IMV CORPORATION

https://we-are-imv.com/en/

*The specifications and design are subject to change without notice.

Jan. 2025

Automatic energy savings,
high performance and
a protected test environment

A-series

IMV CORPORATION

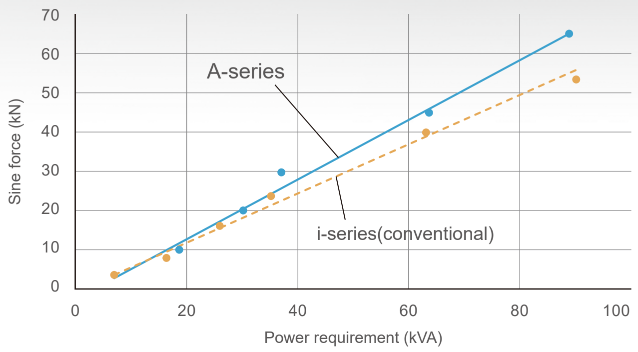
Global version

INDEX

Features

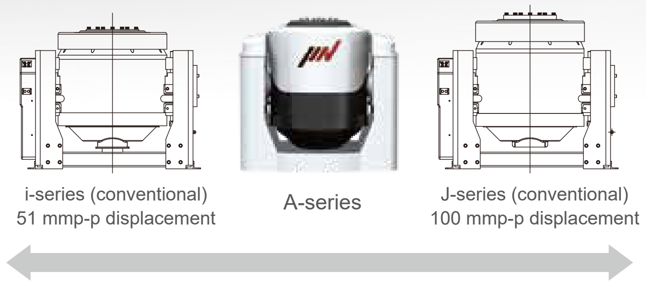
01 Improvement in excitation force

When compared with the conventional i & J-series, the A-series has an increased relative excitation force.



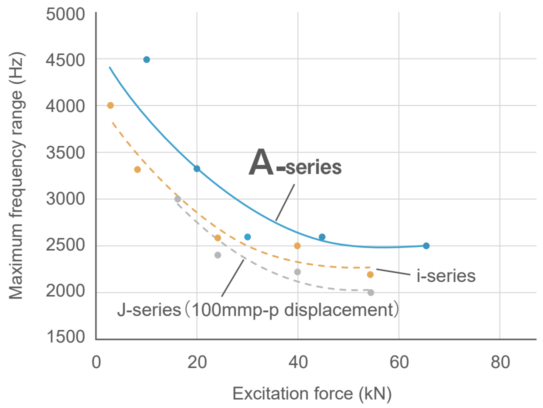
02 Standard 76.2 mmp-p displacement *Only for A30, A45, A65, A74

A-series has a displacement of 76.2 mmp-p (3 inch stroke) which provides a good balance within the specifications for velocity, acceleration and displacement. This single system can be used in a wide variety of tests.



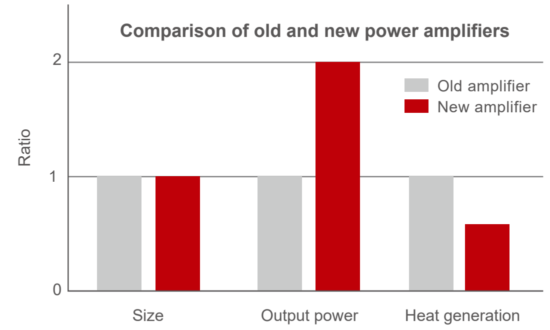
03 Increase in frequency range

In addition to the increased displacement of 76.2 mmp-p, the maximum frequency range is also higher compared to the i- and J-series.



04 Introduction of new power module

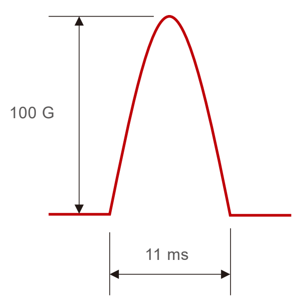
By developing a power amplifier that uses a new next-generation silicon carbide power module, IMV has achieved low noise and high efficiency. This new power module is standard equipment for all A-series models.



05 High velocity shock testing

Where a test requires a high shock velocity, traditional shaker systems use a matching transformer to achieve the necessary lower field voltage. Since IMV's ECO-system has complete control over the field level, the field value can be adjusted to increase the maximum shock velocity capability of the system. By entering the specified shock profile into IMV's K2 controller, the field level in the shaker is automatically adjusted to ensure that the required velocity is achieved. A-series (EM amplifier model) provides a maximum of 3.5 m/s shock velocity testing.

Examples of shock test



i-series (conventional)	Model	i220/SA1HAG
	Rated Force Shock (kN)	16
	Maximum Velocity Shock (m/s)	2.2
	Maximum Displacement (mmp-p)	51
	Maximum Load (kg)	Not achievable (not enough velocity and displacement)

J-series (conventional)	Model	No applicable product	J230/SA3HAG	J240/SA4HAG	J250/SA6HAG	J260/SA7HAG	No applicable product
	Rated Force Shock (kN)	—	40	55	80	108	—
	Maximum Velocity Shock (m/s)	—	2.4	2.4	2.4	2.4	—
	Maximum Displacement (mmp-p)	—	100	100	100	100	—
	Maximum Load (kg)	—	Not achievable (not enough velocity)				—

A-series	Model	A11/EM1HAG	A22/EM2HAG	A30/EM3HAG	A45/EM4HAG	A65/EM5HAG	A74/EM8HAG
	Rated Force Shock (kN)	22（16.5）	44（36）	60（50）	90（80）	130（120）	180（160）
	Maximum Velocity Shock (m/s)	2.5（3.5）	2.5（3.5）	2.5（3.5）	2.5（3.5）	2.5（3.5）	2.5（3.5）
	Maximum Displacement (mmp-p)	51（55）	51（55）	76.2	76.2	76.2	76.2
	Maximum Load (kg)	5	14	17	30	48	86

*Maximum load on bare table

A11/SA1HAG (Standard)
A11/EM1HAG (ECO)

A wider range of test requirements and higher test specifications.

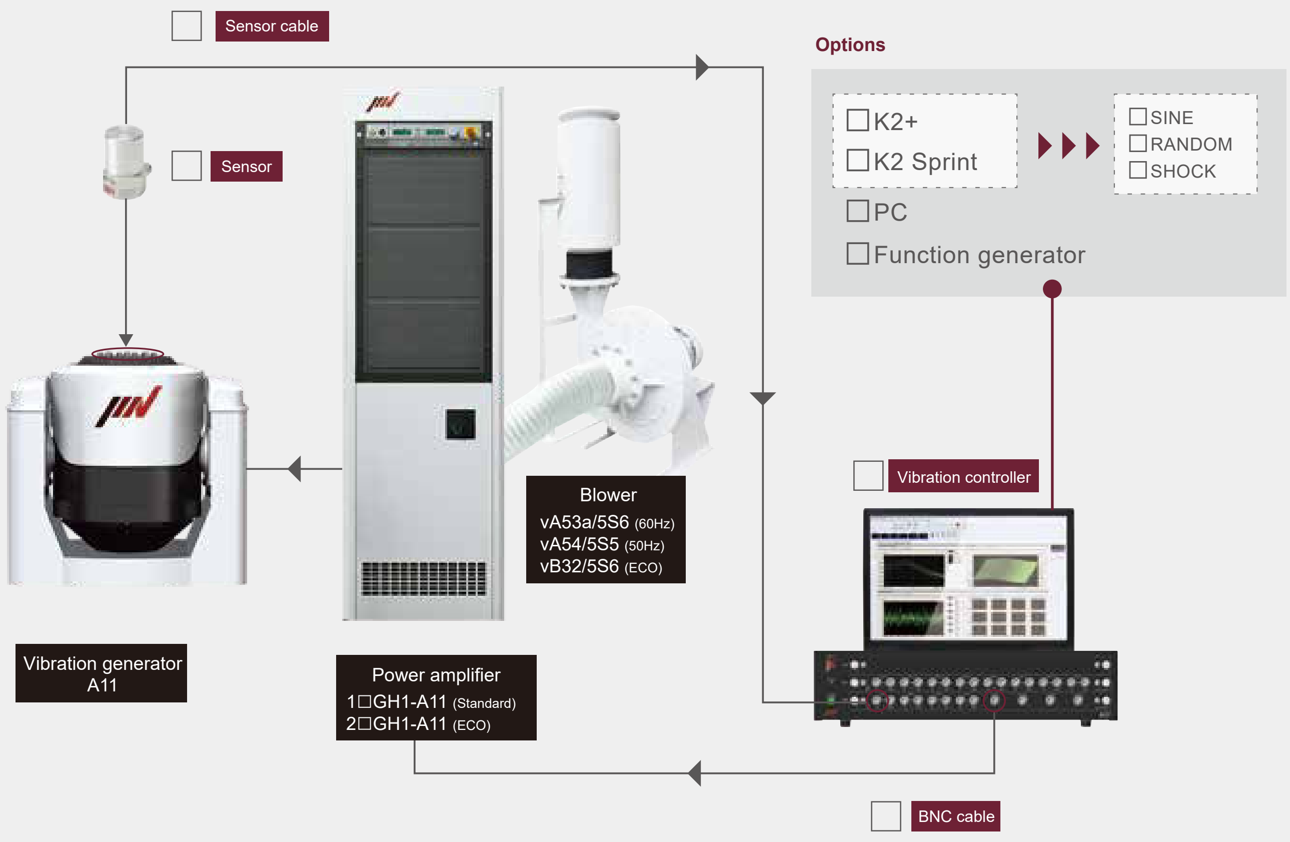
System Model			A11/ SA1HAG	A11/ EM1HAG
System Specifications	Frequency Range (Hz)		0 – 4500*4	0 – 4500*4
	Rated Force	Sine (kN)	11	11
		Random (kN rms)*1	11	11
		Shock (kN)	22	22
		High Velocity Shock (kN)	—	16.5
	Maximum Acc.	Sine (m/s²)	1000	1000
		Random (m/s² rms)	630	630
		Shock (m/s² peak)	2000	2000
		High Velocity Shock (m/s² peak)	—	1500
	Maximum Vel.	Sine (m/s)	2.0	2.0
		Shock (m/s peak)	2.5	2.5
		High Velocity Shock (m/s peak)	—	3.5
	Maximum Disp.	Sine (mmp-p)	51	51
		High Velocity Shock (mmp-p)	—	55
	Maximum Travel (mmp-p)		64	64
	Maximum Load (kg)		200	200
	Power Requirements (kVA)*2		20.4	20.4
	Breaker Capacity (A)*3		75	75

		Model	A11	
Vibration Generator		Armature Mass (kg)	11	
		Armature Diameter (φmm)	210	
		Allowable Eccentric Moment (N・m)	294	
		Dimensions (mm) W × H × D	946 × 827 × 676	
		Shaker Body Diameter (φmm)	585	
		Mass (kg)	1080	
Power Amplifier		Model*6	1□GH1-A11	2□GH1-A11
		Maximum Output (kVA)	12	
		Dimensions (mm) W × H × D	580 × 1950 × 850	
		Mass (kg)	280	470
Controller		Vibration Controller	See Vibration Controller K2+	
Cooling		Cooling Method	Air cooling	
	Blower	Dimensions (mm) W × H × D*5	606 × 1315 × 891	708 × 1421 × 782
		Mass (kg)	125	140
		Wattage (kw)	3.7	
		Duct Hose Diameter (φ)	125	

*1 Random force ratings are specified in accordance with ISO5344 conditions. Please contact IMV or your local distributor with specific test requirements.
*2 Power supply: 3-phase 200/220/380/400/415 V, 50/60 Hz. A transformer is required for other supply voltages.
*3 Breaker capacity for AC 200 V.
*4 Above 4000 Hz, the force rolls-off at a rate of -6 dB/oct.
*5 The specification above applies to 60 Hz. Dimensions change for 50 Hz.
*6 The alphabet of A, B, or C can be entered in □. A: Voltage AC200V system (200 to 230), B: Voltage AC400V system (380A to 440V), C: 480V system (480V to 520V)
*The specifications show the maximum system performance. For long-duration tests, system must be de-rated up to 70%.
Continuous use at maximum levels may cause failure. Please contact IMV if your system operates at more than 70%.
*For random vibration tests, please set the test definition of the peak value of acceleration waveform to operate at less than the maximum acceleration of shock.
*Frequency range values vary according to the sensor and vibration controller.
*Armature mass and acceleration may change when a chamber is added.
*Mass and dimensions may change for CE-marked systems.

System composition

■ Standard equipment ■ Optional items



Head expander compatible with A11

Use a head expander for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (200 kg) minus the head expander mass. When using the head expander, the upper limit frequency is smaller than when using the test system alone.

	Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□	TBV-315-A11-A	315 × 315 × t 30	8.5	1000	Aluminum alloy
□	TBV-315-A11-M	315 × 315 × t 30	5.8	1000	Magnesium alloy
□	TBV-400-A11-A	400 × 400 × t 30	13	600	Aluminum alloy
□	TBV-400-A11-M	400 × 400 × t 30	9	600	Magnesium alloy
□	TBV-500-A11-A	500 × 500 × t 40	15	500	Aluminum alloy
□	TBV-500-A11-M	500 × 500 × t 40	10.4	500	Magnesium alloy
□	TBV-630-A11-A	630 × 630 × t 45	19	360	Aluminum alloy
□	TBV-630-A11-M	630 × 630 × t 45	12.5	360	Magnesium alloy
□	TBV-800-A11-A	800 × 800 × t 70	45	350	Aluminum alloy
□	TBV-800-A11-M	800 × 800 × t 70	30	350	Magnesium alloy

Slip table compatible with A11

Use a slip table for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (200 kg) minus the slip table mass. When using the slip table, the upper limit frequency is smaller than when using the test system alone.

