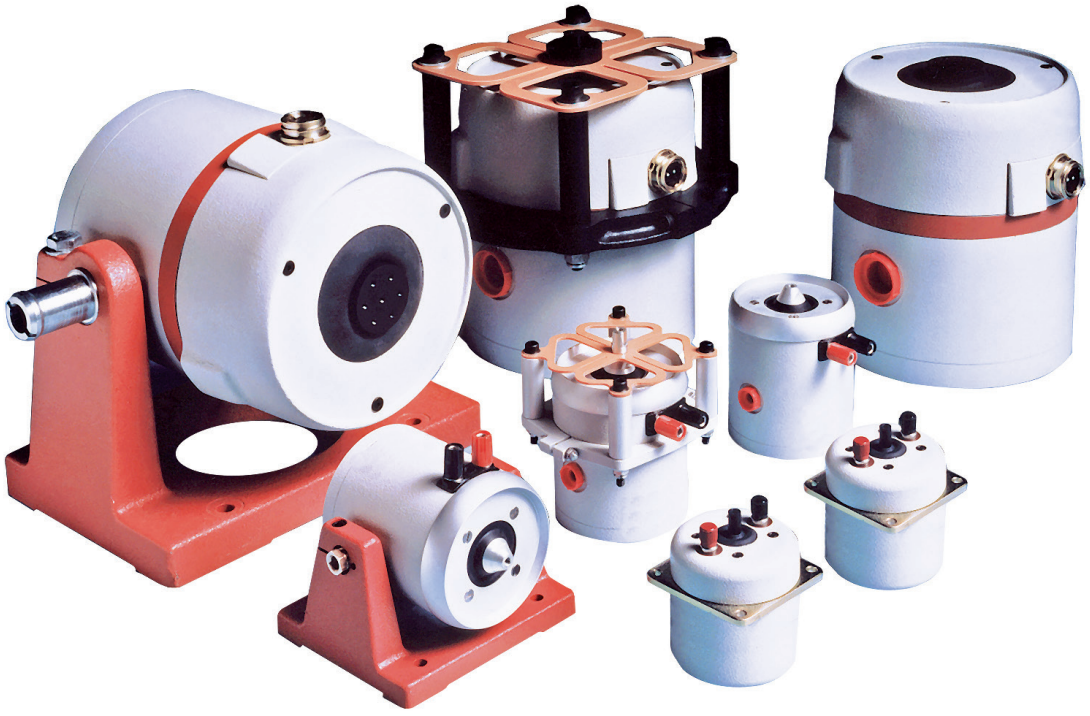
LDS Permanent Magnet Vibration Systems

V100 Series • V200 Series • V400 Series • V450 Series



Industry Applications

- Modal and structural analysis
- Electronic assembly testing
- Laboratory experiments
- Fatigue and resonance testing
- Use as a velocity transducer or high-speed actuator

Features

- Lightweight, high performance armature delivers excellent acceleration and velocity performance
- Powered by compact, quiet and energy efficient amplifiers
- Robust, lightweight suspension provides excellent torsional and transverse stiffness with minimal impact on system acceleration
- Proven reliability maximises system availability
- Vertical and horizontal operations

The LDS® V100 and V200 series are miniature units designed to reproduce a vibration environment under laboratory conditions. They are also suitable as non-seismic pick-ups and are widely used in educational and research establishments to investigate the dynamic behaviour of structures and materials. The LDS LPA100 amplifier is especially recommended for this purpose.

The LDS V400 series shakers are wide-frequency band electro-dynamic transducers capable of producing a sine force up to 196 N. They are also suitable as non-seismic pick-ups and are widely used in educational and research establishments to investigate the dynamic behaviour of structures and materials. The shakers efficient armature design enables them to deliver impressive peak forces and accelerations over a wide frequency range. The LDS LPA100 and LPA600 amplifiers are especially recommended for this purpose, depending on the application.

The LDS V450 Series are wide frequency band electro-dynamic transducers capable of producing sine force of 311N (V450/V451) and 489 N (V455/V456) when forced air cooled. The shakers can be driven by any suitable oscillator/amplifier combination, but the LDS LPA600 and LPA1000 amplifiers are especially recommended for this purpose.

