

ALPHA 4050

Vibration Exciter



MB DYNAMICS
Sound & Vibration Testing Technology

Quiet electrodynamic 4kN shaker with 50mm stroke,
including active load support and integrated quiet fans

With excitation forces of 4kN Sine Peak or 2400N Random RMS, the ALPHA 4050 is one of the most powerful permanent magnet shakers available. The high efficiency and the weight of only 87kg allow the construction of powerful, compact vibration tables for simultaneous excitation in 1 to 6 axes. The robust, low-maintenance construction and the low operating noise allow the universal use of the ALPHA 4050 shakers for Squeak & Rattle tests on passenger cars, vans and minibuses and larger vehicle components. Integrated temperature-controlled quiet fans, active pneumatic load support for centering the moving element in zero position independent of the applied payload and extensive safety and monitoring functions ensure reliable and safe continuous operation even with higher excitation forces. Naturally, the ALPHA 4050 meets the strict requirements of GMW 14011, BMW PR311-4 and TPJLR.00.187 as well as other Squeak & Rattle test specifications for the maximum permissible operating noise of the shaker used. The monitoring of the shakers and the control of the associated MB A2500 power amplifier is done conveniently and easily from the central test bench computer via a supplied control application.



Features & Benefits:

- Compact design, easy integration into a wide range of test benches
- Robust design, low maintenance, reliable and durable
- Extremely quiet, ideal for Squeak & Rattle
- Max. force: 4000N Sine Peak
- Max. displacement: 50mm pk-pk
- Frequency range: DC-500Hz, usable up to 1000Hz
- Frictionless guidance of the moving element
- Integrated active load support
- Integrated air spring for generating static preloads
- Integrated overtemperature protection
- Integrated overtravel protection
- Temperature-controlled quiet fans
- Remote control and monitoring via RS-485 network
- Optional water cooling enables noiseless cooling even with high excitation forces in continuous operation
- Low magnetic stray fields

Typical applications:

- Vibration test systems for excitation in 1 to 6 DOFs
- Squeak & Rattle testing on complete vehicles, vans, minibuses interior- & exterior components
- Testing of battery modules
- Material- and component testing
- Fatigue test systems
- Static and dynamic tension, compression and bending tests

Options / Accessories:

- Trunnion base for vertical and horizontal alignment
- Mounting tables in various sizes
- Horizontal moving tables
- Multi-axis vibration tables
- Quiet water cooling
- Climate-option for use within climate chamber in the temperature range from -40°C to +80°C

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Technical specifications:

ALPHA 4050 vibration exciter	
Maximum dynamic force	
Sine	4000N pk
Random	2400N RMS
Time History	8000N pk, instantaneous peak
Maximum static force	2000N, continuous
Operating noise *	
Noise Rating Curve (NR)	NR18, typical
Sound pressure level **	<28dB(A)
Time Varying Loudness ***	<0,2 Sone
Maximum displacement	50mm pk-pk
Maximum velocity	1,2m/s
Frequency range	DC-500Hz, usable up to1000Hz
Maximum payload vertical	130kg
Maximum payload horizontal	16kg
∅ Mounting table	180mm or 250mm, other sizes on request
Moving mass including 180mm ∅ mounting table	21,4kg
Overtravel protection	Yes, integrated laser position sensor, automatic system shutdown in case of inadmissibly high displacements
Overtemperature protection	Yes, integrated temperature sensor, automatic activation of cooling and, if necessary, system shutdown in the event of further inadmissibly high heating
Integrated cooling	2 integrated, temperature-controlled quiet fans
Automatic load support	Yes
Dimensions (∅ * height)	266mm ∅ * 738mm
Weight	87kg
Temperature range during operation, standard	+5°C to +40°C
Temperature range during operation, with optional climate package	-30°C to +80°C
Maximum coil current	36A RMS / 118A pk
Coil resistance	2*0,60hm

- * Measured at 70cm from the shaker when excited with a typical Squeak & Rattle test profile in the frequency range from 5Hz to 100Hz with an averaged acceleration level of 0.3gRMS
- ** A-weighted Sound Pressure Level, FAST (125ms), 20Hz to 20kHz
- *** N10 Percentile Level, loudness according to DIN45631/A1, measured in accordance with GMW14011

Alternative vibration exciters:

Type	Force, Sine / Random	Displacement	Frequency Range
ALPHA 525	500N pk / 300N RMS	25mm pk-pk	DC-500Hz
ALPHA 1025	1000N pk / 600N RMS	25mm pk-pk	DC-500Hz
ALPHA 2025	2000N pk / 1200N RMS	25mm pk-pk	DC-500Hz
ALPHA 2050	2000N pk / 1200N RMS	50mm pk-pk	DC-500Hz

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MB A2500 power amplifier

Our ALPHA 2025, ALPHA 2050 and ALPHA 4050 shakers are driven by the corresponding MB A2500 power amplifier. The low background noise and the very low harmonic distortion of the amplifier enable distortion-free excitation and minimize the operating noise of the ALPHA shakers. The high efficiency of this amplifier of up to 85%, the uncompromising selection of components and the solid circuit design of the power electronics according to criteria from the aerospace and automotive industries enable high output currents and high 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 handled by the associated CU-4 Control Unit via an RS-485 network.

Technical specifications:

MB A2500 power amplifier	
Frequency range	DC-20kHz
Number of separate inputs	2
Number of separate outputs	2
Maximum Gain factor	32dB, adjustable
Maximum continuous output current, @20hm load	25A RMS, per channel
Maximum instantaneous output current	120A pk, per channel
Maximum continuous output voltage, @20hm load	50V RMS, per channel
Maximum instantaneous output voltage	190V pk, per channel
THD, 1kHz at 4 Ohm and -3dB	<0,03%
Latency time (input to output)	0.000ms
Signal Limiter	Yes
Monitoring max. output current	Yes, adjustable limit value for max. current
Cooling	3 temperature-controlled fans
AC-mains monitoring	Yes
AC-mains input	180VAC to 265VAC, protected by 16A fuse
Inrush current	10A soft start
Dimensions (w*h*d)	483mm*88mm*290mm
Weight	10kg (22lbs)



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Accessories / Options for ALPHA 2050 vibration exciters

<p>Mounting table, 180mm diameter</p> <p>Diameter: 180mm M6x1 threaded inserts on 50mm*50mm grid pattern Weight: 1,36kg</p>	
<p>Mounting table, 280mm diameter</p> <p>Diameter: 280mm M6x1 threaded inserts on 50mm*50mm grid pattern Weight: 3,2kg</p>	
<p>Trunnion base</p> <p>Allows the shaker to rotate 90° from the vertical to the horizontal</p>	
<p>Horizontal moving table</p> <p>Magnesium mounting table Mounting surface of 330mm*430mm M6 threaded inserts on 50mm*50mm grid pattern Moving mass of the table: 9kg Maximum payload: 90kg</p>	
<p>Water cooling</p> <p>Enables silent cooling of the ALPHA 4050 shaker even at high excitation forces in continuous operation. Water cooling is a prerequisite for the climate option. Includes air-cooled heat exchanger with a cooling capacity of approx. 3000Watt as well as 10m supply line and quick couplings.</p>	
<p>Climate option</p> <p>Enables the use of the ALPHA 4050 shaker within a climatic chamber in the temperature range from -40°C to +80°C. Includes thermal insulation of the ALPHA 4050 shaker and constant temperature control through an external combined heating/cooling unit.</p>	