MB: Mechanical Bearing

The mechanical bearing uses a linear motion guide which has a component with a linear rolling motion. It contributes substantially to the high performance of tables with high rigidity, high load, and long stroke motion. Another strong feature of the mechanical bearing is its easy operability, since it is lightweight and has no need for a hydraulic unit.

	Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□	TBH-550-A11-A-MB	550 × 550 × t 40	55	2000	Aluminum alloy
□	TBH-750-A11-A-MB	750 × 750 × t 40	93	2000	Aluminum alloy
□	TBH-950-A11-A-MB	950 × 950 × t 40	138	1250	Aluminum alloy

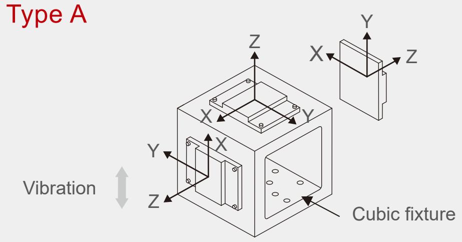
*The weight applies to a plate made of aluminum. Please contact us for a plate made of magnesium.

Cubic fixtures compatible with A11

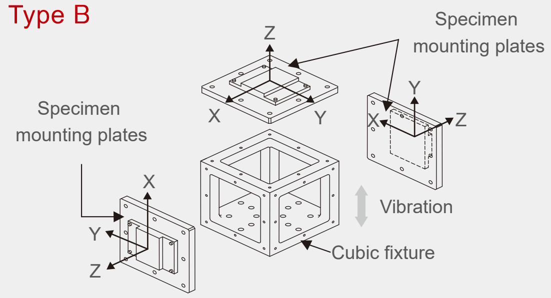
The specimen can be fastened to the top or side face of the cubic fixture where testing in each axis is required. Two types of cubic fixture are available. Type A has mounting holes on each face and Type B has specimen mounting plates which attach to the cubic frame.

	Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□	TCJ-A150-A11-A	150 × 150 × 150	5.5	2000	Aluminum alloy
□	TCJ-A150-A11-M	150 × 150 × 150	4.0	2000	Magnesium alloy
□	TCJ-A160-A11-A	160 × 160 × 160	6.5	2000	Aluminum alloy
□	TCJ-A160-A11-M	160 × 160 × 160	4.6	2000	Magnesium alloy
□	TCJ-A200-A11-A	200 × 200 × 200	8	1000	Aluminum alloy
□	TCJ-A200-A11-M	200 × 200 × 200	5.6	1000	Magnesium alloy
□	TCJ-B150-A11-A	150 × 150 × 150	3.5	2000	Aluminum alloy
□	TCJ-B150-A11-M	150 × 150 × 150	2.5	2000	Magnesium alloy
□	TCJ-B160-A11-A	160 × 160 × 160	4.0	2000	Aluminum alloy
□	TCJ-B160-A11-M	160 × 160 × 160	2.8	2000	Magnesium alloy
□	TCJ-B200-A11-A	200 × 200 × 200	10	2000	Aluminum alloy
□	TCJ-B200-A11-M	200 × 200 × 200	7	2000	Magnesium alloy

Type A



Type B



A22/SA2HAG (Standard)
A22/EM2HAG (ECO)

A wider range of test requirements and higher test specifications.

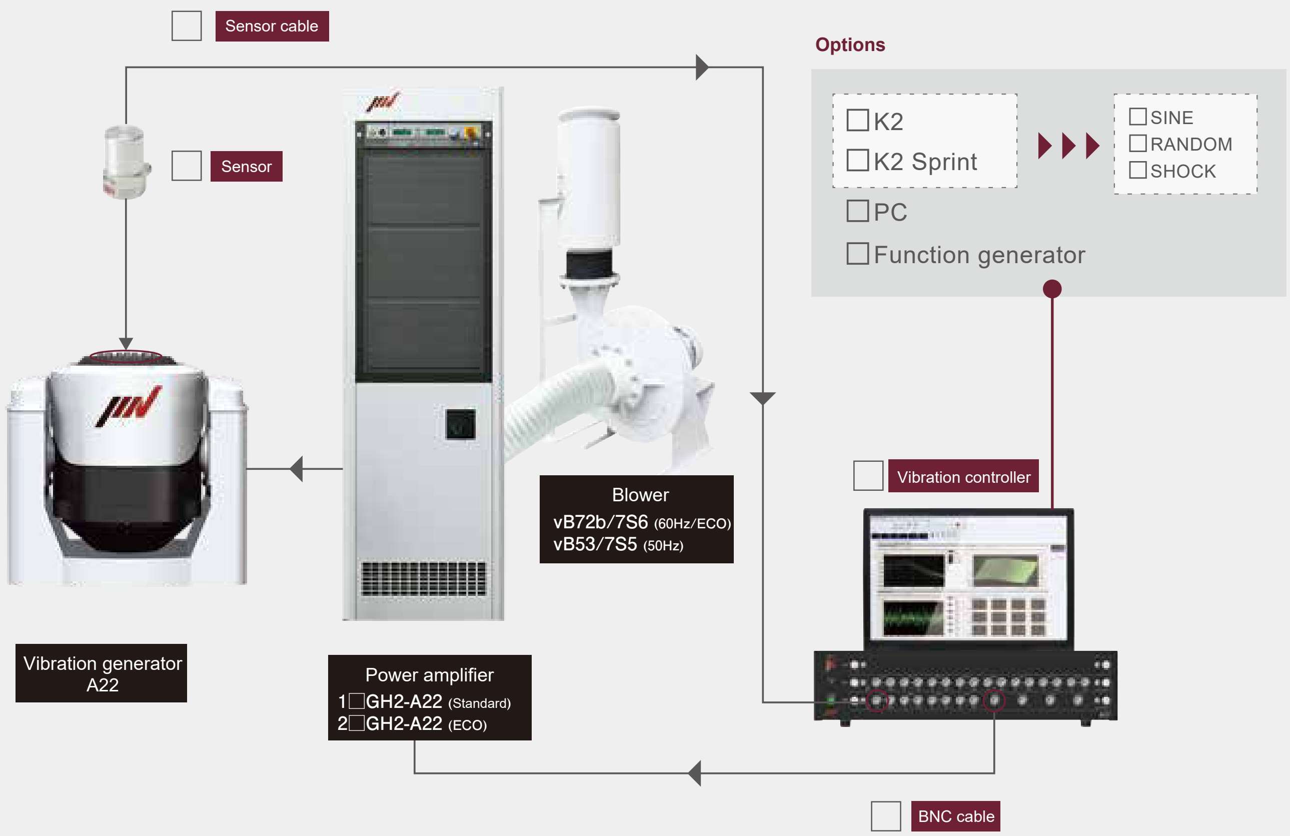
System Model			A22/ SA2HAG	A22/ EM2HAG
System Specifications	Frequency Range (Hz)		0 – 3300	0 – 3300
	Rated Force	Sine (kN)	22	22
		Random (kN rms)*1	22	22
		Shock (kN)	44	44
		High Velocity Shock (kN)	—	36
	Maximum Acc.	Sine (m/s²)	1000	1000
		Random (m/s² rms)	630	630
		Shock (m/s² peak)	2000	2000
		High Velocity Shock (m/s² peak)	—	1636
	Maximum Vel.	Sine (m/s)	2.0	2.0
		Shock (m/s peak)	2.5	2.5
		High Velocity Shock (m/s peak)	—	3.5
	Maximum Disp.	Sine (mmp-p)	51	51
		High Velocity Shock (mmp-p)	—	55
	Maximum Travel (mmp-p)		64	64
	Maximum Load (kg)		300	300
	Power Requirements (kVA)*2		30	30
	Breaker Capacity (A)*3		100	100

	Model		A22	
Vibration Generator	Armature Mass (kg)		22	
	Armature Diameter (φmm)		280	
	Allowable Eccentric Moment (N・m)		700	
	Dimensions (mm) W × H × D		1038 × 955 × 775	
	Shaker Body Diameter (φmm)		678	
	Mass (kg)		1600	
Power Amplifier	Model*5		1□GH2-A22	2□GH2-A22
	Maximum Output (kVA)		24	
	Dimensions (mm) W × H × D		580 × 1950 × 850	
	Mass (kg)		350	560
Controller	Vibration Controller		See Vibration Controller K2+	
Cooling	Cooling Method		Air cooling	
	Blower	Dimensions (mm) W × H × D*4	707 × 1531 × 917	
		Mass (kg)	210	
		Wattage (kw)	5.5	
		Duct Hose Diameter (φ)	200	

*1 Random force ratings are specified in accordance with ISO5344 conditions. Please contact IMV or your local distributor with specific test requirements.
*2 Power supply: 3-phase 200/220/380/400/415 V, 50/60 Hz. A transformer is required for other supply voltages.
*3 Breaker capacity for AC 200 V.
*4 The specification above applies to 60 Hz. Dimensions change for 50 Hz.
*5 The alphabet of A, B, or C can be entered in □. A: Voltage AC200V system (200 to 230), B: Voltage AC400V system (380A to 440V), C: 480V system (480V to 520V)
*The specifications show the maximum system performance. For long-duration tests, system must be de-rated up to 70%.
Continuous use at maximum levels may cause failure. Please contact IMV if your system operates at more than 70%.
*For random vibration tests, please set the test definition of the peak value of acceleration waveform to operate at less than the maximum acceleration of shock.
*Frequency range values vary according to the sensor and vibration controller.
*Armature mass and acceleration may change when a chamber is added.
*Mass and dimensions may change for CE-marked systems.

System composition

■ Standard equipment ■ Optional items



Head expander compatible with A22

Use a head expander for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (300 kg) minus the head expander mass. When using the head expander, the upper limit frequency is smaller than when using the test system alone.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TBV-315-A22-A	315 × 315 × t 30	8.5	1000	Aluminum alloy
□ TBV-315-A22-M	315 × 315 × t 30	5.8	1000	Magnesium alloy
□ TBV-400-A22-A	400 × 400 × t 30	13	600	Aluminum alloy
□ TBV-400-A22-M	400 × 400 × t 30	9	600	Magnesium alloy
□ TBV-500-A22-A	500 × 500 × t 40	15	500	Aluminum alloy
□ TBV-500-A22-M	500 × 500 × t 40	10.4	500	Magnesium alloy
□ TBV-630-A22-A	630 × 630 × t 45	19	360	Aluminum alloy
□ TBV-630-A22-M	630 × 630 × t 45	12.5	360	Magnesium alloy
□ TBV-800-A22-A	800 × 800 × t 70	45	350	Aluminum alloy
□ TBV-800-A22-M	800 × 800 × t 70	30	350	Magnesium alloy
□ TBV-1000-A22-A	1000 × 1000 × t 110	110	350	Aluminum alloy
□ TBV-1000-A22-M	1000 × 1000 × t 110	78	350	Magnesium alloy

Slip table compatible with A22

Use a slip table for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (300 kg) minus the slip table mass. When using the slip table, the upper limit frequency is smaller than when using the test system alone.

MB: Mechanical Bearing

The mechanical bearing uses a linear motion guide which has a component with a linear rolling motion. It contributes substantially to the high performance of tables with high rigidity, high load, and long stroke motion. Another strong feature of the mechanical bearing is its easy operability, since it is lightweight and has no need for a hydraulic unit.

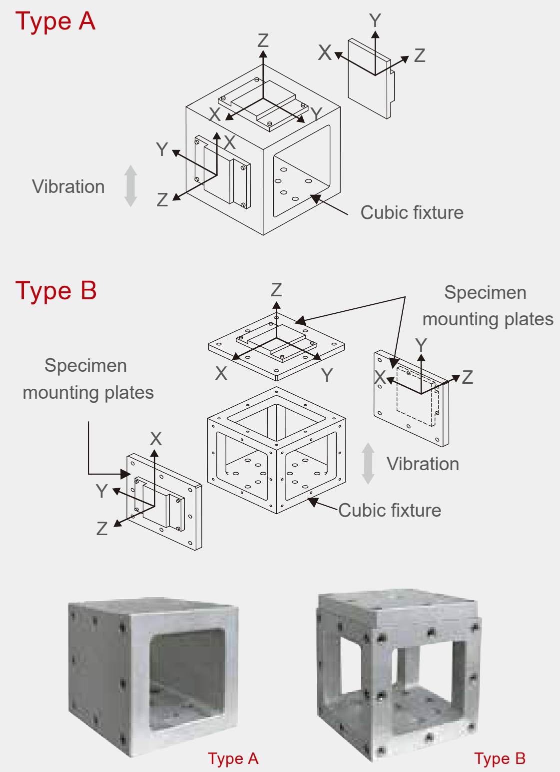
Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TBH-550-A22-A-MB	550 × 550 × t 40	58	2000	Aluminum alloy
□ TBH-750-A22-A-MB	750 × 750 × t 40	95	2000	Aluminum alloy
□ TBH-950-A22-A-MB	950 × 950 × t 40	140	1250	Aluminum alloy
□ TBH-1150-A22-A-MB	1150 × 1150 × t 40	200	800	Aluminum alloy

*The weight applies to a plate made of aluminum. Please contact us for a plate made of magnesium.

