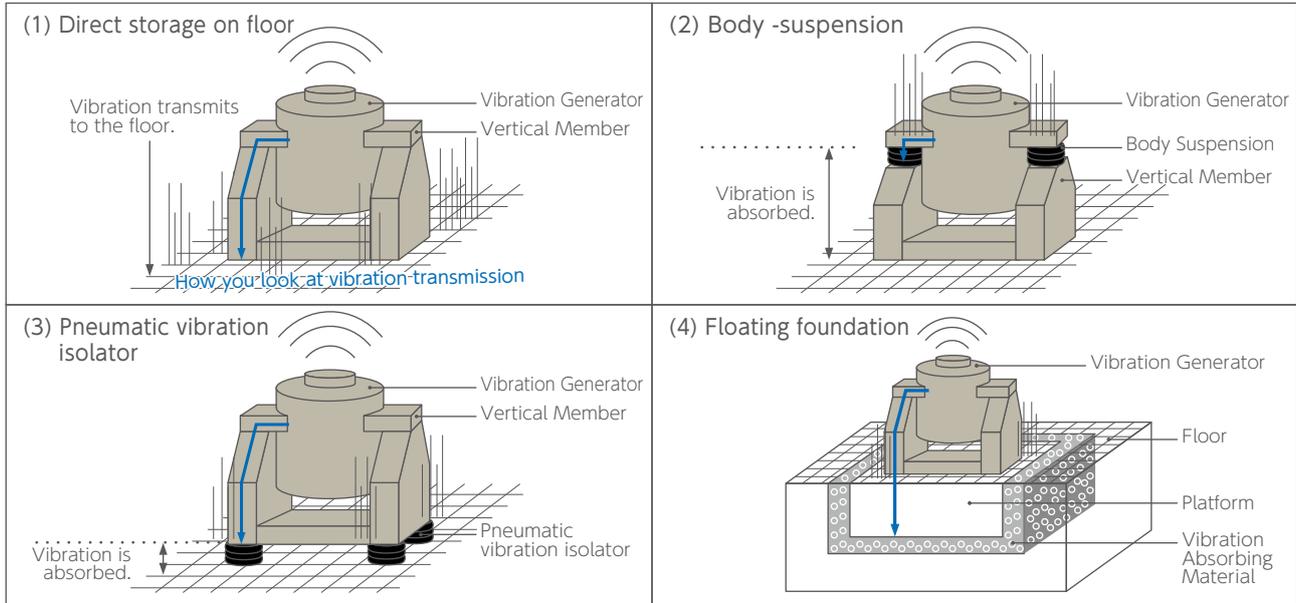
ECO-Vibe neo modifies an existing F series vibration test system and can achieve higher power saving.



Vibration Isolation and Noise Control

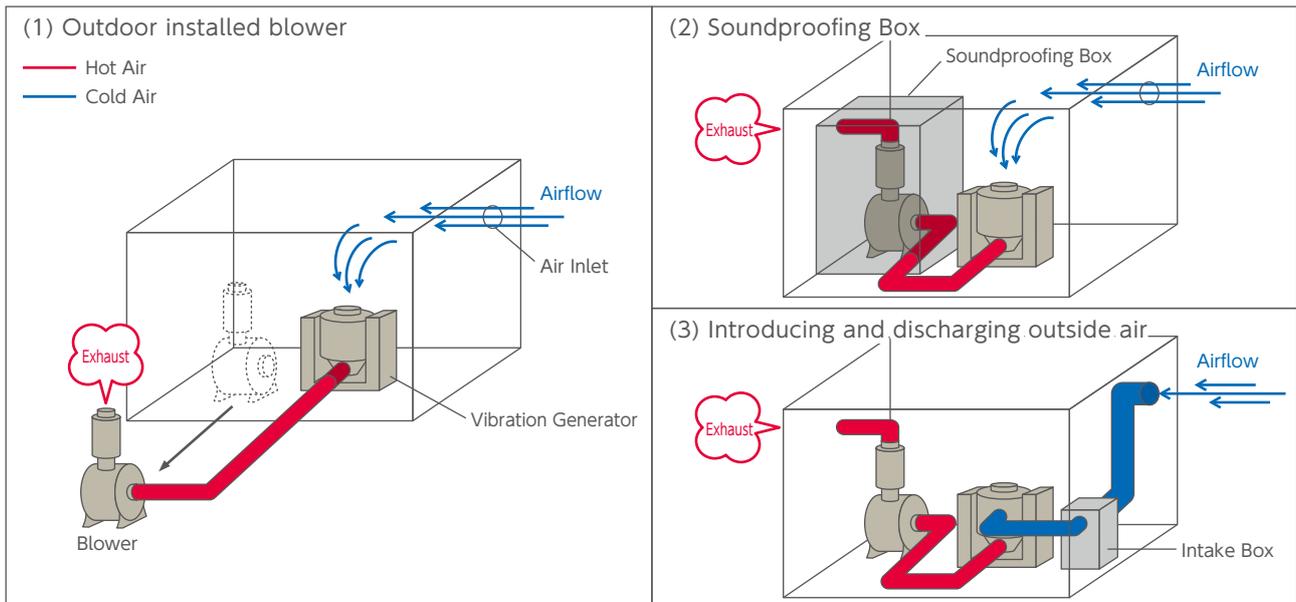
When operating a vibration testing system, the vibration transmits from a vibration generator to the floor or the building structure. When the frequency of this vibration coincides with the resonance frequency in turn, the vibration can increase significantly. To prevent vibrations from transmitting to the system, the sound or vibration control is required for the vibration testing system. The following are various countermeasures against vibration and sound depending on the test specimen, testing equipment and installation site.

