

ALPHA Shaker Systems



MB DYNAMICS
Sound & Vibration Testing Technology



New generation of quiet shaker systems- compact, light, powerful!

The electrodynamic shakers of the ALPHA series impress with their high efficiency and very low operating noise. The robust, low-maintenance design and excitation forces of up to 4000N allow universal use of the ALPHA shakers for squeak & rattle tests and fatigue strength tests on various components in 1 to 6 axes. Integrated temperature-controlled silent fans, active pneumatic load support and extensive safety and monitoring functions ensure reliable and safe continuous operation even with higher excitation forces. Of course, all ALPHAs meet the strict requirements of GMW 14011, BMW PR311 and TPJLR.00.187 as well as other Squeak & Rattle test specifications regarding the maximum permissible operating noise of the shaker used. The monitoring of the shakers and the control of the associated power amplifiers is done clearly and conveniently from the central test bench computer via a control app that is included in the scope of delivery.

Features & Benefits:

- High efficiency, compact design, lightweight and transportable
- Low maintenance, reliable and durable
- Quiet! Ideal for Squeak & Rattle testing
- Max. excitation forces from 500N to 4000N
- Max. displacement: up to 50mm pk-pk
- Frequency range: DC-500Hz, usable up to 1000Hz
- Frictionless and noise-free guidance of the moving element
- Integrated active load support
- Overtravel and overtemp protection
- Easy integration into various test stands
- Build-in temperature controlled silent fans
- Remote control and monitoring from test bench control PC via control app
- Optional water cooling enables noiseless cooling even with high excitation forces in continuous operation
- Low stray magnetic fields

Typical applications:

- Vibration test systems for simulation of real vibration conditions in 1 to 6 axes
- Squeak & Rattle testing on complete vehicles, interior and exterior components
- material and component testing
- Static and dynamic tension, compression and bending tests
- Structural analysis and Modal analysis

Options / Accessories:

- Trunnion base for vertical and horizontal alignment of the shakers
- Mounting tables in different sizes
- Vibrating tables for excitation in horizontal and vertical direction
- Water cooling
- Climate option for use inside a climate chamber (-40°C to +80°C)

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High efficiency enables compact design and low weight

The ALPHA shakers achieve a very high efficiency by using high performance neodymium magnets and an optimized coil design. The resulting extremely compact design and the low weight of the ALPHA shakers facilitate the integration into various test benches and enable the mobile use of the shakers, e.g. for structural and modal analysis.



Picture 1: With a weight of only 40kg and a diameter of 166mm the ALPHA 2025 generates excitation forces of 2000N sine peak and instantaneous peak forces of up to 4000N peak.

A centric M12 thread allows easy connection to a wide range of test tables and structures.

Picture 2: Speed-controlled fans and an internal temperature sensor provide cooling as required. If required, an integrated air spring in the lower part of the ALPHA Shaker supports the static load of heavy test specimens and centers the vibration table in center stroke position.



Cooling on demand and active load support for heavy test specimens

All ALPHA shakers are equipped as standard with speed-controlled quiet fans for cooling as required. The integrated pneumatic load support centres the moving axis in centre stroke position independent of the applied test load and allows direct mounting of test objects with a weight of up to 130kg.

Optional water cooling enables quiet continuous operation at high forces

Water cooling is much more effective and especially quieter than air cooling. For quiet continuous operation at high excitation forces or for use in warm environments where air cooling would not be sufficient, all ALPHA shakers can be optionally equipped with water cooling. The associated chiller is placed outside the test chamber. Quick couplings allow drip-free and quick connection of the cooling ducts. Loud centrifugal blowers are a thing of the past!



Picture 3: Water-cooled ALPHA 2025 with quick couplings for connecting the cooling ducts (right) and the associated compact chiller for a circulating cooling system.



Picture 4: Thermally insulated, water-cooled ALPHA 2025 on movable lever base with integrated magnetic clamping

Climate package for use in the temperature range -40°C to +80°C




The optional climate package allows the ALPHA shaker systems to be used inside a climate chamber. The shaker systems are thermally insulated and equipped with water cooling. A combined heating/cooling unit outside the climate chamber ensures that the shaker is kept at a constant operating temperature regardless of the current load and ambient temperature.