Cubic fixtures compatible with A22

The specimen can be fastened to the top or side face of the cubic fixture where testing in each axis is required. Two types of cubic fixture are available. Type A has mounting holes on each face and Type B has specimen mounting plates which attach to the cubic frame.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TCJ-A150-A22-A	150 × 150 × 150	5.5	2000	Aluminum alloy
□ TCJ-A150-A22-M	150 × 150 × 150	4.0	2000	Magnesium alloy
□ TCJ-A160-A22-A	160 × 160 × 160	6.5	2000	Aluminum alloy
□ TCJ-A160-A22-M	160 × 160 × 160	4.6	2000	Magnesium alloy
□ TCJ-A200-A22-A	200 × 200 × 200	8	1000	Aluminum alloy
□ TCJ-A200-A22-M	200 × 200 × 200	5.6	1000	Magnesium alloy
□ TCJ-A250-A22-A	250 × 250 × 250	13.5	650	Aluminum alloy
□ TCJ-A250-A22-M	250 × 250 × 250	9.5	650	Magnesium alloy
□ TCJ-B150-A22-A	150 × 150 × 150	3.5	2000	Aluminum alloy
□ TCJ-B150-A22-M	150 × 150 × 150	2.5	2000	Magnesium alloy
□ TCJ-B160-A22-A	160 × 160 × 160	4.0	2000	Aluminum alloy
□ TCJ-B160-A22-M	160 × 160 × 160	2.8	2000	Magnesium alloy
□ TCJ-B200-A22-A	200 × 200 × 200	10	2000	Aluminum alloy
□ TCJ-B200-A22-M	200 × 200 × 200	7	2000	Magnesium alloy
□ TCJ-B250-A22-A	250 × 250 × 250	20	1000	Aluminum alloy
□ TCJ-B250-A22-M	250 × 250 × 250	14	1000	Magnesium alloy



A30/SA3HAG (Standard)
A30/EM3HAG (ECO)

A wider range of test requirements and higher test specifications.

System Model			A30/ SA3HAG	A30/ EM3HAG
System Specifications	Frequency Range (Hz)		0 – 2600	0 – 2600
	Rated Force	Sine (kN)	30	30
		Random (kN rms) *1	30	30
		Shock (kN)	60	60
		High Velocity Shock (kN)	—	50
	Maximum Acc.	Sine (m/s²)	900	900
		Random (m/s² rms)	630	630
		Shock (m/s² peak)	1818	1818
		High Velocity Shock (m/s² peak)	—	1515
	Maximum Vel.	Sine (m/s)	2.0	2.0
		Shock (m/s peak)	2.5	2.5
		High Velocity Shock (m/s peak)	—	3.5
	Maximum Disp.	Sine (mmp-p)	76.2	76.2
		High Velocity Shock (mmp-p)	—	76.2
	Maximum Travel (mmp-p)		82	82
	Maximum Load (kg)		400	400
	Power Requirements (kVA)*2		36	36
	Breaker Capacity (A)*3		125	125

	Model		A30	
Vibration Generator	Armature Mass (kg)		33	
	Armature Diameter (φmm)		290	
	Allowable Eccentric Moment (N・m)		850	
	Dimensions (mm) W × H × D		1100 × 1048 × 840	
	Shaker Body Diameter (φmm)		725	
	Mass (kg)		2000	
Power Amplifier	Model*5		1□GH3-A30	2□GH3-A30
	Maximum Output (kVA)		31	
	Dimensions (mm) W × H × D		580 × 1950 × 850	
	Mass (kg)		520	590
Controller	Vibration Controller		See Vibration Controller K2+	
Cooling	Cooling Method		Air cooling	
	Blower	Dimensions (mm) W × H × D*4	707 × 1531 × 917	
		Mass (kg)	210	
		Wattage (kw)	5.5	
		Duct Hose Diameter (φ)	200	

*1 Random force ratings are specified in accordance with ISO5344 conditions. Please contact IMV or your local distributor with specific test requirements.
*2 Power supply: 3-phase 200/220/380/400/415 V, 50/60 Hz. A transformer is required for other supply voltages.
*3 Breaker capacity for AC 200 V.
*4 The specification above applies to 60 Hz. Dimensions change for 50 Hz.
*5 The alphabet of A, B, or C can be entered in □. A: Voltage AC200V system (200 to 230), B: Voltage AC400V system (380A to 440V), C: 480V system (480V to 520V)
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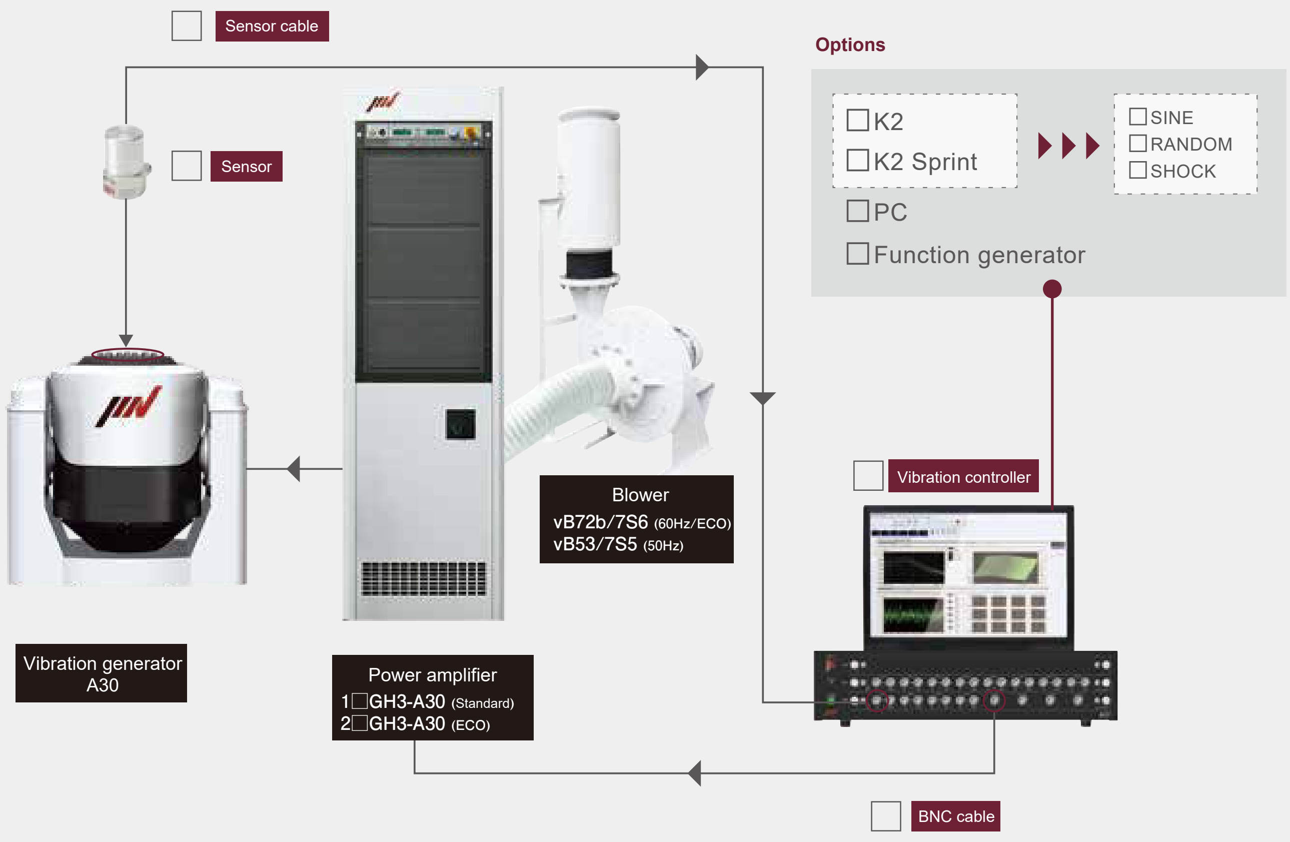
System composition

■ Standard equipment ■ Optional items



Head expander compatible with A30

Use a head expander for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (400 kg) minus the head expander mass. When using the head expander, the upper limit frequency is smaller than when using the test system alone.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TBV-315-A30-A	315 × 315 × t 30	8.5	1000	Aluminum alloy
□ TBV-315-A30-M	315 × 315 × t 30	5.8	1000	Magnesium alloy
□ TBV-400-A30-A	400 × 400 × t 30	13	600	Aluminum alloy
□ TBV-400-A30-M	400 × 400 × t 30	9	600	Magnesium alloy
□ TBV-500-A30-A	500 × 500 × t 40	15	500	Aluminum alloy
□ TBV-500-A30-M	500 × 500 × t 40	10.4	500	Magnesium alloy
□ TBV-630-A30-A	630 × 630 × t 45	19	360	Aluminum alloy
□ TBV-630-A30-M	630 × 630 × t 45	12.5	360	Magnesium alloy
□ TBV-800-A30-A	800 × 800 × t 70	45	350	Aluminum alloy
□ TBV-800-A30-M	800 × 800 × t 70	30	350	Magnesium alloy
□ TBV-1000-A30-A	1000 × 1000 × t 110	110	350	Aluminum alloy
□ TBV-1000-A30-M	1000 × 1000 × t 110	78	350	Magnesium alloy

Slip table compatible with A30

Use a slip table for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (400 kg) minus the slip table mass. When using the slip table, the upper limit frequency is smaller than when using the test system alone.

MB: Mechanical Bearing

The mechanical bearing uses a linear motion guide which has a component with a linear rolling motion. It contributes substantially to the high performance of tables with high rigidity, high load, and long stroke motion. Another strong feature of the mechanical bearing is its easy operability, since it is lightweight and has no need for a hydraulic unit.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TBH-550-A30-A-MB	550 × 550 × t 40	60	2000	Aluminum alloy
□ TBH-750-A30-A-MB	750 × 750 × t 40	100	2000	Aluminum alloy
□ TBH-950-A30-A-MB	950 × 950 × t 40	145	1250	Aluminum alloy
□ TBH-1150-A30-A-MB	1150 × 1150 × t 40	208	800	Aluminum alloy

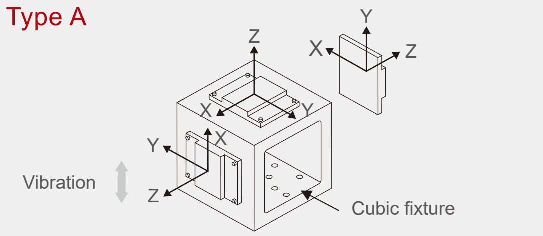
*The weight applies to a plate made of aluminum. Please contact us for a plate made of magnesium.

Cubic fixtures compatible with A30

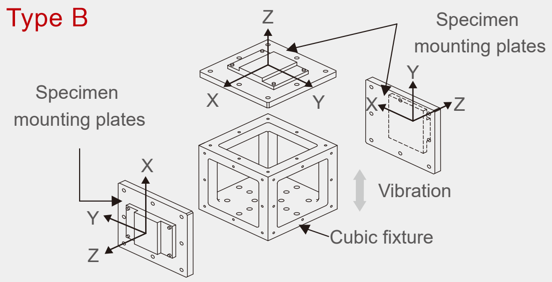
The specimen can be fastened to the top or the side face of the cubic fixture where testing in each axis is required. Two types of cubic fixture are available. Type A has mounting holes on each face and Type B has specimen mounting plates which attach to the cubic frame.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TCJ-A150-A30-A	150 × 150 × 150	5.5	2000	Aluminum alloy
□ TCJ-A150-A30-M	150 × 150 × 150	4.0	2000	Magnesium alloy
□ TCJ-A160-A30-A	160 × 160 × 160	6.5	2000	Aluminum alloy
□ TCJ-A160-A30-M	160 × 160 × 160	4.6	2000	Magnesium alloy
□ TCJ-A200-A30-A	200 × 200 × 200	8	1000	Aluminum alloy
□ TCJ-A200-A30-M	200 × 200 × 200	5.6	1000	Magnesium alloy
□ TCJ-A250-A30-A	250 × 250 × 250	13.5	650	Aluminum alloy
□ TCJ-A250-A30-M	250 × 250 × 250	9.5	650	Magnesium alloy
□ TCJ-A300-A30-A	300 × 300 × 300	20	400	Aluminum alloy
□ TCJ-A300-A30-M	300 × 300 × 300	14	400	Magnesium alloy
□ TCJ-B150-A30-A	150 × 150 × 150	3.5	2000	Aluminum alloy
□ TCJ-B150-A30-M	150 × 150 × 150	2.5	2000	Magnesium alloy
□ TCJ-B160-A30-A	160 × 160 × 160	4.0	2000	Aluminum alloy
□ TCJ-B160-A30-M	160 × 160 × 160	2.8	2000	Magnesium alloy
□ TCJ-B200-A30-A	200 × 200 × 200	10	2000	Aluminum alloy
□ TCJ-B200-A30-M	200 × 200 × 200	7	2000	Magnesium alloy
□ TCJ-B250-A30-A	250 × 250 × 250	20	1000	Aluminum alloy
□ TCJ-B250-A30-M	250 × 250 × 250	14	1000	Magnesium alloy
□ TCJ-B300-A30-A	300 × 300 × 300	20	600	Aluminum alloy
□ TCJ-B300-A30-M	300 × 300 × 300	14	600	Magnesium alloy

Type A



Type B




Type A


Type B

A45/SA4HAG (Standard)
A45/EM4HAG (ECO)