Brüel & Kjær

Permanent Magnet Shakers

left to right: V100 Series, V200 Series on trunnions, V200 Series, V400 Series, V400 Series on trunnions, V450 Series on trunnions, V450 Series

LDS Shaker Model	V100 Series	V200 Series	V400 Series	V450 Series	V455 Series
Recomended LDS Amplifier	LPA100	LPA100	LPA100 - no fan LPA600 - with fan	LPA600	LPA1000
Natural Air Cooling (no fan)					
Sine Peak Force	8.9 N (2.0 lbf)	17.8 N (4.0 lbf)	98.0 N (22.0 lbf)	177.0 N (39.8 lbf)	—
Random Force rms	—	—	38.0 N (8.5 lbf)	—	—
Half-sine Shock Force‡	—	—	90.0 N (21.0 lbf)	—	—
Velocity Sine Peak	1.31 m/s (51.6 in/s)	1.49 m/s (58.7 in/s)	1.52 m/s (59.8 in/s)	1.78 m/s (70.1 in/s)	—
Acceleration Sine Peak	1373 m/s^2 (140.0 g_n)	892 m/s^2 (91.0 g_n)	490 m/s^2 (50.0 g_n)	415 m/s^2 (42.3 g_n)	—
Acceleration Random rms	—	—	190 m/s^2 (19.4 g_n)	—	—
Displacement Peak-Peak†	2.5 mm (0.1 in)	5.0 mm (0.2 in)	14.0 mm (0.55 in)	19.0 mm (0.75 in)	—
Forced Air Cooling (with fan)					
Sine Peak Force	—	—	196 N (44.0 lbf)	311 N (70.0 lbf)	489 N (110.0 lbf)
Random Force rms	—	—	89 N (20.0 lbf)	214 N (48.0 lbf)	290 N (66.0 lbf)
Half-sine Shock Force*	—	—	200 N (44.0 lbf)	460 N (103.0 lbf)	730 N (163.0 lbf)
Velocity Sine Peak	—	—	1.78 m/s (70.1 in/s)	1.78 m/s (70.1 in/s)	2.50 m/s (98.4 in/s)
Acceleration Sine Peak	—	—	980 m/s^2 (100.0 g_n)	730 m/s^2 (74.4 g_n)	1147 m/s^2 (117.0 g_n)
Acceleration Random rms	—	—	446 m/s^2 (45.5 g_n)	501 m/s^2 (51.1 g_n)	686 m/s^2 (70.0 g_n)
Displacement Peak-Peak†	—	—	17.6 mm (0.69 in)	19.0 mm (0.75 in)	
Mass of Moving Elements	0.0065 kg (0.014 lb)	0.02 kg (0.044 lb)	0.2 kg (0.44 lb)	0.426 kg (0.94 lb)	
Body Mass – base mounted	0.91 kg (2.0 lb)	1.81 kg (4.0 lb)	14.1 kg (31.0 lb)	64.0 kg (141.1 lb)	
Body Mass – trunnion mounted	—	3.17 kg (7.0 lb)	22.7 kg (50.0 lb)	81.7 kg (180.1 lb)	
Armature Resonance (f_n)	12000 Hz	13000 Hz	9000 Hz	6000 Hz	
Usable Frequency Range	dc to 12000 Hz	dc to 13000 Hz	dc to 9000 Hz	dc to 7500 Hz	
Acoustic Noise‡					
Shaker naturally cooled	< 70 dBA	75 dBA	82 dBA	105 dBA	
Shaker forced-air cooled	—	75 dBA	105 dBA	105 dBA	
Total Heat Dissipation	9.5 W	48.0 W	340 W	820 W	1.6 kW
Max. Ambient Working Temperature	30 °C (86 °F)				
Maximum Dimensions Base-mounted shaker	89.0 x DIA 65.0 mm (3.25 x DIA 2.6 in)	96.0 x DIA 78.0 mm (3.8 x DIA 3.1 in)	198.4 x DIA 165 mm (7.8 X DIA 6.5 in)	290 x DIA 265 mm (11.4 x DIA 10.4 in)	
Maximum Dimensions Trunnion-mounted shaker	—	120 x 117 x 100 mm (4.7 x 4.6 x 3.9 in)	274 x 259 x 165 mm (10.8 x 10.2 x 6.5 in)	395 x 375 x 275 mm (15.6 x 14.8 x 10.8 in)	

* Half-sine shock force is calculated with the standard payload, 2 ms pulsewidth, 10% pre/post pulse.
† Displacement can vary with payload and shaker orientation. Please contact Brüel & Kjær for advice on specific test requirements.
‡ Measured at a distance of 1 m (3.3 ft) and at a height of 1.6 m (5.2 ft) above floor level in an enclosed cell.

Linear Power Amplifiers

left to right: LPA100 Amplifier, LPA600 Amplifier, LPA1000 Amplifier

Features

- Multi-function display
- Electronic peak current limiting
- Continuously variable gain control with integral reset
- Continuously variable current limit control

The LDS LPA100 Linear Power Amplifier has been designed primarily to drive the LDS V100 Series, and V200 Series shakers.