Vibration-proof Mechanism



Countermeasure against Sound

The vibration testing system, dependent on a test condition, makes noise larger than 100 dB. Therefore, countermeasures against noise may be necessary. The noise can be reduced by more than approx. 20 dB by constructing a soundproofing box/room. There are various noise made in exciting a specimen, intake of outside air, operating the blower motor, exhausting from the blower, etc..



Compliance with various regulations and rules for facilities

Vibration and the noise generated from various test equipment can correspond to the levels regulated in the local regulations and the company's regulations. In this case we can provide appropriate specifications and configurations based on the applicable regulations and rules.

Outsourcing includes quality, reliability, durability, and environmental tests EMIC's contracted test service provides high-quality and reliable services.

Scope of Service

This service we offer allows customers to bring in test articles and perform various tests using the test equipment in our test laboratories. In addition, we can discover and solve the underlying problems that are hard to predict and provide test solutions to improve test quality and get accurate results.

Object to be tested by the customer



Electric/Electronic and Precision Machine



Equipment for Automobile



Railroad



Aerospace



Transportation (Truck)



Construction

Test Planning

We will jointly examine your desired test purpose, then offer you the appropriate test plan.

Safety

Reliability

Durability

Quality

Impact Resistance

Packaging Reliability

Vibration Test, Combined Environmental Test

Sine Vibration, Random Vibration, Shock, Temperature Humidity Test, Vibration-Temperature/Humidity Combined Reliability Test, Actual Environment Simulation Test



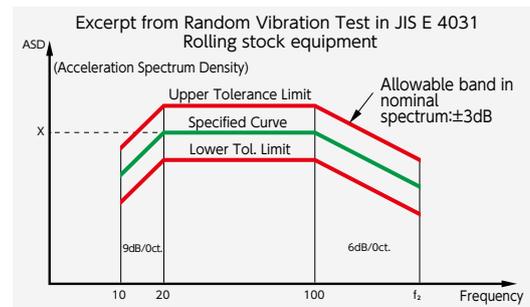
Function and Durability Test of Engine

Temperature Test

Heat Resistance and High Temperature Test

Large-scale Vibration Test

- Enriched large vibration testing system (fully equipped with the rated force 180kN/100kN scale) corresponding to assembling item, large product and heavy specimen
- Additional large triaxial vibration testing system corresponding to the latest railway rolling stock standard and seismic simulation
 - ◆ JIS E 4031 Rolling stock equipment -- Vibration and shock tests
 - ◆ Corresponding to JIS E 3014 Parts for railway signal -- Vibration methods
 - ◆ Corresponding to JIS Z 0232 Packaged freights -- Method of vibration test
 - ◆ The earthquake simulation by seismic intensity, earthquake acceleration and earthquake actual survey data is possible.



Highly Accelerated Life Testing (HALT), Highly Accelerated Stress Screening (HASS)

Although the conventional environmental simulation test is performed to shorten a designed validation test, lower the failure rate of products, extend the service life of products and decrease claims after the sale, the HALT and HASS apply the excessive stress to a product to check its operational limit and destructive limit to verify the design.