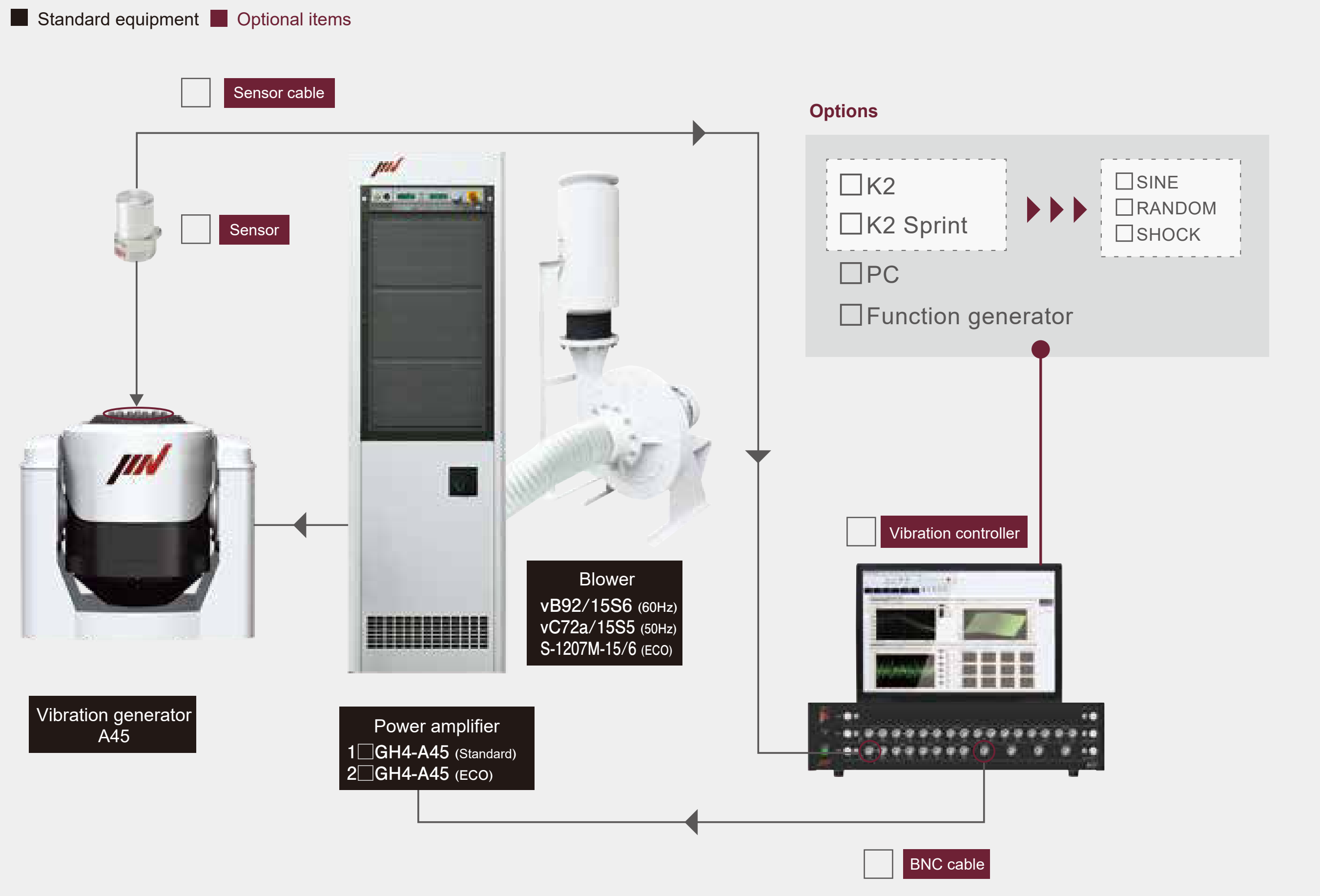
A wider range of test requirements and higher test specifications.

System Model			A45/ SA4HAG	A45/ EM4HAG
System Specifications	Frequency Range (Hz)		0 – 2600	0 – 2600
	Rated Force	Sine (kN)	45	45
		Random (kN rms) *1	45	45
		Shock (kN)	90	90
		High Velocity Shock (kN)	—	80
	Maximum Acc.	Sine (m/s²)	900	900
		Random (m/s² rms)	630	630
		Shock (m/s² peak)	1800	1800
		High Velocity Shock (m/s² peak)	—	1600
	Maximum Vel.	Sine (m/s)	2.0	2.0
		Shock (m/s peak)	2.5	2.5
		High Velocity Shock (m/s peak)	—	3.5
	Maximum Disp.	Sine (mmp-p)	76.2	76.2
		High Velocity Shock (mmp-p)	—	76.2
	Maximum Travel (mmp-p)		82	82
	Maximum Load (kg)		600	600
	Power Requirements (kVA)*2		57	57
	Breaker Capacity (A)*3		200	200

	Model		A45	
Vibration Generator	Armature Mass (kg)		50	
	Armature Diameter (φmm)		436	
	Allowable Eccentric Moment (N・m)		1550	
	Dimensions (mm) W × H × D		1232 × 1215 × 1040	
	Shaker Body Diameter (φmm)		825	
	Mass (kg)		3000	
Power Amplifier	Model*5		1□GH4-A45	2□GH4-A45
	Maximum Output (kVA)		44	
	Dimensions (mm) W × H × D		580 × 1950 × 850	1160 × 1950 × 850
	Mass (kg)		900	1000
Controller	Vibration Controller		See Vibration Controller K2+	
Cooling	Cooling Method		Air cooling	
	Blower	Dimensions (mm) W × H × D*4	1057 × 1841 × 1125	1169 × 2123 × 799
		Mass (kg)	250	280
		Wattage (kw)	11	
		Duct Hose Diameter (φ)	250	

*1 Random force ratings are specified in accordance with ISO5344 conditions. Please contact IMV or your local distributor with specific test requirements.
*2 Power supply: 3-phase 200/220/380/400/415 V, 50/60 Hz. A transformer is required for other supply voltages.
*3 Breaker capacity for AC 200 V.
*4 The specification above applies to 60 Hz. Dimensions change for 50 Hz.
*5 The alphabet of A, B, or C can be entered in □. A: Voltage AC200V system (200 to 230), B: Voltage AC400V system (380A to 440V), C: 480V system (480V to 520V)
*The specifications show the maximum system performance. For long-duration tests, system must be de-rated up to 70%.
Continuous use at maximum levels may cause failure. Please contact IMV if your system operates at more than 70%.
*For random vibration tests, please set the test definition of the peak value of acceleration waveform to operate at less than the maximum acceleration of shock.
*Frequency range values vary according to the sensor and vibration controller.
*Armature mass and acceleration may change when a chamber is added.
*Mass and dimensions may change for CE-marked systems.

System composition



Head expander compatible with A45

Use a head expander for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (600 kg) minus the head expander mass. When using the head expander, the upper limit frequency is smaller than when using the test system alone.

	Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□	TBV-315-A45-A	315 × 315 × t 30	8.5	1000	Aluminum alloy
□	TBV-315-A45-M	315 × 315 × t 30	5.8	1000	Magnesium alloy
□	TBV-400-A45-A	400 × 400 × t 30	13	600	Aluminum alloy
□	TBV-400-A45-M	400 × 400 × t 30	9	600	Magnesium alloy
□	TBV-500-A45-A	500 × 500 × t 40	15	500	Aluminum alloy
□	TBV-500-A45-M	500 × 500 × t 40	10.4	500	Magnesium alloy
□	TBV-630-A45-A	630 × 630 × t 45	19	360	Aluminum alloy
□	TBV-630-A45-M	630 × 630 × t 45	12.5	360	Magnesium alloy
□	TBV-800-A45-A	800 × 800 × t 70	45	350	Aluminum alloy
□	TBV-800-A45-M	800 × 800 × t 70	30	350	Magnesium alloy
□	TBV-1000-A45-A	1000 × 1000 × t 110	110	350	Aluminum alloy
□	TBV-1000-A45-M	1000 × 1000 × t 110	78	350	Magnesium alloy

Slip table compatible with A45

Use a slip table for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (600 kg) minus the slip tabler mass. When using the slip table, the upper limit frequency is smaller than when using the test system alone.

MB: Mechanical Bearing

The mechanical bearing uses a linear motion guide which has a component with a linear rolling motion. It contributes substantially to the high performance of tables with high rigidity, high load, and long stroke motion. Another strong feature of the mechanical bearing is its easy operability, since it is lightweight and has no need for a hydraulic unit.

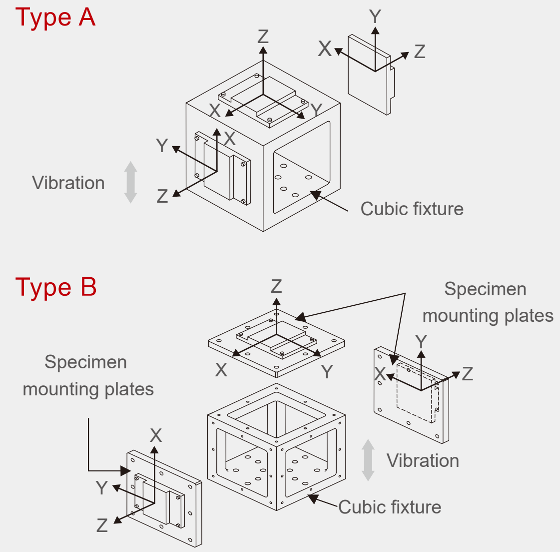
	Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□	TBH-550-A45-A-MB	550 × 550 × t 40	68	2000	Aluminum alloy
□	TBH-750-A45-A-MB	750 × 750 × t 40	108	2000	Aluminum alloy
□	TBH-950-A45-A-MB	950 × 950 × t 40	153	1250	Aluminum alloy
□	TBH-1150-A45-A-MB	1150 × 1150 × t 40	213	800	Aluminum alloy

*The weight applies to a plate made of aluminum. Please contact us for a plate made of magnesium.

Cubic fixtures compatible with A45

The specimen can be fastened to the top or the side face of the cubic fixture where testing in each axis is required. Two types of cubic fixture are available. Type A has mounting holes on each face and Type B has specimen mounting plates which attach to the cubic frame.

	Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□	TCJ-A150-A45-A	150 × 150 × 150	5.5	2000	Aluminum alloy
□	TCJ-A150-A45-M	150 × 150 × 150	4.0	2000	Magnesium alloy
□	TCJ-A160-A45-A	160 × 160 × 160	6.5	2000	Aluminum alloy
□	TCJ-A160-A45-M	160 × 160 × 160	4.6	2000	Magnesium alloy
□	TCJ-A200-A45-A	200 × 200 × 200	8	1000	Aluminum alloy
□	TCJ-A200-A45-M	200 × 200 × 200	5.6	1000	Magnesium alloy
□	TCJ-A250-A45-A	250 × 250 × 250	13.5	650	Aluminum alloy
□	TCJ-A250-A45-M	250 × 250 × 250	9.5	650	Magnesium alloy
□	TCJ-A300-A45-A	300 × 300 × 300	20	400	Aluminum alloy
□	TCJ-A300-A45-M	300 × 300 × 300	14	400	Magnesium alloy
□	TCJ-B150-A45-A	150 × 150 × 150	3.5	2000	Aluminum alloy
□	TCJ-B150-A45-M	150 × 150 × 150	2.5	2000	Magnesium alloy
□	TCJ-B160-A45-A	160 × 160 × 160	4.0	2000	Aluminum alloy
□	TCJ-B160-A45-M	160 × 160 × 160	2.8	2000	Magnesium alloy
□	TCJ-B200-A45-A	200 × 200 × 200	10	2000	Aluminum alloy
□	TCJ-B200-A45-M	200 × 200 × 200	7	2000	Magnesium alloy
□	TCJ-B250-A45-A	250 × 250 × 250	20	1000	Aluminum alloy
□	TCJ-B250-A45-M	250 × 250 × 250	14	1000	Magnesium alloy
□	TCJ-B300-A45-A	300 × 300 × 300	20	600	Aluminum alloy
□	TCJ-B300-A45-M	300 × 300 × 300	14	600	Magnesium alloy



A65/SA5HAG (Standard)
A65/EM5HAG (ECO)

A wider range of test requirements and higher test specifications.

