

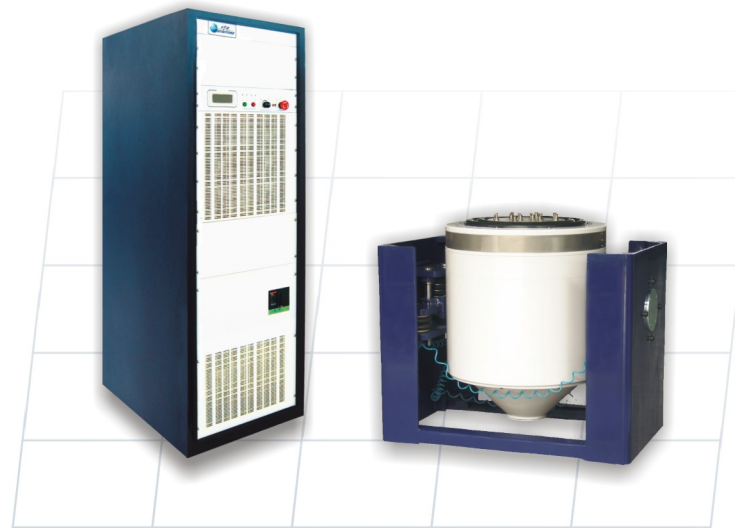
Vibration Testing System — 'M' Series-

Vibration system rating from
1,000 kgf (2,200 lbf) to 3,000 kgf (6,600 lbf).

System Models:

MPA403/M124M
MPA404/M232A
MPA406/M232A
MPA406/M437A

The 'M' Series-I vibration testing system is ideal for screening of small size assemblies with high acceleration test requirements, and can also meet typical vibration test requirements of other medium sized electronic assemblies, automotive components, road navigation units and home appliances. The 'M' Series-I is designed to meet military and international test standards including MIL, ASTM, IEC, ISO, BS and JIS. A wide diameter armature with high cross axial stiffness when coupled to proportional head expander to test multiple specimens simultaneously yet achieving a good vibration transmissibility ratio. Other test requirements including transportation vibration simulation, combined vibration-climatic test and seismic simulations for small size components can easily be fulfilled by the 'M' Series-I.



Features

The Performance

- Specimen payload up to 500 kg (1,100 lbs)
- Excellent random performance meeting ISO standard with 3 sigma peak current rating
- Armature diameters range from 240 mm to 370 mm (9.5 inch to 14.6 inch)
 - Up to 51mm (2 inch) continuous displacement
- Test frequency up to 3,000 Hz

The Shaker

- Rugged trunnion design with bearing guidance
- Air bag or elastomer isolator built-in reducing dynamic floor stress
- Dual layer reinforced armature for high acceleration performance
- Roller-truss flexure suspension system with high cross axial stiffness

The Amplifier

- Integrated with high performance MPA400 Series amplifier
- Modular designed amplifier
- 12kVA power module with two self-reliant compact 6kVA sub-modules
- High modulation switching frequency
- High signal to noise ratio
- Low total harmonic distortion
- Individual power module operation indication light

The Accessories

- Air load support for armature centering
- Dynamic and static armature centering available
- Rotary worm-gear built-in for uni-base slip table
- Thermal barrier for combined climatic chamber test available
- Remote control capabilities available