Design and Manufacture of Specialized Fixture

The key role of the fixture is to attach a specimen and transmit vibration. We offer the design, analysis and manufacturing of specialized fixtures.

The advisors with the most experience will support the testing needs of your company

In performing vibration tests, the technical design of the fixture for mounting a test article is essential.

- The key role of the fixture is to attach a specimen and transmit vibration, in particular transmitting vibration is most important.
- The fixture becomes inherently deformed depending on the test condition or vibration mode.
- Depending on the vibration mode the fixture may not transmit vibration to a specimen, therefore, the intended vibration test may not be performed.
- The vibration mode shows distinctive changes depending on the difference in size and mass of a specimen and test conditions.

EMIC has the design, analysis and manufacture of a fixture meeting the requirement for the customer's demands based on the abundant technique and actual performance of manufacturing, selling and contracted test service and realizes an accurate test.



EMIC CORPORATION

Technical Advisor
Yoshio ISHITA

- Chairman, Subcommittee on Mechanical Environment of Japan Testing Machinery Association
- IEC/TC104/A National Deliberation Committee & JIS Drafting Committee
- ISO/TC108/SC6 National Deliberation Committee
- Former Guest Professor, National Institute of Technology, Numazu College
- Former Technical Advisor, Yamagata-Pref. and Fukushima-Pref.
- Former research committee member, Ministry of Economy, Trade and Industry

Customer Response by Support Staffs

Our experts support the setup of test specimens, and operational procedure of test equipment.

Provision of Solution required for Testing

We offer solution to discover and solve a problem with various tests.

| | | |
|--|--------------------------------|--|
| East Japan Contracted Test Sales Dept. | Utsunomiya Test Lab Center | 23-1 Kiyohara Kogyo-danchi, Utsunomiya-shi, Tochigi 321-3231, Japan |
| | First Saitama Test Lab Center | 622-1 Asahigaoka, Hidaka-shi, Saitama 350-1203, Japan |
| | Second Saitama Test Lab Center | |
| | Mishima Test Lab Center | 11 Heiseidai, Mishima-shi, Shizuoka 411-0042, Japan |
| Center Japan Contracted Test Sales Dept. | Mizunami Test Lab Center | 2020 Yamada Cho, Mizunami-shi, Gifu 509-6104, Japan |
| | Yokkaichi Test Lab Center | 2-1-26 Noda, Yokkaichi-shi, Mie 510-0815, Japan |
| | Hikone Test Lab Center | 746-1 Nodayama Cho, Hikone-shi, Shiga 522-0025, Japan |
| West Japan Contracted Test Sales Dept. | Kobe Test Lab Center | 5-2-13 Mitsugaoka, Nishi-ku, Kobe-shi, Hyogo 651-2228, Japan |
| | Hyogo Test Lab Center | 47-13 Niijima, Harima-cho, Kako-gun, Hyogo 675-0155, Japan |
| Overseas | Thailand Test Lab. Center | 15/1 Soi Punnavithi 28, Sukhumvit 101 Road, Bangchak, Prakanong, Bangkok 10260, Thailand |

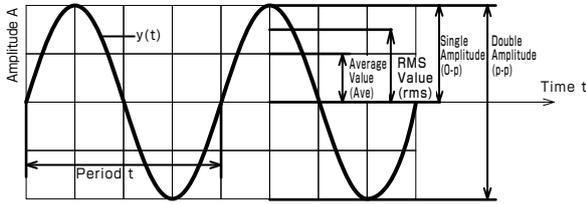
The ISO/IEC 17025 accreditation for technical competence.

First Saitama Test Lab, Yokkaichi Test Lab and Kobe Test Lab received the accreditation on ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories" and can issue the test data with accreditation marks listed. IEC/ISO 17025 also takes the requirements in ISO/IEC Guide 25 of its technical requirements based on the requirements in ISO 9001:2000. In addition, it requires the environmental condition necessary to estimate uncertainty, validity confirmation, etc. according to UM. Accreditation of testing laboratories according to this standard assesses the conformity of technical competence as well as the operation and effectiveness of the quality management system within the laboratory. Based on accumulated much knowledge for longer than 40 years and accreditation EMIC gives a customer a reliable test result.