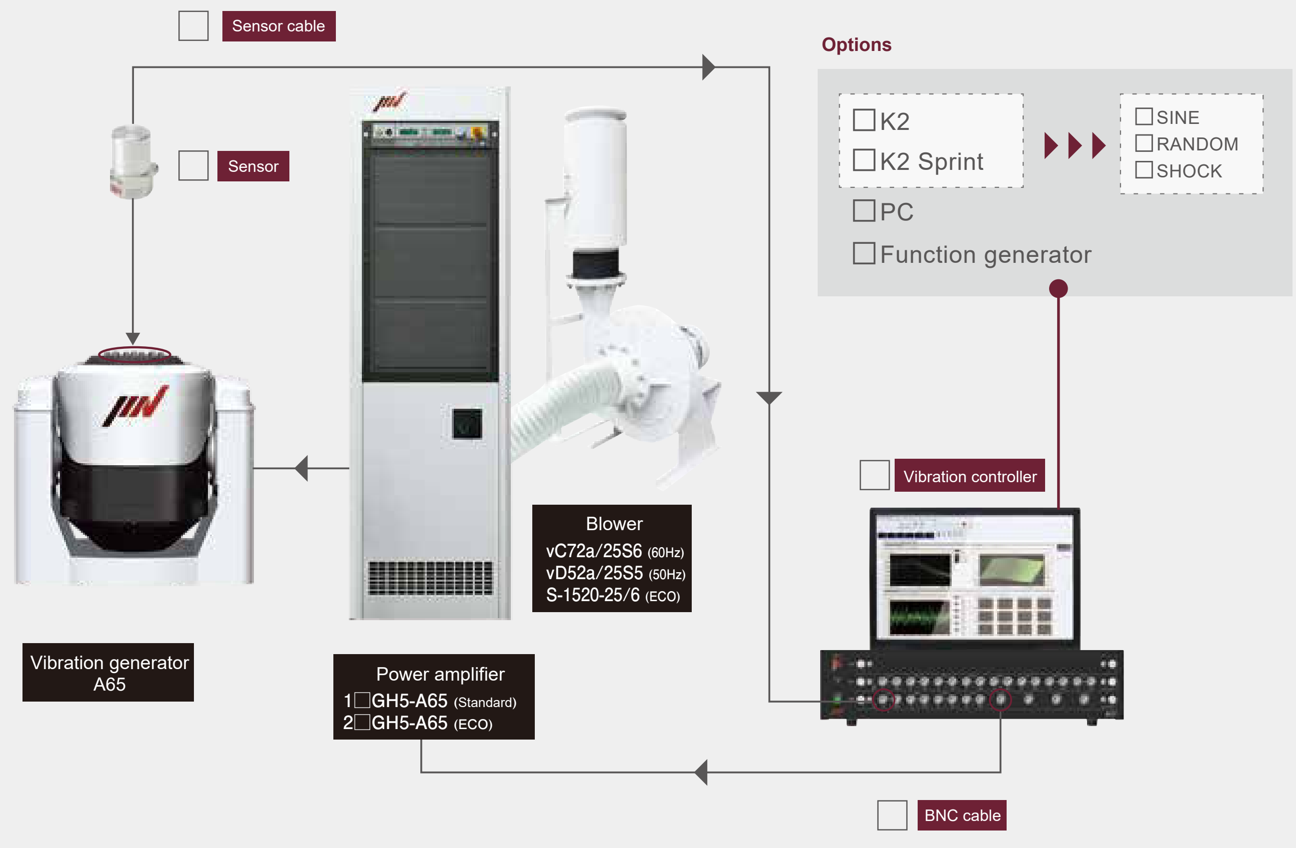
System Model			A65/SA5HAG*6	A65/EM5HAG*6
System Specifications	Frequency Range (Hz)		0 – 2600*4	0 – 2600*4
	Rated Force	Sine (kN)	65	65
		Random (kN rms)*1	65	65
		Shock (kN)	130	130
		High Velocity Shock (kN)	—	120
	Maximum Acc.	Sine (m/s²)	900	900
		Random (m/s² rms)	630	630
		Shock (m/s² peak)	1806	1806
		High Velocity Shock (m/s² peak)	—	1666
	Maximum Vel.	Sine (m/s)	2.0	2.0
		Shock (m/s peak)	2.5	2.5
		High Velocity Shock (m/s peak)	—	3.5
	Maximum Disp.	Sine (mmp-p)	76.2	76.2
		High Velocity Shock (mmp-p)	—	76.2
	Maximum Travel (mmp-p)		82	82
	Maximum Load (kg)		1000	1000
	Power Requirements (kVA)*2		83	83
	Breaker Capacity (A)*3		300	300

		Model	A65	
Vibration Generator		Armature Mass (kg)	72	
		Armature Diameter (φmm)	446	
		Allowable Eccentric Moment (N・m)	1550	
		Dimensions (mm) W × H × D	1310 × 1253 × 1040	
		Shaker Body Diameter (φmm)	925	
		Mass (kg)	4200	
Power Amplifier		Model*7	1□GH5-A65	2□GH5-A65
		Maximum Output (kVA)	68	
		Dimensions (mm) W × H × D	580 × 1950 × 850	1160 × 1950 × 850
		Mass (kg)	1000	1150
Controller		Vibration Controller	See Vibration Controller K2+	
Cooling		Cooling Method	Air cooling	
	Blower	Dimensions (mm) W × H × D*5	1214 × 2006 × 1124	1128 × 2380 × 899
		Mass (kg)	420	228
		Wattage (kw)	18.5	
		Duct Hose Diameter (φ)	250	

*1 Random force ratings are specified in accordance with ISO5344 conditions. Please contact IMV or your local distributor with specific test requirements.
*2 Power supply: 3-phase 200/220/380/400/415 V, 50/60 Hz. A transformer is required for other supply voltages.
*3 Breaker capacity for AC 200 V.
*4 Above 2000 Hz, the force rolls-off at a rate of -12 dB/oct.
*5 The specification above applies to 60 Hz. Dimensions change for 50 Hz.
*6 Export license is required for exporting the shaker system of over 50 kN sine force.
*7 The alphabet of A, B, or C can be entered in □. A: Voltage AC200V system (200 to 230), B: Voltage AC400V system (380A to 440V), C: 480V system (480V to 520V)
*The specifications show the maximum system performance. For long-duration tests, system must be de-rated up to 70%.
Continuous use at maximum levels may cause failure. Please contact IMV if your system operates at more than 70%.
*For random vibration tests, please set the test definition of the peak value of acceleration waveform to operate at less than the maximum acceleration of shock.
*Frequency range values vary according to the sensor and vibration controller.
*Armature mass and acceleration may change when a chamber is added.
*Mass and dimensions may change for CE-marked systems.

System composition

■ Standard equipment ■ Optional items



Head expander compatible with A65

Use a head expander for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (1,000 kg) minus the head expander mass. When using the head expander, the upper limit frequency is smaller than when using the test system alone.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
TBV-315-A65-A	315 × 315 × t 30	8.5	1000	Aluminum alloy
TBV-315-A65-M	315 × 315 × t 30	5.8	1000	Magnesium alloy
TBV-400-A65-A	400 × 400 × t 30	13	600	Aluminum alloy
TBV-400-A65-M	400 × 400 × t 30	9	600	Magnesium alloy
TBV-500-A65-A	500 × 500 × t 40	15	500	Aluminum alloy
TBV-500-A65-M	500 × 500 × t 40	10.4	500	Magnesium alloy
TBV-630-A65-A	630 × 630 × t 45	19	360	Aluminum alloy
TBV-630-A65-M	630 × 630 × t 45	12.5	360	Magnesium alloy
TBV-800-A65-A	800 × 800 × t 70	45	350	Aluminum alloy
TBV-800-A65-M	800 × 800 × t 70	30	350	Magnesium alloy
TBV-1000-A65-A	1000 × 1000 × t 110	110	350	Aluminum alloy
TBV-1000-A65-M	1000 × 1000 × t 110	78	350	Magnesium alloy

Slip table compatible with A65

Use a slip table for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (1,000 kg) minus the slip table mass. When using the slip table, the upper limit frequency is smaller than when using the test system alone.

MB: Mechanical Bearing

The mechanical bearing uses a linear motion guide which has a component with a linear rolling motion. It contributes substantially to the high performance of tables with high rigidity, high load, and long stroke motion. Another strong feature of the mechanical bearing is its easy operability, since it is lightweight and has no need for a hydraulic unit.

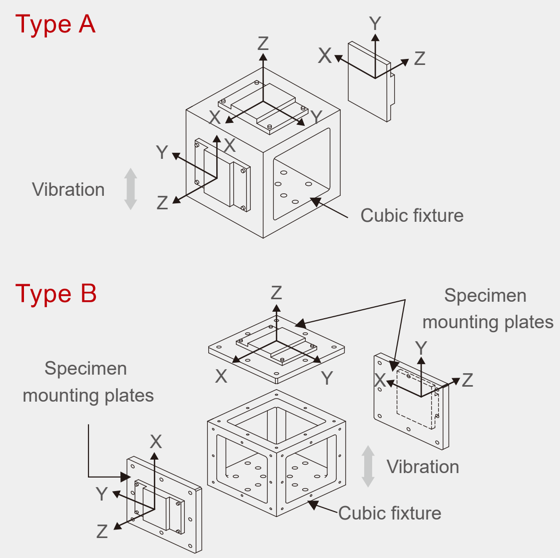
Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
TBH-550-A65-A-MB	550 × 550 × t 40	68	2000	Aluminum alloy
TBH-750-A65-A-MB	750 × 750 × t 40	108	2000	Aluminum alloy
TBH-950-A65-A-MB	950 × 950 × t 40	153	1250	Aluminum alloy
TBH-1150-A65-A-MB	1150 × 1150 × t 40	213	800	Aluminum alloy

*The weight applies to a plate made of aluminum. Please contact us for a plate made of magnesium.

Cubic fixtures compatible with A65

The specimen can be fastened to the top or the side face of the cubic fixture where testing in each axis is required. Two types of cubic fixture are available. Type A has mounting holes on each face and Type B has specimen mounting plates which attach to the cubic frame.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
TCJ-A150-A65-A	150 × 150 × 150	5.5	2000	Aluminum alloy
TCJ-A150-A65-M	150 × 150 × 150	4.0	2000	Magnesium alloy
TCJ-A160-A65-A	160 × 160 × 160	6.5	2000	Aluminum alloy
TCJ-A160-A65-M	160 × 160 × 160	4.6	2000	Magnesium alloy
TCJ-A200-A65-A	200 × 200 × 200	8	1000	Aluminum alloy
TCJ-A200-A65-M	200 × 200 × 200	5.6	1000	Magnesium alloy
TCJ-A250-A65-A	250 × 250 × 250	13.5	650	Aluminum alloy
TCJ-A250-A65-M	250 × 250 × 250	9.5	650	Magnesium alloy
TCJ-A300-A65-A	300 × 300 × 300	20	400	Aluminum alloy
TCJ-A300-A65-M	300 × 300 × 300	14	400	Magnesium alloy
TCJ-B150-A65-A	150 × 150 × 150	3.5	2000	Aluminum alloy
TCJ-B150-A65-M	150 × 150 × 150	2.5	2000	Magnesium alloy
TCJ-B160-A65-A	160 × 160 × 160	4.0	2000	Aluminum alloy
TCJ-B160-A65-M	160 × 160 × 160	2.8	2000	Magnesium alloy
TCJ-B200-A65-A	200 × 200 × 200	10	2000	Aluminum alloy
TCJ-B200-A65-M	200 × 200 × 200	7	2000	Magnesium alloy
TCJ-B250-A65-A	250 × 250 × 250	20	1000	Aluminum alloy
TCJ-B250-A65-M	250 × 250 × 250	14	1000	Magnesium alloy
TCJ-B300-A65-A	300 × 300 × 300	20	600	Aluminum alloy
TCJ-B300-A65-M	300 × 300 × 300	14	600	Magnesium alloy



A74/EM6HAG (Standard)
A74/EM8HAG (ECO)

A wider range of test requirements and higher test specifications.

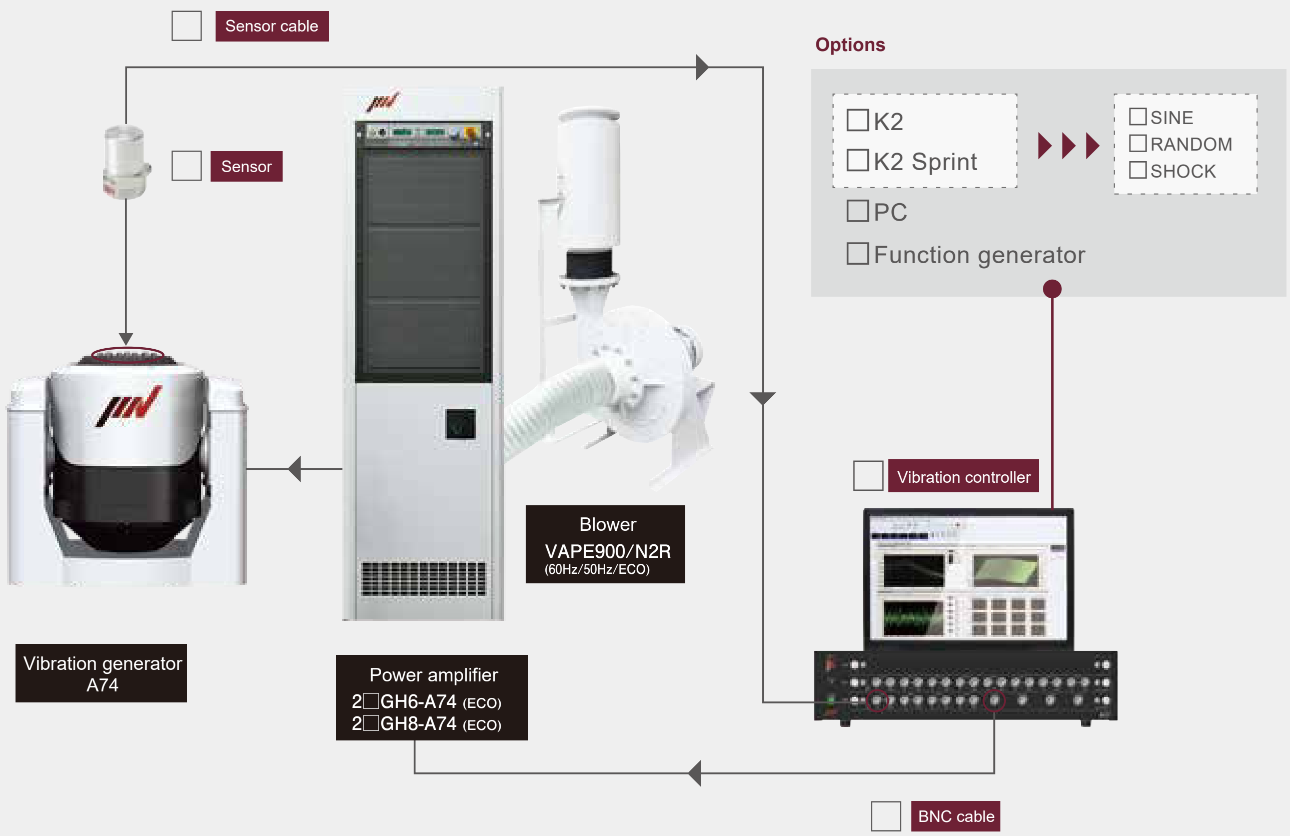
System Model			A74/ EM6HAG*6	A74/ EM8HAG*6
System Specifications	Frequency Range (Hz)		0 – 2600*4	0 – 2600*4
	Rated Force	Sine (kN)	74	74
		Random (kN rms)*1	74	74
		Shock (kN)	148	180
		High Velocity Shock (kN)	120	160
	Maximum Acc.	Sine (m/s²)	1000	1000
		Random (m/s² rms)	630	630
		Shock (m/s² peak)	2000	2000
		High Velocity Shock (m/s² peak)	1621	2000
	Maximum Vel.	Sine (m/s)	2.0	2.0
		Shock (m/s peak)	2.5	2.5
		High Velocity Shock (m/s peak)	3.5	3.5
	Maximum Disp.	Sine (mmp-p)	76.2	76.2
		High Velocity Shock (mmp-p)	76.2	76.2
	Maximum Travel (mmp-p)		82	82
	Maximum Load (kg)		1000	1000
	Power Requirements (kVA)*2		100	100
	Breaker Capacity (A)*3		250	250

