



MODEL K394B30/K394B31

PRECISION VIBRATION CALIBRATION

AIR BEARING CALIBRATION SHAKER

- Drastically reduces uncertainty to provide accurate calibration conforming to ISO 16063 Part 21 transverse recommendations by effectively eliminating transverse motion
- High calibration throughput by simplifying mounting and setup
- Fully test sensors using the shaker's extended frequency range for calibration and mounted resonance tests
- Calibrate at low frequencies without distortion using the shaker's full 10 mm stroke length
- Excellent signal integrity by electrically isolating the reference accelerometer and mounting surface from the armature
- Proven design used in over 100 000 calibrations annually performed by PCB Piezotronics

The Models K394B30 and K394B31 Air Bearing Calibration Shakers represent a new level of performance in calibration grade shakers. Continuing the award-winning PCB Piezotronics tradition of providing superior performance characteristics, Air Bearing Shakers offer ease-of-use while coupled with exceptional value and simplicity. A graphite air bearing combined with an ultra-stiff lightweight armature essentially eliminates transverse motion that plagues traditional flexure-based shaker armature suspension systems.

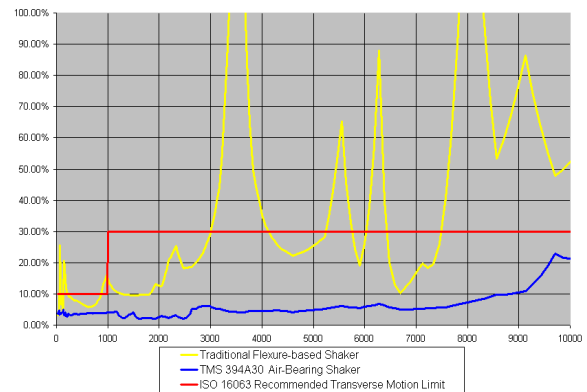
Unlike other air bearing shakers that use rubber bands to adjust and balance the armature, the Air Bearing Shakers from The Modal Shop use a unique Lorentz force lifting mechanism making calibration of various accelerometer sizes quick and easy. An integral reference accelerometer mounted within a beryllium insert has a mounted resonance greater than 70 kHz, permitting the shaker to be used for resonance searches to over 50 kHz, while effectively eliminating the need for complicated mass loading corrections. In addition, this innovative two-part armature design provides electrical isolation of the sensors, improving accuracy by eliminating electrical noise in the calibration measurement. The included SmartAmp™ power amplifier makes system operation over 92% efficient and protects the shaker by automatically shutting down when there is no air flow to the shaker.

These shakers were specifically designed for use in the demanding environment of high-volume, production-comparison accelerometer calibration systems such as The Modal Shop's Model 9155 Accelerometer Calibration Workstation.

SPECIFICATIONS			
Mechanical		396C10	396C11
Stroke	in [mm] pk-pk	0.4 [10]	0.4 [10]
Frequency Range, Frequency Response Testing	Hz (Nominal)	2 to 15 000	2 to 20 000
Frequency Range, Resonant Search Testing	Hz (Nominal)	Up to 50 kHz	Up to 50 kHz
Acceleration Level (sinusoidal)			
Continuous (25 to 10 000 Hz) ^[1]	g [m/s ²] pk	8.5 [83]	
Intermittent (35 to 10 000 Hz) ^[1]	g [m/s ²] pk	40 [392]	
Maximum Load	oz [gm]	17.6 [500]	
Lifting Spring	Type	Lorentz - Force Coil	
Air Bearing Specifications	Type	Graphite	
Pressure	psi [bar]	30 to 60 [2 to 4]	
Recommended Flow Supply to Regulator	ft ³ /min [L/s]	1.5 [0.7]	
Air-bearing Flow Rate (typical)	ft ³ /min [L/s]	0.15–0.20 [0.07–0.09]	
ISO 8573.1 Quality Class		3	
Dirt (particle size)	micron	5	
Water Pressure Dewpoint (100 psi gauge)	°F (ppm vol.)	-4 (128)	
Oil (including vapor)	mg/m ³	1	
Armature	Material	Aluminum	Beryllium
Insert	Material	Beryllium	
Total Mass	oz [gm]	1.6 [45]	
Sensor Mounting ^[2]	Thread Size	¼-28 UNF	
Transverse Motion ^[3]			
<5 000 Hz	%	5	5
<10 000 Hz	%	10	10
<15 000 Hz	%	30	10
<20 000 Hz	%	N/A	20
Shaker Dimensions (D x H)	inch [mm]	6.5 x 5.25 [165 x 133]	6.5 x 5.25 [165 x 133]
Shaker Weight	lb [kg]	22.3 [10.1]	22.3 [10.1]
Electrical			
Drive-Coil Resistance	Ohm (Nominal)	1.0	
Lorentz-Coil Resistance	Ohm (Nominal)	2.8	
Internal Reference Accelerometer			
Type	ICP®		
Sensitivity	mV/g [mV / m/s ²]	10 [1.02]	
Frequency Range (+/- 10%)	Hz	0.7 to 17 000	

SPECIFICATIONS (continued)			
		396C10	396C11
Resonant Frequency	kHz	>70	
SmartAmp™ Power Amplifier			
Efficiency	%	92	
Output Voltage, Max ^[4]	V RMS	38	
Current Limit ^[5]	A peak	18	
Output Power ^[6]	W	400	
Frequency Response, +0 / -3 dB, 4Ω load	Hz	0.4 to 40 000	
Max. Voltage Gain	dB	26	
DC Current Supply, Adjustable	A	0 to 1.75	
Protection Features	Interlock Switch / Air Pressure Switch / DC Fault Detection / Clip Detection / Over-current Detection / Safe Start in Mute Mode		
Front Panel Display	LCD	Two Row, Four Function Keys	
Dimensions (W x H x D)	in [cm]	17.3 x 3.5 x 14.6 [44 x 9 x 37]	
Weight	lb [kg]	8.5 [3.8]	
System Components: K394B30			
396C10 ^[7]	Air Bearing Shaker		
080A200 ^[2]	Beryllium Insert (¼-28 Mount) with Internal Reference Accelerometer		
482A21	ICP® Sensor Signal Conditioner		
Sensor Mounting Adaptor Kit	Includes Typical Mounting Adaptor Studs and Plates		

Typical Transverse Motion



- [1] At 100 Hz with 135-gram payload. [4] At 4Ω load impedance, 1 kHz, THD 0.1%.
 [2] 080A200 is standard armature core supplied. [5] Typical over-current protection limit.
 Other units available include 080A199. [6] At 4Ω load impedance, 1 kHz, THD 0.6%.
 [3] Typical, tested to ISO 16063-21:2003 [7] K394B31 includes 396C11 instead of 396C10.
 recommendations.

THE MODAL SHOP

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The Modal Shop, Inc. offers structural vibration and acoustic sensing systems and services for various applications in design and test laboratories as well as manufacturing plants. An extensive sound and vibration rental program, precision calibration systems, and both modal and vibration shakers are designed to simplify test phases. Non Destructive Testing Systems help manufacturers provide 100% quality inspection of metal components. The Modal Shop, Inc. is a subsidiary of PCB Piezotronics, Inc., and PCB® is a wholly owned subsidiary of MTS Systems Corporation.

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