

The SignalForce® LE-2016-3 water cooled shaker is the latest update to the proven LE-335 electrodynamic shaker system. The LE-2016-3 offers up to 20000 lbf (90 kN) force and up to 3 in. (76.2 mm) peak-peak displacement. As with all of the Data Physics water cooled shakers, the LE-2016-3 features dual hydrostatic bearings for axial guidance and cross-axial restraint. It comes standard with Lin-E-Air isolated trunnions but could be fitted with rigid trunnions if the application dictates the requirement.

Standard Features

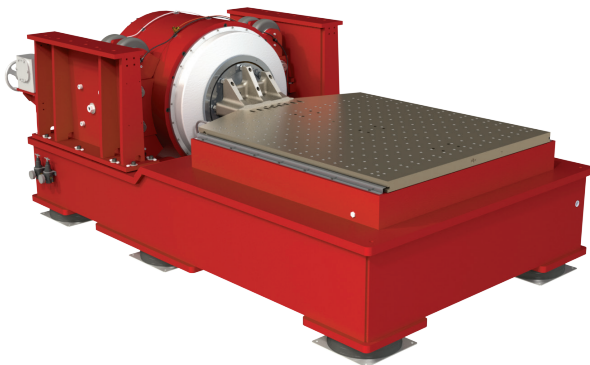
- Peak sine force: 16000 lbf (71 kN) to 20000 lbf (90 kN)
- Random force rms: 16,000 lbf (71 kN) to 20000 lbf (90 kN)
- Velocity peak: 79 ips (2 m/sec)
- Peak to peak displacement: 3 in. (76.2 mm)
- Armature diameter: 17.3 in. (440 mm)
- Dual hydrostatic bearings
- Superior axial and torsional stability
- Automatic load support and armature centering
- Payload support up to 2000 lbs (909 kg)
- High force systems include chillers

Options

- Custom designed head expanders utilizing 3-D modeling and FEA analysis for maximum performance
- Rigid trunnions available for VH configured systems
- Isolated trunnions (VH) with Lin-E-Air isolation
- Monobase with slip tables
- Air glides and guidance systems
- Metric and imperial table threads

Typical Applications

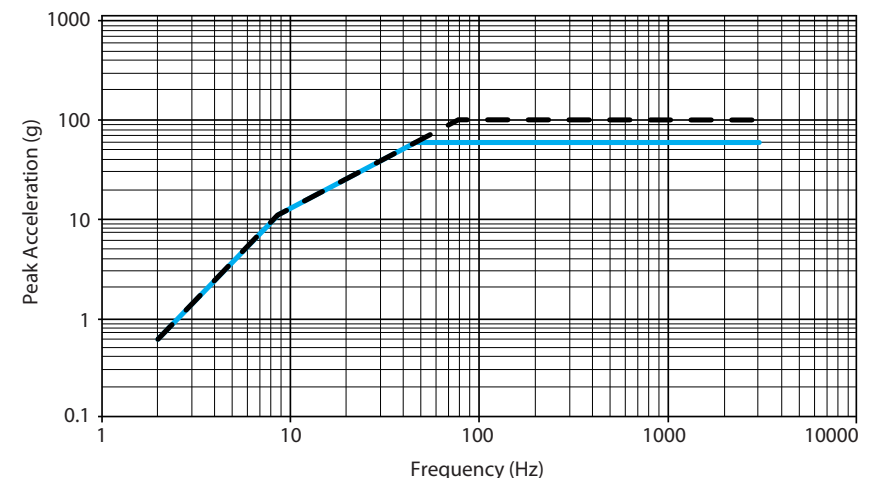
- Aerospace
- Automotive battery (Electric vehicles)
- Satellite
- High force requirements