Benefits

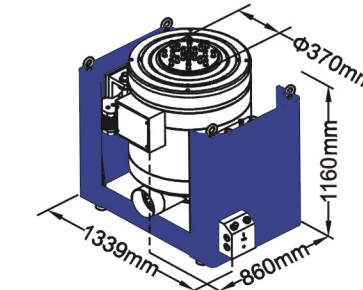
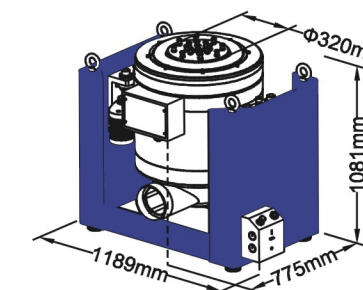
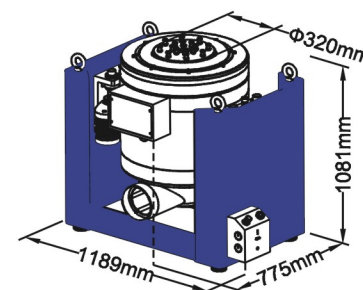
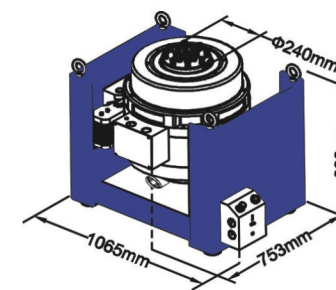
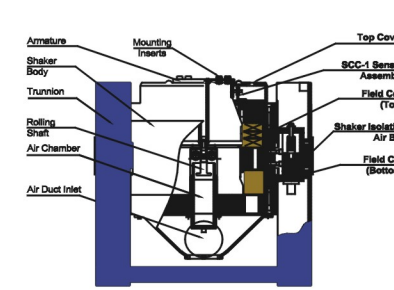
- Simple system operation
- State-of-the-art microprocessor logic control unit
- High energy conversion efficiency (greater than 90%)
- Reasonably priced optimal
- Performance system for major test standards
- Compact shaker and amplifier size saving valuable floor space
- Shaker air cooled by rugged outdoor blower for continuous long period operation
- Air cooled amplifier power electronics for safe and reliable operation
- Designed to reduce reliance on mechanical switch gears with CPU logic controlled
- All-encompassing fuse protection designs for high current system components
- Detailed scope of system interlock protections
- Complies with USA, European and international safety and EMC regulations

Operational Reliability Safety

- Compatible with any vibration controller
- Remote control panel available with full functional features
- Low profile body design ready for chamber integration
- Integration with unibase or standalone slip table
- Simple initial self system setup
- Interactive diagnostic "System Status" displayed on LCD
- Easy maintenance and rapid servicing
- Full three years warranty on armature and field coil
- Worldwide spare parts support

Compatibility Serviceability

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System Model	MPA403/M124M		MPA404/M232A	
	American	Metric	American	Metric
Sine Force	2,200 lbf	1,000 kgf	3,300 lbf	1,500 kgf
Random Force	2,200 lbf	1,000 kgf	3,300 lbf	1,500 kgf
Shock Force (6 ms)	4,400 lbf	2,000 kgf	6,600 lbf	3,000 kgf
Usable Frequency Range	DC-4,500 Hz	DC-4,500 Hz	DC-3,000 Hz	DC-3,000 Hz
Continuous Displacement ①	2 inch	51 mm	2 inch	51 mm
Shock Displacement	2 inch	51 mm	2 inch	51 mm
Max. Velocity (Sine)	78.7 in/s	2 m/s	78.7 in/s	2 m/s
Max. Acceleration (Sine)	100 g	981 m/s ²	75 g	735.4 m/s ²

Shaker Unit	M124M		M232A	
	American	Metric	American	Metric
Armature Diameter	9.4 inch	240 mm	12.6 inch	320 mm
Effective Moving Element Mass	22 lbs	10 kg	44 lbs	20 kg
Load Attachment Points	16 stainless steel inserts		16 stainless steel inserts	
Inserts Size (Standard)	M10	M10	M10	M10
Grid Pattern (Diameter, Circle)	8 on 100 mm φ; 8 on 200 mm φ		8 on 120 mm φ; 8 on 250 mm φ	
Nominal, Bare Table ②	3,700 Hz	3,700 Hz	2,500 Hz	2,500 Hz
Max. Static Payload	308 lbs	140 kg	660 lbs	300 kg
Natural Frequency-Thrust Axis	<5 Hz	<5 Hz	<5 Hz	<5 Hz
Stray Flux Density ③	Less than 10 gauss	Less than 10 gauss	Less than 10 gauss	Less than 10 gauss
Dimension(Uncrated)(L x W x H)	41.9x29.6x34.6 inch	1065x753x880 mm	46.8x30.5x42.6 inch	1189x775x1081 mm
Shaker Weight (Uncrated)	2,112 lbs	960 kg	3,630 lbs	1,650 kg

