

# PRODUCT DATA

## LDS V994 Shaker Imperial

### Performance Parameters\*

|  |               |
|--|---------------|
| Armature Diameter                      | 29.9 in       |
| Sine Force (peak)                      | 65000 lbf     |
| Random Force (rms)†                    | 60000 lbf     |
| Maximum ½-sine Shock Force‡            | 130129 lbf    |
| Armature Resonance (f <sub>n</sub> )   | 1325 Hz       |
| Usable Frequency Range                 | d.c – 1.7 kHz |
| Mass of Moving Element (flush inserts) | 562 lb        |
| Velocity (sine peak) – full-field      | 74.8 in/s     |
| Acceleration (sine peak)               | 75 g          |
| Acceleration (random rms)              | 60 g          |
| Displacement (pk–pk) – continuous      | 2.0 in        |
| LDS Amplifier                          | DPA-K range   |

### Characteristics

|                                    |                                   |
|------------------------------------|-----------------------------------|
| Suspension Axial Stiffness         | 520 lbf/in                        |
| Suspension Rotational Stiffness    | 94.7 × 10 <sup>6</sup> lbf in/rad |
| Suspension Cross-axial Stiffness   | 410000 lbf/in                     |
| Internal Load Support Capacity     | 11023 lb                          |
| Shaker Body Mass (M <sub>b</sub> ) | 28590 lb                          |
| Stray Magnetic Field‡              | 20 gauss                          |
| Low Gauss Option                   | 3 gauss                           |
| Compressed Air Supply              | 100 lbf/in <sup>2</sup>           |
| Max. Required Input, Amplifier     | 244.59 kVA                        |
| Max. Required Input, FPS and CU    | 169.63 kVA                        |

Used where large payloads need high performance vibration or shock testing, the V900 series gives engineers the confidence they need to develop highly reliable products. These systems have been used in single and multi-shaker configurations, and have been used to test products such as satellites and missiles.

### Features

- Combination of high performance armature design and water-cooled coils deliver excellent acceleration and velocity performance
- Automatic armature and body position load compensation system ensures larger loads can be comfortably accommodated
- Trunnions feature Lin-E-Air suspension system as standard. Solid trunnions available upon request



### System Performance

|                                       | with DPA 90/140K -DC  | with DPA 120/140K -DC | with DPA 140K -TC | with DPA 140K -DC | with DPA 140K -TC | with DPA 165/210K -DC | with DPA 210K -DC | with DPA 210K -TC | with DPA 280K -TC |
|---------------------------------------|---|-----------------------|-------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|
| <b>Sine Force (peak)</b>              | 30100 lbf   | 39600 lbf             | 35000 lbf         | 48000 lbf         | 42000 lbf         | 52000 lbf             | 45900 lbf         | 57000 lbf         | 65000 lbf         |
| <b>Max. Acceleration (sine peak)</b>  | 53.6 g  | 70 g                  | 62.3 g            | 75 g              | 74.7 g            | 75 g                  | 75 g              | 75 g              | 75 g              |
| <b>Random Force (rms)</b>             | 39600 lbf   | 39600 lbf             | 52000 lbf         | 39600 lbf         | 52000 lbf         | 39600 lbf             | 60000 lbf         | 60000 lbf         | 60000 lbf         |
| <b>Max. Acceleration (random rms)</b> | 60 g  | 60 g                  | 60 g              | 60 g              | 60 g              | 60 g                  | 60 g              | 60 g              | 60 g              |
| <b>Velocity (sine peak)</b>           | 51.2 in/s   | 51.2 in/s             | 70.9 in/s         | 51.2 in/s         | 59.1 in/s         | 51.2 in/s             | 51.2 in/s         | 63 in/s           | 74.8 in/s         |
| <b>Health and Safety</b>              | Complies with the following EU directives: Machinery 2006/42/EC, Low Voltage 2006/95/EC, EMC 2004/108/EC<br>Designed in accordance with EN 61010–1:2001 |                       |                   |                   |                   |                       |                   |                   |                   |

### Industry Applications

- 3-axis testing of complete satellite systems
- Avionics and military hardware testing
- Structural dynamics testing
- Clean room environments
- Multi-shaker, multi-axis applications

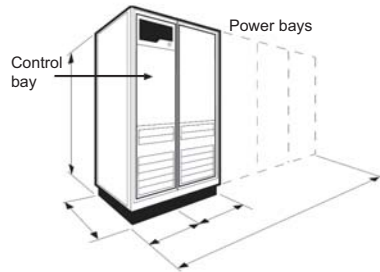
\* Force and velocity ratings depend on the amplifier driving the shaker. The sine force, random force and velocity parameters detailed here are based on the shaker when driven by the DPA 280K amplifier.