Sine Performance Envelope

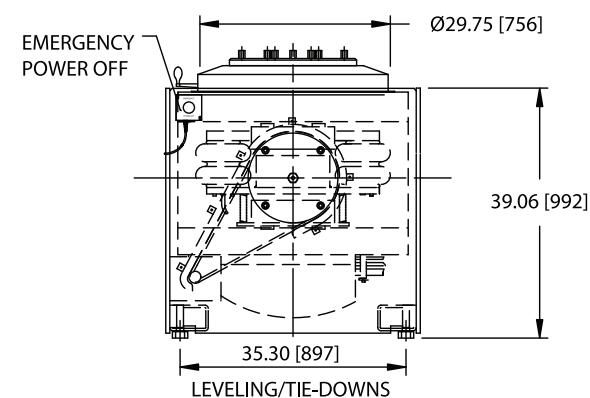
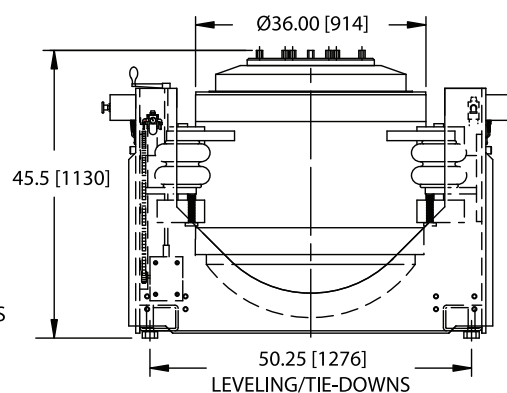
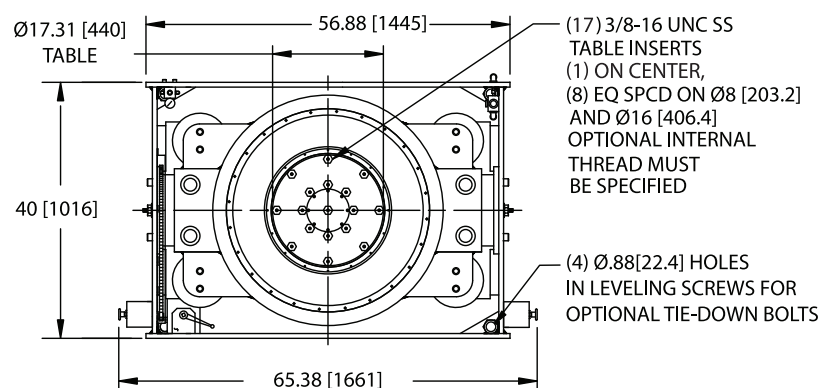
LE-2016-3 / DSA15-16

Bare table = ■ 200 lbs (90.7 kg) mass = ■



LE-2016-3 / DSA15-12 / DSA15-14 / DSA15-16

	Maximum Sine Force		Maximum Random Force (rms)		Maximum Shock Force		Maximum Acceleration (bare table)		Maximum Velocity		Displacement (Peak to Peak)		Armature Diameter		Armature Mass		Insert Threads		Armature Suspension	Armature Axial Resonance	Stray Magnetic Field	Frequency Range	Static Payload Support		Uncrated Shaker Mass		Heat Dissipation (kW)				Facility Power Requirements
	lbf	kN	lbf	kN	lbf	kN	g	m/s ²	ips	m/s	in	mm	in	mm	lbs	kg	SAE	Metric	Type	Hz	gauss	Hz	lbs	kg	lbs	kg	Shaker	Amplifier	Chiller	Cooling Unit	kVA
LE-2016-3 / DSA 15-12	16000	71	16000	71	35200	156	100	981	79	2	3	76.2	17.3	440	135	61	3/8-16	M-8	Beryllium copper loop flexures	2190	< 10	5-2500	2000	909	8000	3630	4	39	11	12	220
LE-2016-3 / DSA 15-14	18000	80	16000	71	39600	176	100	981	79	2	3	76.2	17.3	440	135	61	3/8-16	M-8	Beryllium copper loop flexures	2190	< 10	5-2500	2000	909	8000	3630	4	46	11	12	252
LE-2016-3 / DSA 15-16	20000	90	20000	90	44000	196	100	981	79	2	3	76.2	17.3	440	135	61	3/8-16	M-8	Beryllium copper loop flexures	2190	< 10	5-2500	2000	909	8000	3630	4	53	11	12	284



All drawings are in inches and (millimeters) unless otherwise noted. Dimensions are provided for evaluation purposes. Formal layout drawings can be provided for additional dimensions and dimension verification.