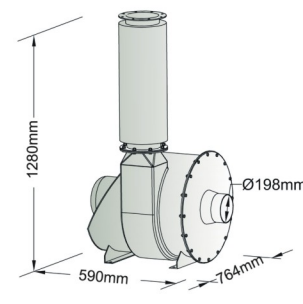
Amplifier Unit	MPA403		MPA404	
	American	Metric	American	Metric
Amplifier Output	13 kVA	13 kVA	16 kVA	16 kVA
Total Harmonic Distortion (At Rated Output)	From DC(0.1 Hz) to 500 Hz less than 0.5%; From 500 Hz to 4,500 Hz less than 1.0%			
Signal-Noise-Ratio	More than 65 dB at 100 V rms output, 10 K Ω input termination with rated resistive load			
DC Stability	Less than 0.05% of full output voltage with 10% change in line voltage			
Input Drive	1.5 V rms into 10 K Ohms for full output (120 V rms)			
Amplifier Frequency Response ①	From DC(0.1 Hz) to 4,500 Hz: ±3 dB; From 10 Hz to 3,000 Hz: ±1 dB			
Switching Frequency	112 kHz	112 kHz	112 kHz	112 kHz
Max. Output Voltage	120 V rms	120 V rms	120 V rms	120 V rms
Max. Output Current Per Module (Continuous)	50 A rms	50 A rms	50 A rms	50 A rms
Max. Output Current Per Module (Transient)	150 A rms	150 A rms	150 A rms	150 A rms
Amplifier Efficiency	> 90%	> 90%	> 90%	> 90%
Dimension(Uncrated)(L x W x H)	21.7x31.5x72.8 inch	550x800x1850 mm	21.7x31.5x72.8 inch	550x800x1850 mm
Amplifier Weight (Uncrated)	1,166 lbs	420 kg	1,188 lbs	540 kg

Blower Unit	HP-2		HP-3	
	American	Metric	American	Metric
Power Requirement	4 kW	4 kW	7.5 kW	7.5 kW
Air Flow	476.77 ft ³ /m	0.25 m ³ /s	2415.61 ft ³ /m	1.14 m ³ /s
Air Pressure	0.681 PSI	0.048 kgf/cm ²	0.738 PSI	0.052 kgf/cm ²
Dimension(Uncrated)(L x W x H)	27.2x30x50.4 inch	590x764 x1280 mm	36.2x31.2x66.9 inch	920x794x1700 mm
Weight (Uncrated)	330 lbs	153 kg	572 lbs	230 kg

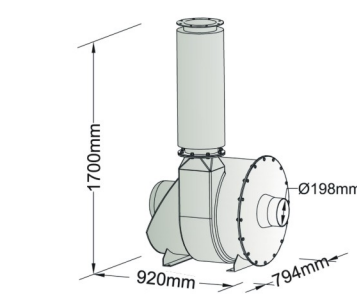
MPA400 Series



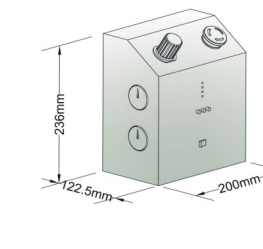
HP-2



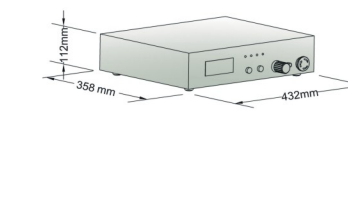
HP-3



Servo Control Console (SCC-1 Unit)



Remote Control Panel (RCP)



Basic Guide on Choosing Shaker

Guide 1 - Determine Required Shaker Force Rating

Using the fundamental formula (F = MA), to determine the required shaker force rating. Below is a more detailed illustration.

F = (Ma + Mf + Ms) * A
Where:
F = Shaker required Rated Force (N)
Ma = Armature Effective Mass
Mf = Fixtures mass
Ms = Test Specimen mass
A = Acceleration

Guide 2 - Calculating Displacement and Velocity Factor

Below is an illustration on the fundamental sinusoidal vibration relationship between acceleration, velocity, displacement and frequency.

	SI Units	Gravitational Units	Imperial Units
Force (F)	N	kgf	lbf
Mass	kg	kg	lbs
Acceleration (A)	m/s ²	G	G
Frequency (f)	Hz	Hz	Hz
Displacement (D)	mm (pk - pk)	mm (pk - pk)	in (pk - pk)

Useful Conversion Factor

Force	1 kgf = 9.807 N	1 kgf = 2.2 lbf
Mass	1 kg = 2.2 lbs	
Acceleration	1 G = 9.807 m/s ²	
Length	1 inch = 25.4 mm	
Velocity	1 m/s = 39.37 in/s	

Remarks

- Test payload should be less than 10% of shaker weight.
- Natural frequency at ± 5% tolerance.
- Measured at 152 mm above armature table. Contact us for lower gauss level requirement.
- Sine mode, resistive load.
- Optional Remote Control Panel.
- Amplifier power rating includes the field supplies and blower motor.