	Model		A74	
Vibration Generator	Armature Mass (kg)		74	
	Armature Diameter (φmm)		446	
	Allowable Eccentric Moment (N・m)		1550	
	Dimensions (mm) W × H × D		1310 × 1253 × 1040	
	Shaker Body Diameter (φmm)		925	
	Mass (kg)		4800	
Power Amplifier	Model*7		2□GH6-A74	2□GH8-A74
	Maximum Output (kVA)		100	
	Dimensions (mm) W × H × D		1160 × 1950 × 850	
	Mass (kg)		1340	1850
Controller	Vibration Controller		See Vibration Controller K2+	
Cooling	Cooling Method		Air cooling	
	Blower	Dimensions (mm) W × H × D*5	1462 × 2800 × 927	
		Mass (kg)	320	
		Wattage (kw)	30	
		Duct Hose Diameter (φ)	250	

*1 Random force ratings are specified in accordance with ISO5344 conditions. Please contact IMV or your local distributor with specific test requirements.
*2 Power supply: 3-phase AC380/400/415 V, 50/60 Hz. A transformer is required for other supply voltages.
*3 Breaker capacity for AC 200 V.
*4 Above 2000 Hz, the force rolls-off at a rate of -12 dB/oct.
*5 The specification above applies to 60 Hz. Dimensions change for 50 Hz.
*6 Export license is required for exporting the shaker system of over 50 kN sine force.
*7 The alphabet of A, B, or C can be entered in □. A: Voltage AC200V system (200 to 230), B: Voltage AC400V system (380A to 440V), C: 480V system (480V to 520V)
*The specifications show the maximum system performance. For long-duration tests, system must be de-rated up to 70%.
Continuous use at maximum levels may cause failure. Please contact IMV if your system operates at more than 70%.
*For random vibration tests, please set the test definition of the peak value of acceleration waveform to operate at less than the maximum acceleration of shock.
*Frequency range values vary according to the sensor and vibration controller.
*Armature mass and acceleration may change when a chamber is added.
*Mass and dimensions may change for CE-marked systems.

System composition

■ Standard equipment ■ Optional items



Head expander compatible with A74

Use a head expander for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (1,000 kg) minus the head expander mass. When using the head expander, the upper limit frequency is smaller than when using the test system alone.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TBV-315-A74-A	315 × 315 × t 30	8.5	1000	Aluminum alloy
□ TBV-315-A74-M	315 × 315 × t 30	5.8	1000	Magnesium alloy
□ TBV-400-A74-A	400 × 400 × t 30	13	600	Aluminum alloy
□ TBV-400-A74-M	400 × 400 × t 30	9	600	Magnesium alloy
□ TBV-500-A74-A	500 × 500 × t 40	15	500	Aluminum alloy
□ TBV-500-A74-M	500 × 500 × t 40	10.4	500	Magnesium alloy
□ TBV-630-A74-A	630 × 630 × t 45	19	360	Aluminum alloy
□ TBV-630-A74-M	630 × 630 × t 45	12.5	360	Magnesium alloy
□ TBV-800-A74-A	800 × 800 × t 70	45	350	Aluminum alloy
□ TBV-800-A74-M	800 × 800 × t 70	30	350	Magnesium alloy
□ TBV-1000-A74-A	1000 × 1000 × t 110	110	350	Aluminum alloy
□ TBV-1000-A74-M	1000 × 1000 × t 110	78	350	Magnesium alloy

Slip table compatible with A74

Use a slip table for test samples that are too large to put on the table. The test sample mass must fall within the load limit of the shaker (1,000 kg) minus the slip table mass. When using the slip table, the upper limit frequency is smaller than when using the test system alone.

MB: Mechanical Bearing

The mechanical bearing uses a linear motion guide which has a component with a linear rolling motion. It contributes substantially to the high performance of tables with high rigidity, high load, and long stroke motion. Another strong feature of the mechanical bearing is its easy operability, since it is lightweight and has no need for a hydraulic unit.

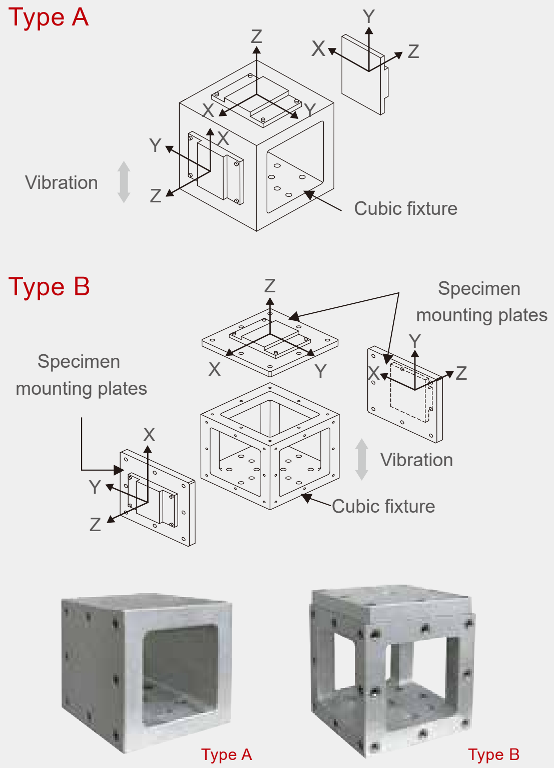
Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TBH-550-A74-A-MB	550 × 550 × t 40	68	2000	Aluminum alloy
□ TBH-750-A74-A-MB	750 × 750 × t 40	108	2000	Aluminum alloy
□ TBH-950-A74-A-MB	950 × 950 × t 40	153	1250	Aluminum alloy
□ TBH-1150-A74-A-MB	1150 × 1150 × t 40	213	800	Aluminum alloy

*The weight applies to a plate made of aluminum. Please contact us for a plate made of magnesium.

Cubic fixtures compatible with A74

The specimen can be fastened to the top or the side face of the cubic fixture where testing in each axis is required. Two types of cubic fixture are available. Type A has mounting holes on each face and Type B has specimen mounting plates which attach to the cubic frame.

Model	Dimensions (mm)	Mass (kg)	Maximum frequency (Hz)	Material
□ TCJ-A150-A74-A	150 × 150 × 150	5.5	2000	Aluminum alloy
□ TCJ-A150-A74-M	150 × 150 × 150	4.0	2000	Magnesium alloy
□ TCJ-A160-A74-A	160 × 160 × 160	6.5	2000	Aluminum alloy
□ TCJ-A160-A74-M	160 × 160 × 160	4.6	2000	Magnesium alloy
□ TCJ-A200-A74-A	200 × 200 × 200	8	1000	Aluminum alloy
□ TCJ-A200-A74-M	200 × 200 × 200	5.6	1000	Magnesium alloy
□ TCJ-A250-A74-A	250 × 250 × 250	13.5	650	Aluminum alloy
□ TCJ-A250-A74-M	250 × 250 × 250	9.5	650	Magnesium alloy
□ TCJ-A300-A74-A	300 × 300 × 300	20	400	Aluminum alloy
□ TCJ-A300-A74-M	300 × 300 × 300	14	400	Magnesium alloy
□ TCJ-B150-A74-A	150 × 150 × 150	3.5	2000	Aluminum alloy
□ TCJ-B150-A74-M	150 × 150 × 150	2.5	2000	Magnesium alloy
□ TCJ-B160-A74-A	160 × 160 × 160	4.0	2000	Aluminum alloy
□ TCJ-B160-A74-M	160 × 160 × 160	2.8	2000	Magnesium alloy
□ TCJ-B200-A74-A	200 × 200 × 200	10	2000	Aluminum alloy
□ TCJ-B200-A74-M	200 × 200 × 200	7	2000	Magnesium alloy
□ TCJ-B250-A74-A	250 × 250 × 250	20	1000	Aluminum alloy
□ TCJ-B250-A74-M	250 × 250 × 250	14	1000	Magnesium alloy
□ TCJ-B300-A74-A	300 × 300 × 300	20	600	Aluminum alloy
□ TCJ-B300-A74-M	300 × 300 × 300	14	600	Magnesium alloy



Environmental Test Systems

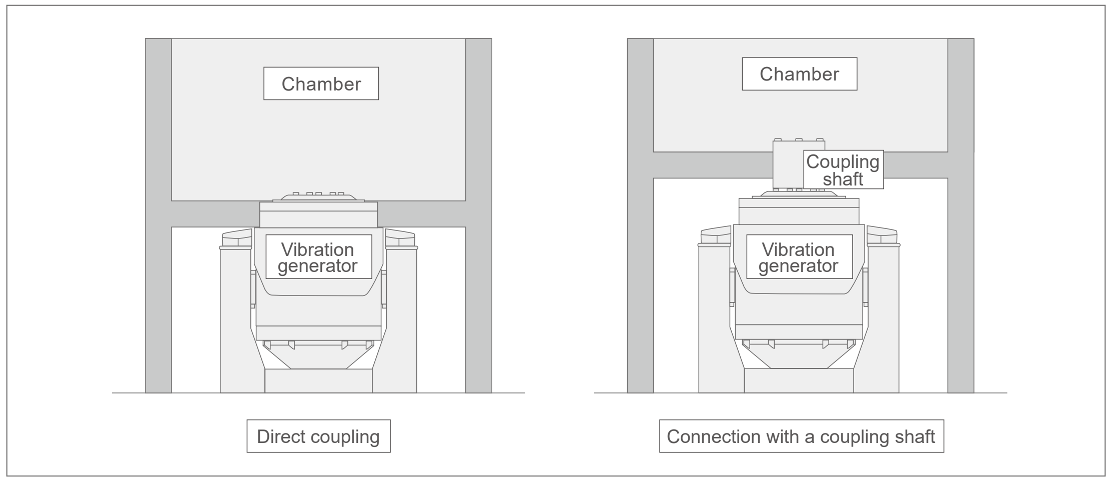
Chamber for Vertical Excitation

Inner pressure regulator: Reduces internal pressure fluctuation caused by vibration (standard equipment)

Model: Syn-3HA-40-V

Internal dimensions	W 1000 × D 1000 × H 1100 mm
Temperature range	-40℃ to +150℃
Humidity range	20% to 95% RH
Temperature pull-down time	+20℃ → -40℃ In 60 minutes (Curve gradient)
Temperature heat-up time	-40℃ → +150℃ In 90 minutes (Curve gradient)

Docking image of combined systems



Model: Syn-6HW-30-V

Internal dimensions	W 1800 × D 1900 × H 1500 mm
Temperature range	-30℃ to +80℃
Humidity range	30% to 95% RH
Temperature pull-down time	+45℃ → -30℃ In 35 minutes (Curve gradient)
Temperature heat-up time	-30℃ → +80℃ In 25 minutes (Curve gradient)

Environmental Test Systems

Chamber for both Vertical and Horizontal Excitation

Horizontal slip table combined with vibration test system.
Combining a rail support for horizontal movement and a lift support for vertical movement, this chamber allows combined tests for both vertical and horizontal axes.

Vertical use

Horizontal use

Rail and lift support

Model: Syn-3HA-70-VH

Internal dimensions	W 1000 × D 1000 ×H 1000 mm
Temperature range	-70℃ to +180℃
Humidity range	20% to 98% RH
Temperature pull-down time	1°C/minutes or more (Curve gradient)
Temperature heat-up time	2°C/minutes or more (Curve gradient)

Watch the YouTube video

Chamber options for both vertical and horizontal excitation

Optional crane

Adding a dedicated crane allows for the safe and simple loading and unloading of test specimens.

Optional crane and observation door

The vertical base can be attached and detached using the optional crane with the head expander staying mounted on the vibration generator. In addition, operator-friendly features are included, such as an observation door, body-suspension automatic-adjustment mechanism, etc.

Side window

A side window allows chamber-combined docking with the specimen attached to the shaker during vertical excitation.

Cable bear

The cable carrier promotes a safe work environment by allowing cables and water pipes to be held together.

Chamber for Multi-Axis Excitation

Temperature and humidity chamber for multi-axis vibration test system.
The time needed to reconfigure for testing in each axis is eliminated, reducing total test time.