Environmental Characteristics

Ambient Working Temperature Range

Shaker	+40F to +100F (+4C to +38C)
Amplifier	+32F to +104F (+0C to +40C)

Heat Dissipation

Shaker	4 kW
Amplifier*	16 kW (12 Module) 19 kW (14 Module) 21 kW (16 Module)
Chiller	11 kW
Cooling unit	12 kW

Acoustic Noise @ 1m

Shaker	105 dBA
Amplifier	85 dBA
Cooling unit	75 dBA

Humidity

Shaker	<95% non-condensing
Amplifier	<95% non-condensing

Facility Requirements

Cooling unit

Armature raw water flow at 85F (29C)	30 GPM (114 L/min)
Field coils raw water flow at 85F (29C)	60 GPM (227 L/Min)
PSI drop across cooling unit	25 PSI (1.72 Bar)
Distilled water requirement	15 gallons (56.8 Litres)

Chiller

Raw water flow at 85F (29C)	9 GPM (34 L/min)
PSI drop across chiller	15 PSI (1.03 Bar)

Amplifier cooling air flow*

5250 CFM (149 m³/min)
(12/14/16 Modules)

Compressed air supply

3 CFM at 100 PSI
(0.08 m³/min at 6.9 Bar)

Total electrical req.

See Table

Power supply range

360 – 480 VAC, (3) phase, 50/60 Hz

Amplifier Characteristics

Rated Power*

180 kVA (12 Module)
210 kVA (14 Module)
240 kVA (16 Module)

Efficiency

Up to 92%

Switching Frequency

50 kHz

Input Impedance

1.5 V rms for full output
(10 K ohm input impedance)

Voltage Output

200 V rms

Current Output*

996 A rms (12 Module)
1162 A rms (14 Module)
1328 A rms (16 Module)

Distortion

(at rated output) THD
< 0.5% from DC to 1500 Hz
0.75% from 1500 to 2000 Hz
1.0% from 2000 to 3000 Hz

Noise & Hum

> 70 dB below full output,
with shorted input

Weight*

5290 lbs (2400 kg) (12 Module)
5360 lbs (2431 kg) (14 Module)
5430 lbs (2463 kg) (16 Module)

Performance Notes

1. Random force rating based on flat spectrum from 20–2000 Hz, with 275 lbs. (124.8 kg) non-resonant load. Ratings comply with or exceed ISO 5344.
2. Shock pulses will yield different performance characteristics based on duration of the pulse. Consult application specialist to evaluate specific shock pulses.
3. Heavy payloads may reduce available peak-peak displacement.
4. Stray magnetic field measured at full field 6 inches (152.4 mm) above armature table.
5. Shaker weight will vary based on mounting configuration.
6. As measured at maximum force, bare table. Acoustic noise from a test will depend on test load and spectrum.
7. Wet bulb temp not to exceed 80° F (27° C). Specifications are subject to change without notice.
8. Max performances shown are for no more than 10 minutes of operation.
9. For continuous duty, the levels stated need to be reduced to 80%. Specifications are subject to change without notice.

Amplifier Dimensions

Height	78" (1981 mm)
Width	92" (2327 mm)
Depth	43" (1092 mm)

Cooling Unit Dimensions

Height	72" (1829 mm)
Width	42" (1067 mm)
Depth	27" (686 mm)

Chiller Dimensions

Height	50" (1270 mm)
Width	32" (813 mm)
Depth	34" (864 mm)

EMI shielded console, air cooled screens, and 3-phase line filtering standard.

* Multiple listing reflects amplifier size – small to large.