Technical Notes

Fundamentals of Vibration

Basic Vibration

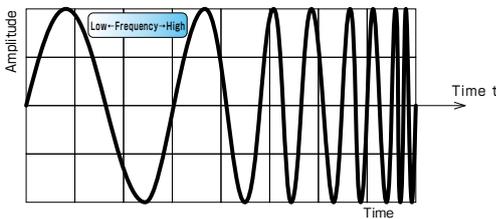


The most fundamental vibration is motion such that the amplitude is a sinusoidal function of time. The vibration level is generally represented by acceleration, velocity and displacement. The sinusoidal vibration is specified by the following parameter as:

- Period $t=1/f$ (f:Frequency)
- Single Amplitude (0-p)
- Double Amplitude (p-p)=Single Amplitude (0-p)×2
- Root-mean-square Value (rms)=Single Amplitude (0-p)×1/√2
- Average Value (Ave)=Single Amplitude (0-p)×2/π

Basic Equation $y(t)=A \cdot \sin \omega t$ (ω :Angular Frequency)

Sine Vibration Test



Point Test (Fixed frequency test)

The point test is done at a frequency fixed to any given value. The aim is to evaluate the durability of a unit under test at its resonant condition or the characteristics at a specified frequency.

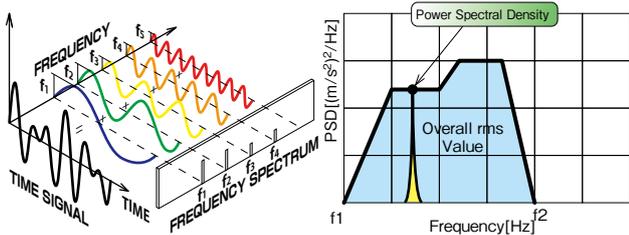
- Main Parameter
- Frequency [Hz]
 - Acceleration [m/s^2]
 - Test Time [t]

Swept Sine Test

The frequency of a swept sine test changes with time continuously for the purpose of resonant search or the evaluation of characteristics over any frequency range.

- Main Parameter
- Frequency [Hz]
 - Acceleration [m/s^2]
 - Test Time [t]
 - Sweep Rate [oct/min], [Hz/s]

Random Vibration Test

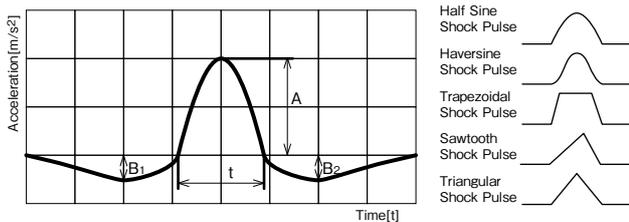


A random vibration happens when sinusoidal waves of different frequency and phase are combined. The random vibration test permits to detect many vibrations in resonance in a short time because it can excite test article at many different frequencies simultaneously. Also it can simulate vibrations close to a real environment.

Main Parameter

- Overall rms Value (rms) [m/s^2 rms]
- Power Spectral Density (PSD) [$(m/s^2)^2/Hz$]
- Test Time [t]

Shock Test



● Main Shock Pulse

● Half Sine Shock Pulse

● Haversine Shock Pulse

● Trapezoidal Shock Pulse

● Sawtooth Shock Pulse

● Triangular Shock Pulse

The shock test assures that material can withstand the nonrepetitive shocks and transient vibrations as well as measuring the item's fragility.

Main Parameter

- Main Shock Pulse
- Shock Pulse Duration [s] t
- Acceleration [m/s^2] A
- Velocity [m/s] V
- Pre-load [%] $P_1 = B_1/A \times 100[\%]$
- Post-load [%] $P_2 = B_2/A \times 100[\%]$

Unit System

| International System of Units SI (JIS Z 8202) | | | |
|---|-----------------------------|---------------------------|-------------|
| | Quantity | Unit Name | Unit Symbol |
| Base Unit | Length | meter | m |
| | Mass | kilogram | kg |
| | Time | second | s |
| | Thermodynamical Temperature | Kelvin | K |
| Auxiliary | radian | radian | rad |
| Derived Unit | Velocity | meter per second | m/s |
| | Acceleration | meter per second square | m/s^2 |
| | Angular Velocity | radian per second | rad/s |
| | Angular Acceleration | radian per second squared | rad/s^2 |
| | Force | newton | N |
| | Moment, Torque | newton-meter | N·m |

Terminology

● Power Spectral Density

Power level (energy per unit time) at each frequency. In particular, it shows a vibration environment for equipment in a random vibration test.