2-axis

Model: Syn-4HA-40-M

Internal dimensions	W 1200 × D 1200 × H 1000 mm
Temperature range	-40℃ to +150℃
Humidity range	20% to 98% RH
Temperature pull-down time	+20℃→-40℃ In 80 minutes (Load condition:combined + aluminum 60 kg)
Temperature heat-up time	-40℃→+150℃ In 80 minutes (Load condition:combined + aluminum 60 kg)

3-axis

Model: Syn-3HA-40-M

Internal dimensions	W 1000 × D 1000 × H 1000 mm
Temperature range	-70℃ to +180℃
Humidity range	20% to 98% RH
Temperature pull-down time	+20℃ → -70℃ In 40 minutes (Curve gradient)
Temperature heat-up time	-70℃ → +180℃ In 40 minutes (Curve gradient)

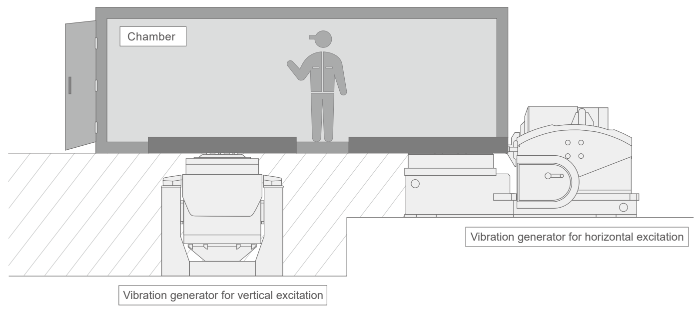
Prefabricated Chamber for Large Specimens

Large-sized specimens can be tested with a chamber combined test in both the vertical and horizontal axes.

Model: Syn-6HA-40-VH

Internal dimensions	W 4000 × D2000 × H 2500 mm
Temperature range	-40℃ to +120℃
Humidity range	30% to 95% RH
Temperature pull-down time	+20℃→-40℃ In 120 minutes (Curve gradient)
Temperature heat-up time	-40℃→+150℃ In 150 minutes (Curve gradient)

Docking image of combined systems

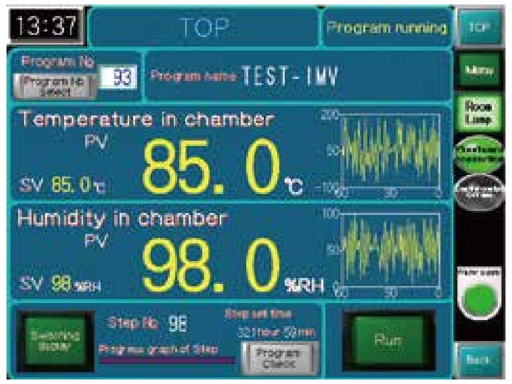


Chamber controller

Chamber controller display panel

8.4-inch touch panel

Clear display of information and buttons on the 8.4-inch touch-panel. A clean and unambiguous way to see all of the information needed.

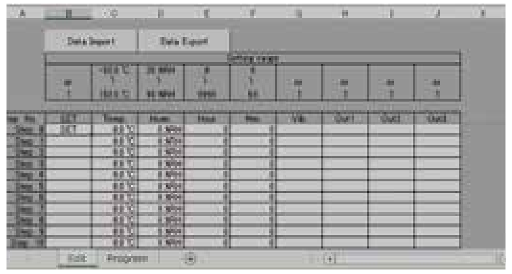


Program selection

Up to 100 programs can be stored in memory. Program selection is straightforward.

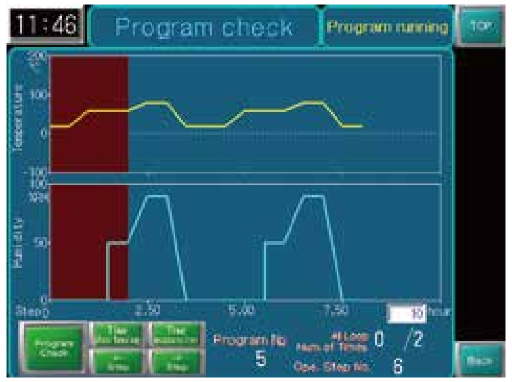
Program editable in PC

Tests can be set up using a spreadsheet. Programs use the standard CSV file format.



Program confirmation

Test progress can be viewed using tabular and graphical displays.

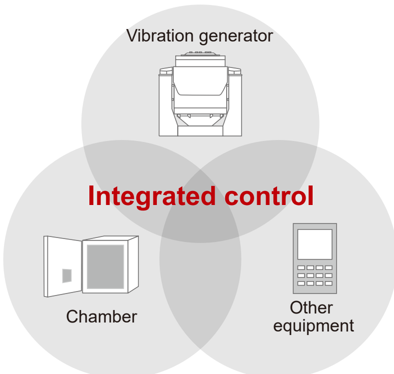


System monitor (option)

The controller connects to the system monitor using Ethernet. The test status of both vibration generator and chamber can be monitored remotely.

Integrated control system (option)

Vibration generator, chamber and other equipment can be controlled from one place.



Options

Many options are available for simplified operation, such as different door positioning and observation window locations.

Observation door

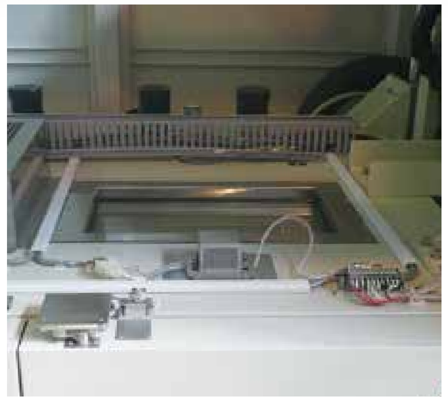
An observation door enables monitoring of the test specimen.

Infrared irradiation

Car instrument panel, door, bumper, or body sections can be tested.

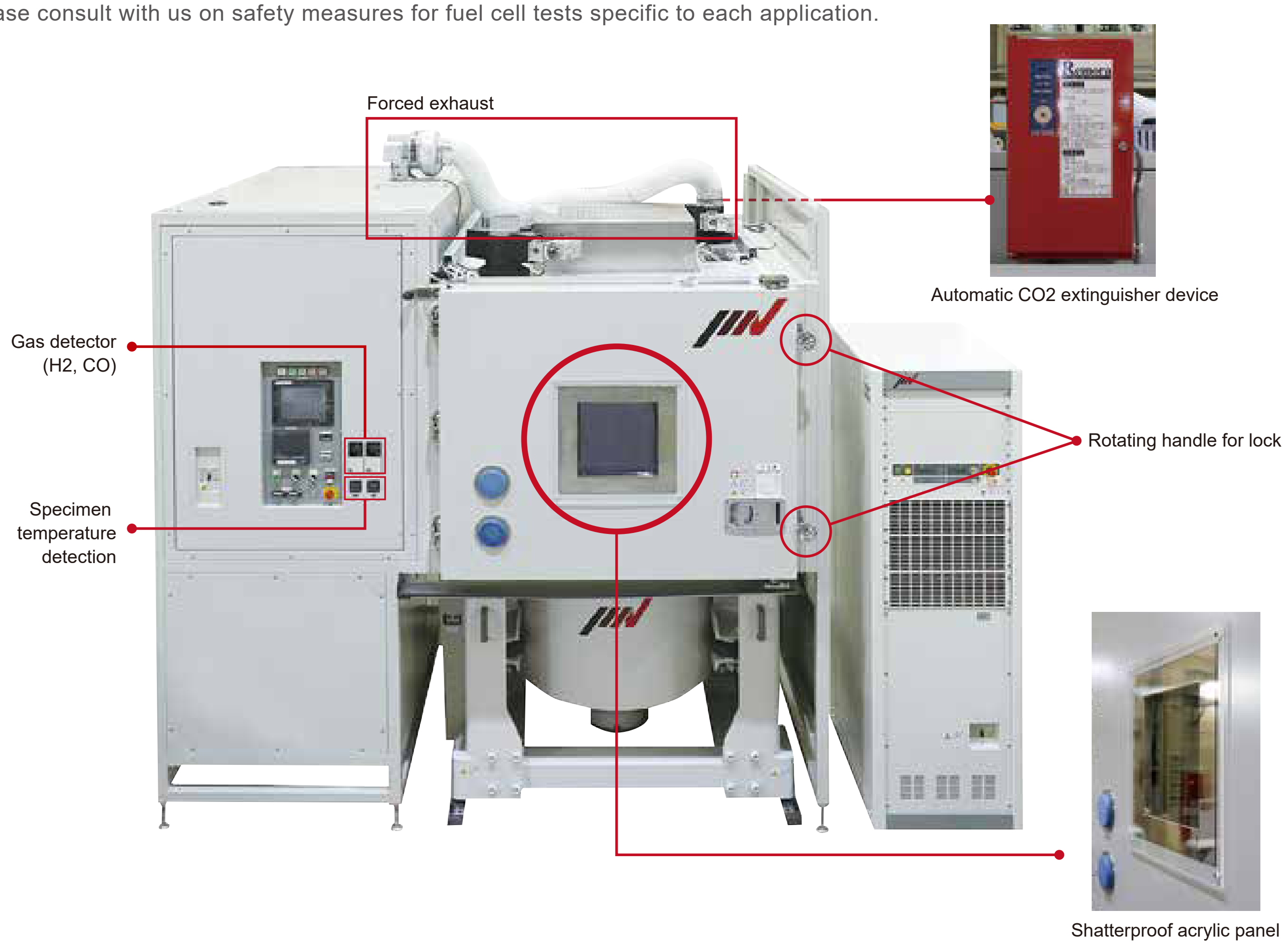
Ceiling observation window

A ceiling observation window allows full visibility of the vibration test.



Safety measures for fuel cell tests

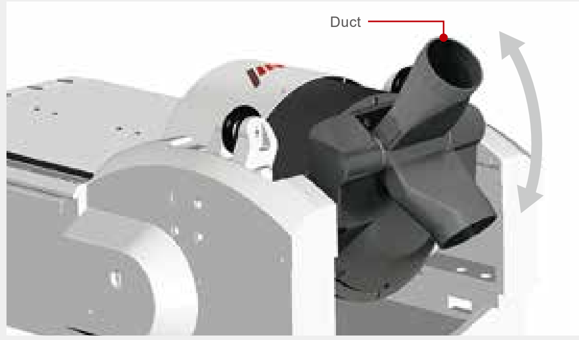
Please consult with us on safety measures for fuel cell tests specific to each application.



Optional Units

Duct

A newly upgraded duct is standard equipment for every system.
No operation needed for direction change between vertical and horizontal. Space behind the shaker is minimized.



Cooling ducting

The standard arrangement for air-cooled systems is to install the blower outside the work area. Ducting inlet air from outside eliminates the changes in ambient pressure and temperature caused by the cooling air flow.

Soundproof enclosure

A soundproof enclosure for the cooling blower reduces noise in installations where the blower cannot be placed outside the work area.


inside

Drive bar adapter with diagonal bolt access

The method for fastening a drive bar to a slip table was simplified in response to customer feedback. Usability has been improved and torque adjustment for bolts made easier.

Combined option with high thermal insulation

Choosing the option of directly combining with the A-series utilizes a newly-designed structure with high thermal insulation.
Improved temperature uniformity inside the chamber reduces the effects of condensation down to 1/5.

*Only for A30, A45, A65, A74

Optional built-in vibration controller

PC, display and keyboard for the vibration controller can be incorporated into the power amplifier for extra space-saving. The keyboard can be stored away when not in use.
*Display size is 17 inch
*Keyboard with numeric keypad

*Only for A11, A22

Videos

This is a video of the Sine sweep test using the A-series. The sweep test is a test that generates vibration while gradually changing the frequency.

This is a video of the Multi Sweep Sine test using the A- series. The Multi Sweep Sine test is a test in which sinusoidal excitation of multiple frequencies is performed at the same time.

This is a video of the Random test using the A-series. The Random test is a test of irregular vibration.

This is a video of the Shock test using the A-series. The Shock test is a test that evaluates the durability of a product by exerting a large, sudden force on it.

IMV's eco-shaker uses a patented solution called ISM to automatically reduce noise, energy consumption and heat generation. Take a look to see how quiet the eco-shaker can be.

Basic units used for vibration test

There are four important units for a vibration test. Force [N], Acceleration [m/s^2], Velocity [m/s], and Displacement [mm peak-to-peak (p-p)]
The force "F" required to give an object of mass, "m" acceleration "A" is:

$$F=mA$$

	SI units	Gravitational units
F: force	[N]	[kgf]
m: mass	[kg]	[kg]
A: acceleration	[m/s^2]	[G]

That is to say, when a mass of 1 kg is accelerated to an acceleration of 1 m/s^2 the required force is 1 N. Gravitational acceleration "G" equals to 9.8 m/s^2.
To describe vibration, frequency and vibration level need to be specified. Vibration is a form of movement with a consequent relationship between acceleration, velocity and displacement. To describe vibration level, any of these units can be used. Here are the relationships between each of the units.
We have an object moving in a sine wave.
The displacement is:

$D = D0 \sin\omega t$

The velocity is obtained by differentiation of the displacement. Therefore

$V = \frac{dD}{dt}$

$V = \omega D0 \cos\omega t$

The acceleration is obtained by differentiation of the velocity. Therefore

$A = \frac{dV}{dt}$

$A = -\omega^2 D0 \sin\omega t$

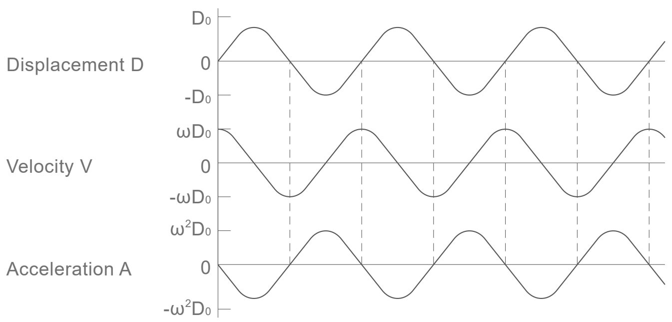
As we substitute

$\omega = 2\pi ft$

We have formulae indicated only in amplitude:

$V = \omega D = 2\pi fD$	D:Displacement	[$m^{0\text{-}P}$]
$A = \omega^2 D = (2\pi f)^2 D$	V:Velocity	[m/s]
	A:Acceleration	[m/s^2]

The following diagram shows waveforms for displacement, velocity and acceleration.



