

PRODUCT DATA



V9x Shaker Metric

Performance Parameters*

Armature Diameter	440 mm
Sine Force (peak)	105 kN
Random Force (rms) [†]	105 kN
Maximum ½-sine Shock Force [‡]	193.1 kN
Armature Resonance (f _n)	2.0 kHz
Usable Frequency Range	d.c. – 2.7 kHz
Mass of Moving Element (raised inserts)	49.8 kg
Velocity (sine peak) – full-field	3.0 m/s
Acceleration (sine peak)	150 g
Acceleration (random rms)	70 g
Displacement (pk–pk) – continuous	76 mm
Useable Shock – 20 kg payload	>300 g
Useable Shock – 30 kg payload	>200 g
LDS Amplifier	SPA 176 K

Environmental Data

Working Ambient Temperature Range:

Shaker and Cooling Unit	7° – 30° C
Amplifier and FPS	5° – 30° C

Acoustic Noise at 1 m Distance:**

Shaker	112 dBA
Amplifier	85 dBA
Field Power Supply (FPS)	70 dBA
Cooling Unit	<80 dBA

Total Heat Dissipation:

Shaker to air (from body)	6 kW
Amplifier	17 kW
Field Power Supply	≈ 4.3 kW

V9x[†] Shakers offer maximum force, velocity and displacement simultaneously, along with the highest achievable envelope of testing parameters. Multiple V9 shaker systems are used extensively within the aerospace industry for large payloads.

V9x Shakers are trunnion-mounted, either free-standing or as part of shaker/slip table combos. Trunnion mounting allows the shaker to be used in either the horizontal or vertical axis. The trunnions are supported by LDS' Lin-E-Air suspension system, which enables low frequency operation at full displacement.



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Characteristics

Suspension Axial Stiffness	Nil	Max. Required Input, Amplifier	170 kVA
Suspension Rotational Stiffness	564 kN m/rad	Max. Required Input, Field Power Supply (FPS)	105 kVA
Suspension Cross-axial Stiffness	10 kN/mm	Max. Required Input, Cooling Unit	8.3 kVA
Stray Magnetic Field ^{††}	<1.03 mT	Compressed Air Supply	6.9 bar
Lin-E-Air Body Resonance	<5 Hz	Cooling Air Flow – Amplifier	4 m ³ /s
Internal Load Support Capacity	1800 kg	Cooling Air Flow – FPS	1 m ³ /s
Shaker Body Mass (M _b)	2180 kg		

System Performance

	with SPA 176K-105	with SPA 176K-90
Sine Force (peak)	105 kN	90 kN
Max. Acceleration (sine peak)	150 g	150 g
Random Force (rms)	105 kN	105 kN
Max. Acceleration (random rms)	70 g	70 g
Velocity (sine peak)	3.0 m/s	3.0 m/s

* Force and velocity ratings depend on the amplifier driving the shaker. The sine force, random force and velocity parameters detailed here are based on the shaker when driven by the SPA176K amplifier.

[†] V9x is the latest version of the V9 Shaker model. All accessories and spare parts are interchangeable with older models.

[‡] Random and shock ratings assume a payload approximately twice the mass of the armature; shock pulse 2 ms. For advice on specific test requirements, contact Brüel & Kjær.

** Measured at a height of 1.60 m above floor level in enclosed cell.

^{††} Theoretical maximum, measured 150 mm above table, full-field, at normal operating temperature.

Some of the features listed are available as standard, others as options. Please contact Brüel & Kjær for advice on the optimum specification to meet your system needs

SPA-K Series Amplifier Characteristics

Power Range	152 – 176 kVA in 8 kVA increments
Signal-to-noise Ratio	>68 dB, with respect to 100 V rms output, 10 kΩ input termination and rated resistive load connected
Input Impedance	10 kΩ nominal
Total Harmonic Distortion	0.5 – 0.8% at rated output into resistive load
Input Sensitivity	1.0 V for 100 V rms output
Modulation Range	d.c. – 10 kHz
Switching Frequency	150 kHz
Efficiency	>90% (not including FPS)
Continuous Output Current	80 A rms (sine and random) per 8 kVA increment
Transient Output Current	240 A per 8 kVA increment for 100 ms
Full Power Bandwidth	20 Hz – 3 kHz
Rated Output Voltage	100 V rms (sine)
Module Efficiency	93%
Protection	Integral protection to prevent output devices from working outside their specified limits
Health and Safety	Complies with the following EU directives: Machinery :2006/42/EC Low Voltage: 2006/95/EC EMC: 2004/108/EC Designed in accordance with EN 61010 – 1:2001

V9x Shaker Options

Armature Insert Selection:

M 8	◆
M 10 raised	◆
3/8" UNC	◆

Mounting Selection:

Trunnion mounted with Lin-E-Air isolation and body rotation gearbox	◆
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Airglide mobility	●
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Other Options:

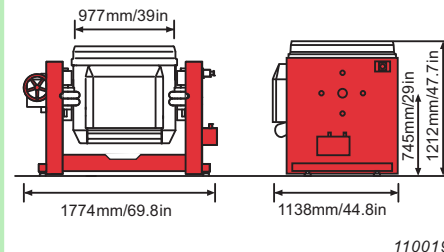
Thermal barrier	●
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A standard range of head expanders is also available

Key:

- ◆ Standard – Available on shortest delivery
- Option – Stocked item, available on short delivery

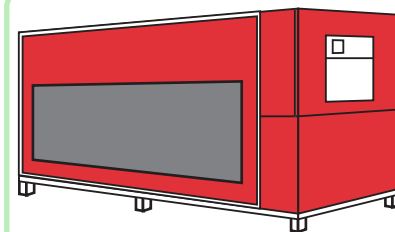
V9x Shaker



Shaker Mass (trunnion mounted): 3100 kg

Armature Insert Pattern:

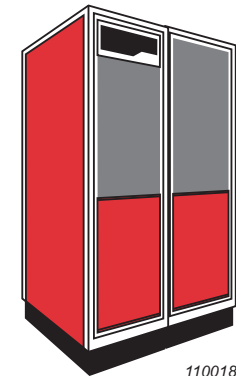
PCD:	Centre	203.2 mm	406.4 mm
440 mm			
Inserts	1	8	8



Cooling Unit

Raw Water:	
Flow Rate	200 l/min
Maximum Supply Pressure	500 kPa
Typical Pressure Drop	150 kPa
Maximum Inlet Temperature	32° C
Maximum Heat Rejected	153 kW
Height	1580 mm
Width	800 mm
Depth	1750 mm
Mass	600 kg

SPA-K Amplifier with Integral FPS



	Amplifier	FPS
Mass (kg)	1500	500
Height (mm)	1905	1905
Width (mm)	1080/1420*	1080/1420*
Depth (mm)	825	825

* with casters

Make Our Experience Your Advantage

From application engineering, installation and training through to maintenance, spares and repairs, Brüel & Kjær offers a total service approach to keep your system operating efficiently and reliably. All LDS systems (standards and specials) are designed and manufactured to ISO 9001 standard. Brüel & Kjær offers a comprehensive range of vibration, measurement and analysis equipment. Please consult our website for details.