● Overall rms Value

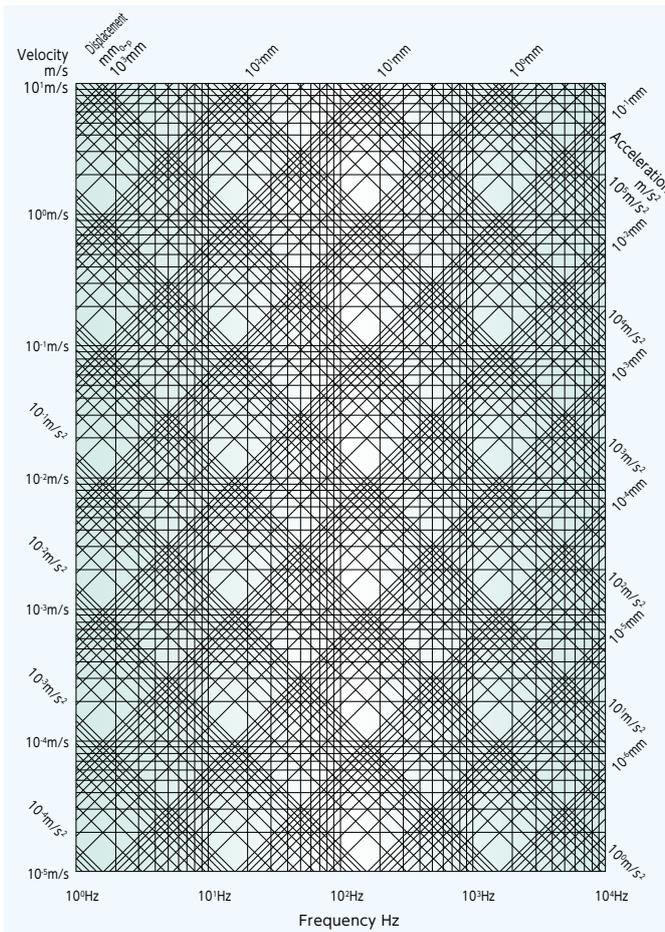
The square root of the sum of vibration power over a certain frequency range. In particular, it shows the overall value of vibration power (kinetic energy) such as random vibration.

● Pre-Pulse, Post-Pulse

Compensation pulse of the waveform to yield zero final velocity and displacement. the compensation pulse to be added before and after the main pulse is called pre-pulse post pulse respectively.

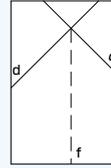


Vibration Nomograph

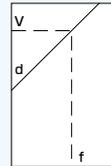


How to Use Vibration Nomograph

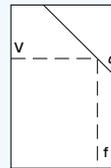
● Relation among displacement, d, acceleration, α and frequency, f.



● Relation among velocity, v, frequency, f and displacement, d.



● Relation among velocity, v, frequency, f and acceleration, α .



d : Displacement (mm_{o-p})
V : Velocity (m/s_{o-p})
 α : Acceleration (m/s²_{o-p})
f : Frequency (Hz)

Relation Among Acceleration, Velocity and Displacement.

| Relation | Equation for Estimation |
|--|--|
| Acceleration α [m/s ² _{o-p}] = $(2\pi f)^2 d / 1000$ = $2\pi f v$ | α [m/s ² _{o-p}] $\approx 0.0394 d f^2$ ※1 $\approx 6.28 f v$ ※1 |
| Velocity V [m/s _{o-p}] = $2\pi f d / 1000$ = $\alpha / 2\pi f$ | v [m/s _{o-p}] $\approx 0.00628 f d$ $\approx 0.159 \alpha / f$ ※2 |
| Displacement d [mm _{o-p}] = $1000 \alpha / (2\pi f)^2$ = $1000 v / 2\pi f$ | d [mm _{o-p}] $\approx 25.3 \alpha / f^2$ ※2 $\approx 159.2 v / f$ |

※1 Divide the acceleration value by 9.8 when its unit is G.
※2 Multiply the acceleration value by 9.8 when its unit is G.