We get the formulae below by transforming the above formulae.

$$f = \frac{A}{2\pi V}$$
$$A = \frac{V^2}{D}$$
$$V = 2\pi fD$$
$$D = \frac{A}{(2\pi f)^2}$$

In the field of vibration test, we use mm p-p for peak to peak displacement.
Therefore

$$D = \frac{d}{2000}$$

is substituted into all of the above formulae

$f = \frac{A}{2\pi V}$	f: Frequency [Hz]
$A = \frac{(2\pi f)^2 d}{2000}$	A: Acceleration [m/s^2]
$V = \frac{2\pi fd}{2000}$	V: Velocity [m/s]
$d = \frac{2000A}{(2\pi f)^2}$	d: Displacement [mmp-p]

The following is an example

[ex] i) f = 50 [Hz], d = 2 [mmp-p]

$$V = \frac{2\pi fd}{2000} = \frac{2\times\pi\times50\times2}{2000} = 0.314 \text{ [m/s]}$$

$$A = \frac{(2\pi f)^2 d}{2000} = \frac{4\times\pi^2\times50^2\times2}{2000} = 98.7 \text{ [m/s}^2\text{]}$$

II) A = 100 [m/s^2], V = 0.5 [m/s]

$$f = \frac{A}{2\pi V} = \frac{100}{2\times\pi\times0.5} = 31.8 \text{ [Hz]}$$

$$d = \frac{2000V^2}{A} = \frac{2000\times0.5^2}{100} = 5 \text{ [mmp-p]}$$

About [dB]

We use "dB" as a unit when describing the proportional relationship of physical quantities. Especially, in cases where one value is thousands or millions times a multiple of a reference value, then we use the logarithmic scale "dB" instead of a linear scale. This makes the values more sensible and is an industry standard practice.
"dB" is expressed by the following

$a = 20 \log \frac{A_1}{A_0}$ [dB] A_1 = Comparison value, A_0 = Reference value

One million times is:

$a = 20 \log \frac{1{,}000{,}000}{1} = 120$ [dB]

Not only does dB reduce the number of digits (smaller numbers to handle) but it also simplifies calculations. For example, adding 25 dB and 30 dB makes 55 dB, but if you do it in a linear way:

25 [dB] = 20 log A $A = 10^{\frac{25}{20}} = 17.78$
30 [dB] = 20 log B $B = 10^{\frac{30}{20}} = 31.62$
A×B = 17.78×31.62 = 562.3 = 20 log 562.3 = 55 [dB]

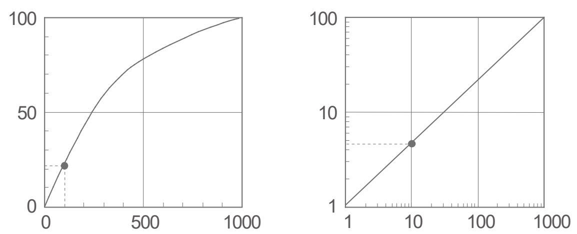
Now you see you can use addition instead of multiplication by using "dB". That is to say, it is very easy to calculate by using "dB".
The following is a conversion table for "dB" and multiples.

dB	0	0.1	1	3	6	10	20	30	40	60
Multiple	1	1.01	1.12	1.41	2.0	3.16	10	31.6	100	1000

dB	0	-0.1	-1	-3	-6	-10	-20	-30	-40	-60
Multiple	1	0.99	0.891	0.709	0.501	0.316	0.1	0.0316	0.01	0.001

Use of a logarithmic graph

We often use a logarithmic graph when we need to plot data for vibration testing or other physical phenomena.



Linear graph   Logarithmic graph

On the linear graph, we can read 20 for Y when X is 100. But we can hardly read Y when X is 10 or 1, whereas on the logarithmic graph, we can read the value even if it is 1/100 or 1/1000 of the maximum value. We use a logarithmic graph for such a benefit.

Sine test graph

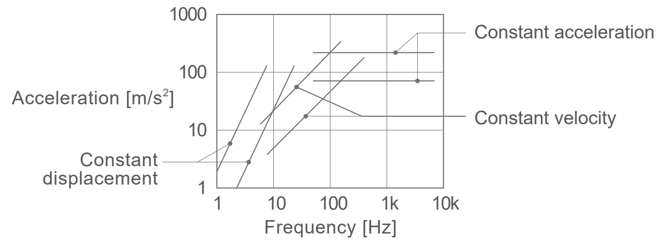
We often use the graph below when running a Sine vibration test. This is a log-log graph that was discussed above. Asymptotes of constant displacement, velocity and acceleration are shown. Here is an example of an asymptote of constant velocity. From the formulae we learned before:

$A = 2\pi fV$ A: Acceleration, f: Frequency, V: Velocity

From this equation we can read that acceleration A is increased 10 times when frequency f is also increased 10 times. On the graph below, we see that the acceleration increases to 100 m/s^2 from 10 m/s^2 as the frequency increases from 10 Hz to 100 Hz.
In the case of constant displacement

$A = (2\pi f)^2 D$ D : Displacement

The equation shows that acceleration A is increased by 100 (10^2) times when the frequency f is increased by 10 times, acceleration being proportioned to the second power of displacement. On the graph below, we can read that the acceleration increases to 100 m/s^2 from 1 m/s^2 as the frequency increases to 10 Hz from 1 Hz.



Sine test (logarithmic graph)

The graph shows the asymptotes when velocity or displacement stays constant.

Vibration insulation for a vibration generator

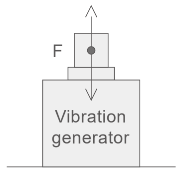
When using a vibration generator, the vibration is transmitted to the building and other facilities through the floor.

Particularly in the frequency range of 2 Hz to 20 Hz, even a small proportion of vibration from the vibration generator can have a large effect on buildings because they have their own resonances in this frequency range.

Therefore, a vibration generator needs a vibration isolation system.

The following shows some examples.

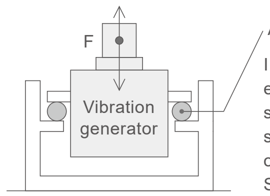
1) No insulation



F: Force

All the force generated by the vibration system is transmitted into the floor. This may excite resonances in the building and adjacent facilities. The vibration generator itself may sometimes jump up and down.

2) Body suspension

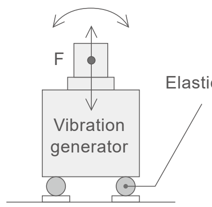


Air springs

IMV uses this method of vibration isolation except in the case of the small, compact shaker range. This may limit a shaker system's maximum displacement when the operating frequency is low.

See "Limitation of maximum displacement"

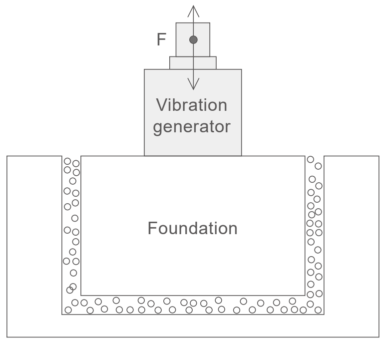
3) Bottom suspension



Elastic objects or air springs

This has a similar effect of vibration isolation but it can also cause lateral motion at low frequency.

4) Isolated foundation



This is the best method of vibration isolation.

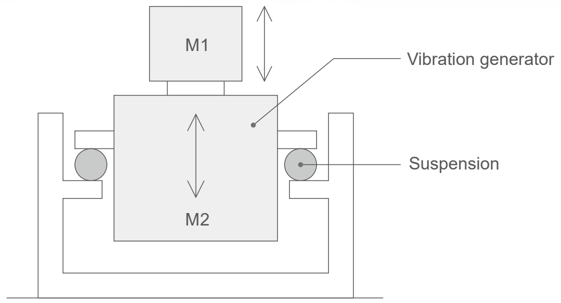
Generally, the mass of the foundation block should be at least ten times heavier than the rated force of the system. Typically, the mass of the foundation should be twenty times heavier.

If you are interested in this method of isolation, please contact IMV.

Limitation of maximum displacement

There are several methods for vibration isolation. All of these ways create limitations in maximum displacement.

In body isolation, the vibration generator body reacts against the movement of the specimen.



This will cause the vibration generator body to be excited by the reaction force. If the shaker excitation frequency is 2-7 Hz, this may coincide with the resonant frequency of the armature suspension system and the body suspension system. The armature and body motion could be almost in "anti-phase", resulting in the absolute value of the available armature displacement becoming severely limited. Typically only 10 mmp-p displacement is available from a 51 mmp-p-rated vibration generator.

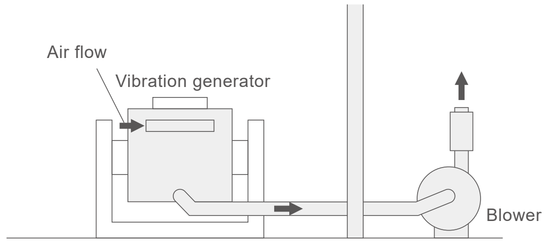
If using an "isolated foundation", the effective mass of the foundation plus vibration generator body could be much heavier than specimen + armature assembly. Therefore, limitation for the available displacement becomes negligible.

Noise control

When a vibration test system is installed, noise is an important consideration. There are several sources of noise, such as excitation noise, suction noise (for air-cooled systems), blower noise, blower exhaust noise, cooling fan noise of the power amplifier, etc.

The shaker excitation noise might exceed 100 dBA at a typical maximum acceleration of 980 m/s^2. The suction noise is about 90 dBA, and blower noise + blower exhaust noise is about 80 dBA. However, these figures can differ depending on the shaker model.

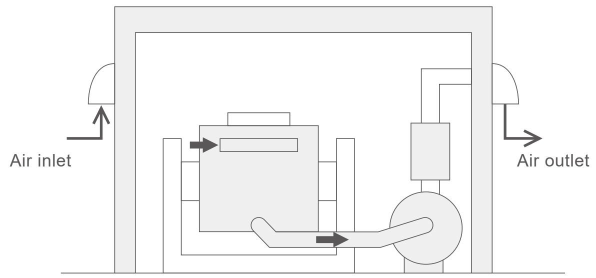
1) Installing the blower outside the room



This is a common and straightforward method.
The blower noise and the blower exhaust noise are reduced in the test area.
However, this method doesn't change the suction noise or the excitation noise of the vibration generator.
*The blower cannot be installed outdoors.

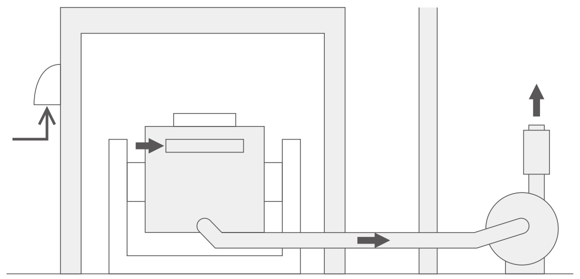
2) Soundproof box

A. Vibration generator and blower



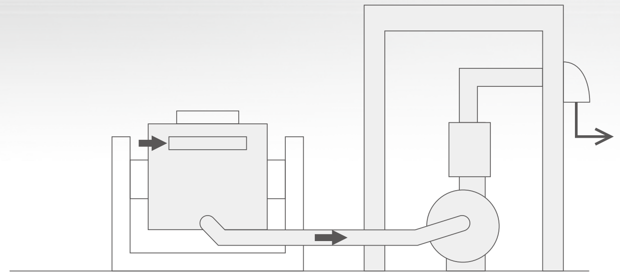
This method reduces the excitation noise and the blower noise.
*While the blower is stopped, we recommend taking measures to prevent air backflow.

B. Vibration generator only (blower outside the room)



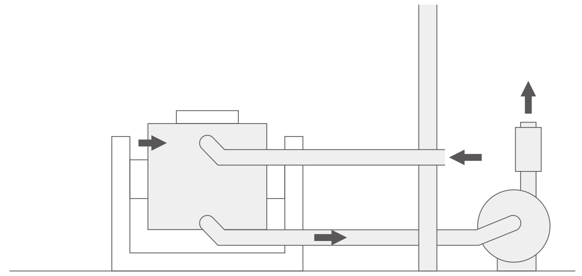
The excitation noise and the air inlet noise are lowered.
Placing the blower outside the room is recommended.
*The blower cannot be installed outdoors.

C. Soundproof box only for the blower



The blower noise is reduced
This method doesn't change the suction noise or the excitation noise of the vibration generator.
*While the blower is stopped, it is advisable to take measures against air backflow.

3) Concentrated suction design



The suction noise of the vibration generator falls by about 5 dB. The main purpose of concentrated suction is to take air from the outside without using the air in the room to cool the shaker (typically used for clean rooms, etc.).
*The blower cannot be installed outdoors.