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Technical Data ALPHA 525, ALPHA 1025 and ALPHA 2025

	ALPHA 525	ALPHA 1025	ALPHA 2025
Picture			
Max. dynamic force			
Sine	500N peak	1000N peak	2000N peak
Random	300N rms	600N rms	1200N rms
Time History /Shock	750N peak inst.	1500N peak inst.	4000N peak inst.
Max. static force	1000N	1000N	2000N
Operating noise			
Noise Rating Curve*	NR16, typical	NR16, typical	NR 18, typical
Sound level**	<25dB(A)	<25dB(A)	<28dB(A)
Time Varying Loudness***	<0,1Sone	<0,1Sone	<0,2Sone
Max. displacement	25mm pk-pk	25mm pk-pk	25mm pk-pk
Max. velocity	1m/s	1m/s	1,5m/s
Frequency range	DC-500Hz, useable up to 1000Hz	DC-500Hz, useable up to 1000Hz	DC-500Hz, useable up to 1000Hz
Max. payload vertical	90kg	90kg	90kg
Max. payload horizontal	8kg	10kg	12kg
∅ Mounting table	180mm	180mm/280mm	180mm/280mm
Active load support	manual	Yes	Yes
Integrated cooling	Yes, air cooling	Yes, air cooling	Yes, air cooling
Water cooling	Optional	Optional	Optional
Overtravel protection	Optional	Yes	Yes
Overtemp protection	Yes	Yes	Yes
Dimensions	166mm ∅*459mm	166mm ∅ * 509mm	166mm ∅ * 609mm
Weight	22kg	30kg	40kg
Recommended amplifier	MB A500	MB A500	MB A2500

* Measured at a distance of 70cm from the centre above the vibration table during excitation with typical Squeak & Rattle test profiles in the frequency range from 5Hz to 100Hz, average acceleration level of 0.3gRMS.

** A-weighted sound pressure level, FAST (125ms), 100Hz to 20kHz

*** N10 percentile level, loudness according to DIN45631/A1, measured in accordance with GMW14011

**** Related to the RMS value of the accelerations in the frequency range 5Hz-100Hz

Technical Data ALPHA 2050 and ALPHA 4050:

	ALPHA 2050	ALPHA 4050
Picture		
Max. dynamic force		
Sine	2000N peak	4000N peak
Random	1200N rms	2400N rms
Time History /Shock	4000N peak	8000N peak
Max. static force	2000N	2000N
Operating noise		
Noise Rating Curve*	NR18, typical	NR18, typical
Sound level**	<28dB(A)	<28dB(A)
Time Varying Loudness***	<0,2Sone	<0,2Sone
Max. displacement	50mm pk-pk	50mm pk-pk
Max. velocity	1,5m/s	1,2m/s
Frequency range	DC-500Hz, useable up to 1000Hz	DC-500Hz, useable up to 1000Hz
Max. payload vertical	90kg	130kg
Max. payload horizontal	12kg	16kg
Ø Mounting table	180mm/280mm	180mm/280mm
Active load support	Yes	Yes
Integrated cooling	Yes, air cooled	Yes, air cooled
Water cooling	Optional	Optional
Overtravel protection	Yes	Yes
Overtemperature protection	Yes	Yes
Dimensions	166mm Ø * 684mm	226mm Ø * 738mm
Weight	48kg	87kg
Recommended amplifier	MB A2500	MB A2500

- * Measured at a distance of 70cm from the centre above the vibration table during excitation with typical Squeak & Rattle test profiles in the frequency range from 5Hz to 100Hz, average acceleration level of 0.3gRMS.
- ** A-weighted sound pressure level, FAST (125ms), 100Hz to 20kHz
- *** N10 percentile level, loudness according to DIN45631/A1, measured in accordance with GMW14011
- **** Related to the RMS value of the accelerations in the frequency range 5Hz-100Hz

MB Power amplifier for ALPHA shakers

Our ALPHA 2025, ALPHA 2050 and ALPHA 4050 shakers are controlled by the associated MB A2500 power amplifier. Vibration exciters type ALPHA 1025 and ALPHA525 are controlled by the smaller power amplifier type MB A500. The low electrical noise and the very low distortion factor of the amplifiers enable a distortion-free excitation and minimize the operating noise of the ALPHA shakers. The high efficiency of these digital power amplifiers of up to 85%, the uncompromising selection of components and the solid circuit design of the power electronics enable high output currents and excitation forces of the ALPHA shakers in continuous operation. Extensive safety and monitoring functions prevent possible overloads and guarantee reliable and safe operation. The operation, parameterization and monitoring of the shakers and power amplifiers is done clearly and conveniently from the test bench computer with an associated control app.