Decibel Value

The unit, decibel [dB] is used to compare the ratio of two sound intensities or vibration levels.
Calculation Formula:

Gain of acceleration, voltage, sound pressure, etc. $G_v(\text{dB}) = 20 \times \log_{10} (\text{Output Voltage}/\text{Input Voltage})$
Gain of electric power, acoustic power, etc. $G_p(\text{dB}) = 10 \times \log_{10} (\text{Output Power}/\text{Input Power})$

● A multiple calculation can be simplified.

The ratio can be calculated by summing the quantity in decibels of the individual components, rather than multiply the amplification factors. For example, let's compare how to calculate the amplification factor when amplifiers of different amplification factor are connected in series. If the amplifiers amplify the input signal to 56 times (35 dB or app.) and 9 times (19 dB or app.) respectively are connected in series, the total amplification factor is $56 \times 9 = 504$ times for the multiple calculation, on the other hand, $35 + 19 = 54$ dB for the decibel calculation. Because the decibel calculation is the summation, it can be performed easier than the multiplication.

● Decibel indicating relative value to reference value

The decibel indicates how many times the value (signal) to be compared is to the reference value (signal). Since the comparison of sound intensity (sound pressure), vibration and power, and the attenuation, etc. are expressed by the ratio of energy, the decibel is employed. The amplification factor and attenuation rate in the electrical system, for example, transmitting the electrical power, the ratio of output power to input power is used. The decibel expresses the ratio to a certain reference physical quantity by the common logarithm. It is the relative value, not the absolute value.

● Correlativity of decibel and human perception is best

In human hearing the resolution of perception is constant when the sound level changes 2 times, 4 times, 8 times, 16 times,....logarithmically (Weber-Fechner's law). This is because it uses the decibel that the volume of sound to hear changes in the same way when the volume of the acoustic equipment has been turned up.

Relation between Decibel Value and Magnification Ratio

| Decibel Value | Magnification Ratio |
|---------------|----------------------|
| -120[dB] | 0.000001 (1/1000000) |
| -100[dB] | 0.00001 (1/100000) |
| -80[dB] | 0.0001 (1/10000) |
| -60[dB] | 0.001 (1/1000) |
| -20[dB] | 0.100 (1/10) |
| -10[dB] | 0.316 (1/3) |
| -6[dB] | 0.501 (1/2) |
| -3[dB] | 0.709 (7/10) |
| 0[dB] | 1.000 (1) |
| 3[dB] | 1.410 (1.41) |
| 6[dB] | 2.000 (2) |
| 10[dB] | 3.160 (3) |
| 20[dB] | 10.00 (10) |
| 40[dB] | 100.0 (100) |
| 60[dB] | 1000 (1000) |
| 80[dB] | 10000 (10000) |
| 100[dB] | 100000 (100000) |
| 120[dB] | 1000000 (1000000) |

Vibration Generator Selection

1. Definition of Test Conditions

First, check and define the test conditions for the vibration test to be put into execution.

- Estimated mass of test article and fixture
- Maximum acceleration (velocity or displacement)
- Frequency or frequency range

2. Calculation of Required Force

Determine the required force for the vibration test using the following equation by substituting the defined test conditions above.

$$F = (m_0 + m_1 + m_2) \times \alpha$$

F : Force (N) m_1 : Fixture mass (kg)

α : Acceleration (m/s^2) m_2 : Test article mass (kg)

m_0 : Moving element mass (kg)

Example: Assuming that Model: F-10K/56 system is suitable for your application, the moving element mass m_0 , fixture mass m_1 and test article mass m_2 be 15 kg, 20 kg and 35 kg respectively. Determine the required force for generating the acceleration level α of $98.0 m/s^2$ as follows;

$$F = (15kg + 20kg + 35kg) \times 98.0 m/s^2 = 6860N$$

3. Selection of Vibration Testing System

If the following specifications of a certain vibration testing system can meet the test conditions and calculated force, that system is available for your application.

- Frequency range
- Rated force
- Maximum acceleration
- Maximum velocity
- Maximum displacement

To choose the most suitable vibration testing system:

(1) Requirement for force generated by vibration testing system.

When customers select the vibration testing system by themselves, its rated force shall be larger than 1.25 times of the required force for a test by taking the dynamical behavior of a specimen, etc. into consideration. Please contact us for advice on the above condition.