† 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.

‡ Theoretical maximum, measured 5.9 in 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

### DPA-K Series Amplifier Characteristics



|                             |   |
|-----------------------------|---|
| Power Range                 | 90 – 280 kVA in 8 kVA increments  |
| Signal-to-noise Ratio       | >65 dB, relative to 100 V rms output, 10 kΩ input termination and rated resistive load connected (100 kHz BW) |
| Input Impedance             | 10 kΩ nominal   |
| Total Harmonic Distortion   | 0.5 – 0.8% at rated output into resistive load  |
| Input Sensitivity           | 1.1 V (±0.1 V rms input) for 100 V rms output at rated sinusoidal Volt Amp output                             |
| Switching Frequency         | 150 kHz   |
| Module Efficiency           | 90.9%   |
| Nominal Sine Output Voltage | 100 V rms at rated power output   |
| Frequency Range             | 10 Hz – 1 kHz   |
| Frequency Response          | 20 Hz – 3 kHz: ±1.5 dB  |
| Common Mode Rejection       | 100 dB (d.c. – 5 kHz)   |
| Protection                  | Integral protection to prevent output devices from working outside their specification limits                 |

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### Environmental Data\*

|                                    | V994 Shaker | DPA-K Amplifier           |          |                            |          |                            | FPS and Cooling Unit      |
|------------------------------------|-------------|---------------------------|----------|----------------------------|----------|----------------------------|---------------------------|
|                                    |             | 90/140K                   | 140K     | 165/210K                   | 210K     | 280K                       |                           |
| Working Ambient Temp. (°F)         | 40 to 151   | 41 to 104                 |          |                            |          |                            | 41 to 104                 |
| Heat Dissipation (Rejected to Air) | 12 kW       | 9.41 kW                   | 14.91 kW | 17.20 kW                   | 22.29 kW | 29.69 kW                   | 4.79 kW                   |
| Acoustic Noise at 6.6 ft           | 105 dBA     | 85 dBA                    |          |                            |          | 90 dBA                     | 75 dBA                    |
| Cooling Air Flow                   | –           | 6990 ft <sup>3</sup> /min |          | 10485 ft <sup>3</sup> /min |          | 14000 ft <sup>3</sup> /min | 1400 ft <sup>3</sup> /min |
| Raw Water Flow Rate                | –           | 46.8 gal/min <sup>†</sup> |          | 48.6 gal/min <sup>†</sup>  |          | 50.5 gal/min <sup>†</sup>  | 55 gal/min <sup>†</sup>   |
| Raw Water Pressure Drop            | –           | 8.3 lbf/in <sup>2†</sup>  |          | 9.0 lbf/in <sup>2†</sup>   |          | 9.6 lbf/in <sup>2†</sup>   | 11.2 lbf/in <sup>2‡</sup> |
| Raw Water Max. Inlet Temp. (°F)    | –           | 90 <sup>†</sup>           |          |                            |          |                            | 90 <sup>†</sup>           |
| Raw Water Max. Outlet Temp. (°F)   | –           | 111 <sup>†</sup>          |          | 113 <sup>†</sup>           |          | 116.6 <sup>†</sup>         |                           |
| Height (in)                        | 80          | 75                        |          | 75                         |          | 75                         |                           |
| Width (in)                         | 107         | 61.4                      |          | 81.5                       |          | 101.6                      |                           |
| Depth (in)                         | 64.6        | 32.5                      |          | 32.5                       |          | 32.5                       |                           |
| Mass (lb)                          | 40390       | 3097                      | 3307     | 4594                       | 4782     | 6256                       | 2694                      |

\* Values for air trunnion mounted shaker and an amplifier configuration of one control bay and one power bay

† Actual values when used with V994 shaker

‡ Values for cooling unit alone when running at maximum capacity

### 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.

### V 994 Shaker Options

#### Armature Insert Selection:

M 12 ◆

1/2" UNC ◆

#### Mounting Selection:

Trunnion mounted with Lin-E-Air isolation and body rotation gearbox ◆

Solid trunnion ●

#### Other Options:

Combination shaker/slip table base ●

Chamber support kit ●

Thermal barrier ●

#### Key:

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

Brüel & Kjær reserves the right to change specifications and accessories without notice.

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