Technical Data:

Power amplifier	MB A2500	MB A500
Used for	ALPHA 2025, 2050 and 4050	ALPHA 1025 and 525
Frequency range	DC-20kHz	DC-20kHz
Number of separate inputs	2	2
Number of separate outputs	2	2
Maximum continuous output current, @20hm load	25A RMS, per channel	20A RMS, per channel
Maximum instantaneous output current	120A pk, per channel	50A pk, per channel
Maximum continuous output voltage, @20hm load	50V RMS, per channel	25V RMS, per channel
Maximum instantaneous output voltage	190V pk, per channel	85V pk, per channel
THD, 1kHz at 4 Ohm and -3dB	<0,03%	<1%
Latency time (input to output)	0.000ms	-
Signal Limiter	Yes	Yes
Monitoring max. output current	Yes, adjustable limit value for max. current	Yes, fixed limit value
Temperature monitoring	Yes	Yes
Cooling	3 fans, speed temperature controlled	3 fans, speed temperature controlled
AC mains input	180VAC to 265VAC, fused with 16A	180VAC to 260VAC or 90VAC to 130VAC, fused with 16A
Dimensions (width*height*depth)	483mm*88mm*290mm	483mm*88mm*340mm
Weight	10kg (22lbs)	7kg (15,4lbs)



Picture 5: MB A2500 power amplifier for ALPHA 2025, ALPHA 2050 and ALPHA 4050 shakers



Picture 6: MB A500 power amplifier for ALPHA 1025 and ALPHA 525 shakers

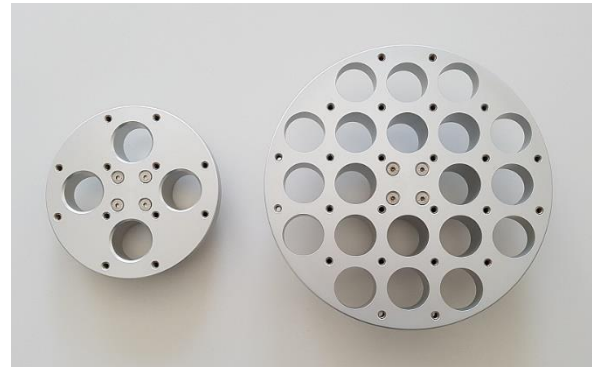
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Interchangeable mounting tables

All ALPHA shakers can be combined with mounting tables in different sizes. As standard sizes, mounting tables are available with a diameter of 180mm and 280mm. M6 threaded inserts on a 50mm*50mm grid pattern allow easy mounting of the test specimens. The mounting tables themselves are attached to the moving element of the ALPHA shaker by four screws. Other special sizes are of course available on request.



Picture 7: Ø180mm and Ø280mm mounting tables



Picture 8: Trunnion base allows quick and easy change between vertical and horizontal orientation of the ALPHA

Trunnion base for excitation in vertical and horizontal direction

For vibration tests in vertical and horizontal direction, all ALPHA Shakers can be integrated into a trunnion base, which allows a quick and easy change between vertical and horizontal orientation the ALPHA shaker within a minute. Optionally, the shakers can also be fixed at adjustable angles of inclination. Smaller components can be mounted directly to the test table of the shaker in horizontal direction.

Horizontal moving table

For testing larger and heavier components in horizontal direction, the use of a horizontal vibration table is recommended to avoid inadmissibly high bending moments on the bearing of the moving element inside the shaker due to eccentric and overhang mass centers of gravity. The magnesium table has a mounting surface of 430mm*330mm with M6 threaded inserts on a 50mm*50mm grid for mounting the test specimens.



Picture 9: Horizontal Moving Table for ALPHA shakers



Picture 10: ALPHA 2025 in movable MLB-Base („Movable Lever Base“) with integrated 2:1 lever arm and electromagnets for electromagnetic clamping

Movable base with integrated lever arm and magnetic clamping

The Movable Lever Base on spring ball rollers (short MLB-base) with an integrated lever arm allows easy positioning and flexible use of ALPHA shakers on various vehicle and component test benches. The base is fixed by electromagnetic clamping to a steel plate which is anchored to the ground.