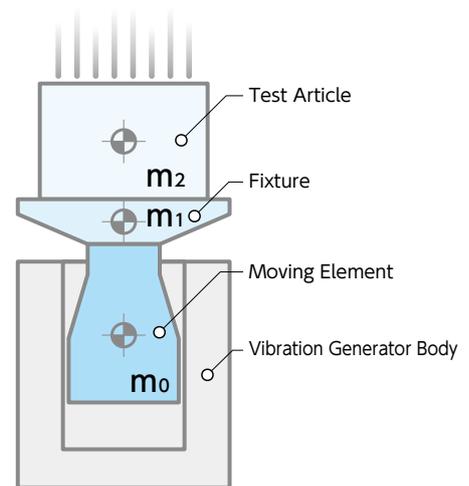
(2) Allowable moment against offset load

The ideal mounting method of a specimen is to be placed on the armature table so that its center of gravity will be positioned at the center of the armature table. The eccentric moment increases with the distance between them. Please attach the load to a suitable position by taking high acceleration level due to resonance into consideration. Please contact us for advice on large distance condition.

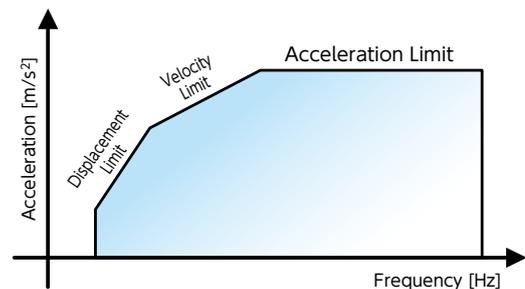
Conversion between SI and others

| Unit | SI | Gravitational |
|--------------|---|------------------------------|
| Force | 1N | 0.10197kg (0.102kgf or app.) |
| | 9.80665N (9.8N or app.) | 1kgf |
| Acceleration | 1m/s ² | 0.101972G (0.102G or app.) |
| | 9.80665m/s ² (9.8m/s ² or app.) | 1G |

Outline Block Diagram



Performance Curve



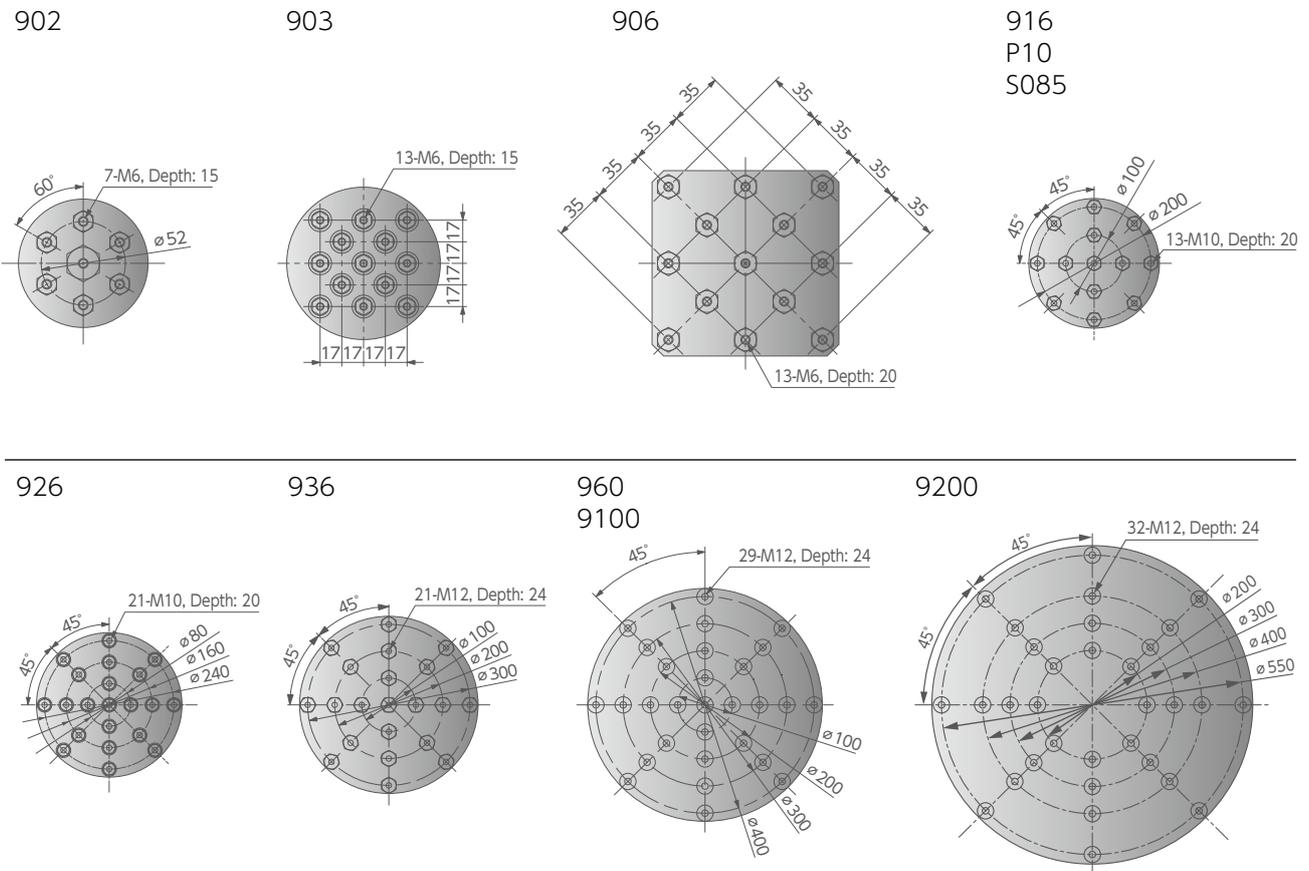
Notes:

- 1) The catalogue states specifications when the input power of 200 VAC 3 ϕ 50/60 Hz is applied to the vibration test system (except some parts).
- 2) If operating equipment under a high velocity condition such as swept-sine or fixed frequency test for a long time the velocity shall be less than 1.5 m/s as a guide.
- 3) The random force rating is based on our specified condition according to ISO 5344 standard.

Armature Table Hole Pattern and Size

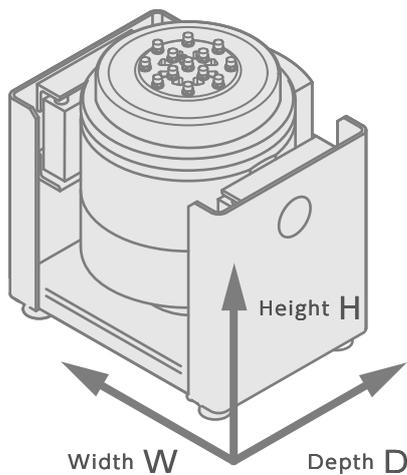


Table Pattern



* The inch standard mounting hole is also available.

Exterior



| Shaker | Exterior Dimensions |
|---------------------------|----------------------|
| 902-FN | 460W×490H×490D mm |
| 903-FN 903-FN/A 903-FN/FA | 630W×602H×528D mm |
| 906-FN 906-FN/A | 720W×675H×628D mm |
| 916-BP/LA 916-AP/LA | 975W×885H×700D mm |
| 926-AP/LA | 1106W×1047H×855D mm |
| 936-AP/LA | 1224W×1107H×971D mm |
| 960-AP/LA | 1452W×1252H×1215D mm |
| S085-AW/LA | 797W×775H×635D mm |
| 916-BW/LA 916-AW/LA | 974W×1035H×700D mm |
| 926-AW/LA | 1106W×1135H×880D mm |
| 936-AW/LA | 1106W×1135H×880D mm |
| 960-AW/LA | 1452W×1297H×1231D mm |
| 916-AW/SLS | 974W×1035H×700D mm |
| 926-AW/SLS | 1082W×1163H×866D mm |
| 936-AW/SLS | 1125W×1200H×965D mm |
| 960-AW/SLS | 1452W×1297H×1231D mm |
| 916-AP/SLA | 950W×1029H×665D mm |
| 926-AP/SLA | 1082W×1163H×866D mm |
| 936-AP/SLA | 1186W×1255H×971D mm |
| 960-AP/SLA | 1461W×1375H×1115D mm |
| 9100-AWW/LA | 1489W×1338H×1149D mm |
| 9200-AWW/LA | 1905W×1348H×1473D mm |
| P10-10AW/LA | 702W×763H×572D mm |
| P20-A | 982W×1000H×750D mm |
| P01-AB/AS | 384W×391.5H×360D mm |
| Σ9515-AB/SD | 442W×360H×340D mm |

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※ Specifications are subject to change without notice for improvement.

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