The LDS LPA600 Linear Power Amplifier has been designed primarily to drive the LDS V400 Series, and V450 Series shakers.

The LDS LPA1000 Linear Power Amplifier has been designed to work with the larger V455 Series permanent magnet shakers.

LDS Linear Power Amplifier Model	LPA100	LPA600	LPA1000
Classification	class B linear amplifier, air-cooled		
Input Supply (±10%)	100, 120, 230 V, at 50/60 Hz		
Input kVA	<0.44 kVA	<1.85 kVA	<2.70 kVA
Rated Power Output	94 VA in 3.15 Ω	656 VA in 2.5 Ω	961 VA in 4.0 Ω
Maximum Power Output Capacity	154 VA in 3.15 Ω	810 VA in 2.5 Ω	1296 VA in 4.0 Ω
Gain	22 V/V ± 2 dB max.	45 V/V ± 2 dB max.	72 V/V ± 2 dB max.
Monitoring Output — Voltage	0.1V/V ± 3%, 5 Hz to 15 kHz	0.05V/V ± 3%, 5 Hz to 10 kHz	0.05V/V ± 3%, 5 Hz to 10 kHz
Monitoring Output — Current	0.1V/A ± 3%, 5 Hz to 15 kHz	0.1V/A ± 3%, 5 Hz to 10 kHz	0.1V/A ± 3%, 5 Hz to 10 kHz
Frequency Range at Maximum Power	dc to 15 kHz for 30 mins at max. VA	40 Hz to 10 kHz for 30 mins at max. VA	
Total Harmonic Distortion at Rated Output	<0.1%, 15 Hz to 5 kHz <0.2%, 5 kHz to 15 kHz	<0.2%, 40 Hz to 5 kHz <0.3%, 5 kHz to 10 kHz	
Maximum Output Voltage — no load	22 Vrms, dc to 15 kHz	45 Vrms, dc to 10 kHz	72 Vrms, dc to 10 kHz
Output Current at Rated VA	5.5 A rms	16.2 A rms	15.5 A rms
Maximum Output Current	7.0 A rms, dc to 15 kHz for 30 mins	17.75 A rms, 40 Hz to 10 kHz for 30 mins	
Signal-to-Noise Ratio	> 95 dB		
Amplifier Efficiency	52 %	57 %	64 %
Sound Power Level at 2m (6.6 ft)	41 dBA	45 dBA	49 dBA
Max. Ambient Working Temperature	35 °C (95 °F)		
Drive Input Connection	BNC		
Weight	14.0 kg (31 lb)	27 kg (60 lb)	33 kg (73 lb)
Height	88 mm (3.5 in) excluding feet	132 mm (5.2 in) excluding feet	
Width	482.6 mm (19.0 in), with flanges for standard 19" rack mounting		
Depth	450 mm (17.7 in)	450 mm (17.7 in)	550 mm (21.6 in)

Armature Interface

LDS Shaker Model	V100 Series	V200 Series	V400 Series	V450 Series	V455 Series
Armature Diameter	—	—	38.0 mm (1.5 in)	63.5 mm (2.5 in)	63.5 mm (2.5 in)
Insert Options	M4, 6/32 UNC	M4, 10/32 UNC	M4, 10/32 UNF	M5, 10/32 UNF	M5, 10/32 UNF
Insert Pattern	1 insert on central spigot	1 insert on central spigot	1 insert at centre, 6 inserts equispaced on 25.4 mm (1.0 in) PCD*	1 insert at centre, 5 inserts equispaced on 50.0 mm (1.97 in) PCD*	1 insert at centre, 5 inserts equispaced on 50.0 mm (1.97 in) PCD*

* PCD = Pitch Circle Diameter

Cooling Fans

LDS Shaker Model	V100 Series	V200 Series	V400 Series	V450 Series	V455 Series
Dimensions	—	—	249 x 241 x 389 mm (9.8 x 9.5 x 15.3 in)	249 x 241 x 186 mm (9.8 x 9.5 x 7.5 in)	249 x 241 x 186 mm (9.8 x 9.5 x 7.5 in)
Weight	—	—	17 kg (37 lb)	15 kg (33 lb)	15 kg (33 lb)
Electrical Requirement	—	—	single phase: 230V (50 Hz), or 120V / 230V (60 Hz)		

Further Information

For further details on LDS products and systems, including outline drawings, please contact your local Brüel & Kjær representative.

Safety

Complies with the following EU directives:
- Machinery: 2006/42/EC
- Low Voltage: 2014/35/EU
- EMC: 2014/30/EU
- Designed in accordance with EN 61010-1:2010

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