



SMARTER.
SUSTAINABLE.
SERVOELECTRIC.

seaMAST



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The seaMAST utilizes servoelectric actuation (SEA) to simulate complex dynamic motion by reproducing the multi-axial vibrations that products undergo during their lifetime. Equipped with multiple servoelectric motors with full 6 degrees-of-freedom controls, the seaMAST accurately replicates the stress, strains, and vibrations experienced by a product in its real-world environment. The seaMAST is available in hexagonal, orthogonal, and custom configurations.

seaMAST CONFIGURATIONS

The seaMAST has been designed and can be configured to meet the needs of diverse industries, products, and applications.

Hexapod systems offer versatility. Hexapod systems can provide motion and force in all 6 degrees-of-freedom, which makes them well-suited for applications that require complex motion. Hexapod systems can also offer high accuracy, repeatability, and frequencies in excess of 200 Hz.

Orthogonal systems typically consist of 3 vertical actuators, with a combination of at least 1 actuator in a horizontal axis opposed by 2 actuators in the other horizontal axis to fully provide true 6 degrees-of-freedom in X, Y, Z, Roll (rotation about the X axis), Pitch (rotation about the Y axis), and Yaw (rotation about the Z axis). By optimizing the system to specific combinations of stroke, velocity, and acceleration performance, orthogonal systems are easily adapted to meet customer-specific needs.

Custom configurations are often designed for project and application specific requirements.



seaMAST HEXAPOD SERIES SPECIFICATIONS

SPECIFICATIONS			15-1S	15-1S-HP	35-2S	69-2.2S
		units				
Table Size	m		1.2 x 1.2	1.2 x 1.2	2.0 x 2.0	2.2 x 2.2
	in		48.0" x 48.0"	48.0" x 48.0"	78.7" x 78.7"	86.6" x 86.6"
Minimum Simulation Frequency Range	Hz		>0-200	>0-400	>0-200	>0-200
Rated Payload	Kg		500	400	500	1000
	Lb		1102	880	1102	2205
Actuator Peak Force (standard moment arm)	KN		15.4	15.4	34.5	69
	Kip		3.5	3.5	7.8	15.5
Linear Displacement (total Pk-Pk)	Longitudinal (X)	mm	94	94	220	220
		in	3.7	3.7	8.66	8.66
	Lateral (Y)	mm	82.8	82.8	250	250
		in	3.26	3.26	9.84	9.84
	Vertical (Z)	mm	80.8	80.8	345	345
		in	3.18	3.18	13.6	13.6
Angular Displacement (total Pk-Pk)	Roll	deg	13.8	13.8	18.8	18.8
	Pitch	deg	12.6	12.6	20.9	20.9
	Yaw	deg	11.4	11.4	12.4	12.4
Linear Acceleration (bare table)	Longitudinal (X)	+ g	19.4	13.0	11.0	10.2
	Lateral (Y)	+ g	16.3	14.0	11.0	13.6
	Vertical (Z)	+ g	14.3	15.0	13.5	13.5
Linear Acceleration (at Rated Payload)	Longitudinal (X)	+ g	4.2	6.3	7.2	7.2
	Lateral (Y)	+ g	5.8	6.4	7.2	7.6
	Vertical (Z)	+ g	6.3	9.7	9.5	10.8

Notes:

1. All linear and angular motion values are based on a single degree of freedom movement at or around the tabletop center.
2. Acceleration values are peak values and may not be achievable throughout the entire frequency range.
3. Maximum performance is achievable with a solid steel payload with a Center of Gravity mounted within 1m of the X-Y radius of the table center.
4. All performance parameters are estimates based on design considerations and are subject to change at any time.
As such, eMpulse cannot be held liable for any incidental or consequential damages or losses arising from the use of this information.
5. Interpretation and use of the data are the sole responsibility of the user.



KEY BENEFITS OF seaMAST

The seaMAST is a more efficient and precise option compared to hydraulic systems. The key benefits of seaMAST testing technology include:

Energy Efficiency: Electric systems are widely acknowledged as being more energy-efficient than hydraulic systems. Electric systems convert electricity into motion directly, whereas hydraulic systems require multiple inefficient conversions of energy, from the motor to the pump, distribution system, servo valve, and eventually, the actuator. These additional conversions in hydraulic systems create heat, which must then be removed, resulting in additional energy consumption. As a result, SEA systems can consume less than 20% of the energy compared to hydraulic systems, making them a more efficient choice in terms of energy usage.

Cleaner Environment: Hydraulic fluids can be hazardous to the environment, and the process of disposing of used fluids can be costly and complex. Servoelectric systems do not require any fluids, making them a cleaner and safer alternative.

Reduced Maintenance: Electric systems require less maintenance than hydraulic systems with extended diagnostic tools and simplified maintenance increase uptime.

Increased Precision: High fidelity with 28 bit internal signal resolution provides more precise control and better repeatability. Electric motors can provide accurate, repeatable, and smooth motion, which is important for simulating realistic motion replication.

Noise Reduction: Electric systems are generally quieter than hydraulic systems because they don't require the use of noisy hydraulic pumps and hoses.

Increased Flexibility: Electric systems can be more flexible than hydraulic systems because they can be programmed to simulate a wide range of motion profiles, including complex movements that are difficult to achieve with hydraulic systems.

Advanced Safety Features: SEA systems provide a cost-effective alternative for a number of safety features. These can be easily configured inside our control system without the need for costly equipment upgrades.

- ▶ Safe Limited Speed (SLS)
- ▶ Safe Limited Acceleration (SLA)
- ▶ Absolute Encoder monitoring and fault detection
- ▶ System-wide Safe Torque Off (STO) operation
- ▶ Internal temperature monitoring of all components
- ▶ Customizable limits to specimen-specific parameters



APPLICATIONS

We offer standard and custom configurations for various applications, such as:

- ▶ Durability
- ▶ Ride Comfort
- ▶ Noise, Vibration and Harshness (NVH)
- ▶ Modal Correlation
- ▶ SAE and ISO Test Specifications



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