eMpulse
test systems

SMARTER.
SUSTAINABLE.
SERVOELECTRIC.

seaPLUS MULTI AXIS ROAD SIMULATORS

SMARTER. SUSTAINABLE. SERVOELECTRIC.

Using our servoelectric actuators (SEA), eMpulse Test Systems road simulators are designed to replicate real-world driving conditions, including road surfaces, terrain, and environmental factors.

We offer a range of systems that can simulate a wide variety of driving conditions, from city streets to highways to off-road environments. In addition to traditional 4-Poster testing applications, we also offer optional body coupled and aero loading actuation. Our road simulators can be integrated with various chamber types including acoustic attenuation for ambient NVH testing or a climatic chamber capable of temperature, humidity, and solar simulation.

seaPLUS ROAD SIMULATORS

The seaPLUS series by eMpulse Test Systems offers superior efficiency and extended performance. With a 46% higher performance over previous systems, the seaPLUS series widens the performance gap between our servoelectric technology and comparable hydraulic systems. seaPLUS further enhances durability and expands testing capabilities across a wider range of applications and industries.

The key benefits of seaPLUS road simulation testing technology include:

Improved Reliability: A less complicated actuator assembly resulting in fewer parts yields an increase in reliability and lower maintenance costs.

Higher Accuracy: SEA systems are not affected by many physical constraints that cause reduced system accuracy and repeatability. These variables include oil viscosity changes with temperature, accumulator pressure, servo valve wear, flow restrictions, seal friction, hydraulic resonances, and oil contamination.

Increased Performance: seaPLUS can achieve higher velocities at higher forces, with 3X higher frequency response, resulting in lower RMS errors than hydraulic systems.

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Greater Efficiency: In comparable use cases, SEA systems use less than 20% of the electrical energy compared to hydraulic systems.

Safer Operation: The seaPLUS eliminates the potential for high pressure oil leaks and related environmental pollution. The SeaPLUS also utilizes safety integrated functions that allow for safety limited acceleration, velocity and force (current) to be configured for specific applications or testing.

Improved Troubleshooting: Smart diagnostics capability within the controls can direct operators to the specific hardware causing a fault condition. Remote log-in capability allows eMpulse engineers to aid in troubleshooting anywhere in the world.

Reduced Maintenance: Servoelectric actuators are compact, easy to install, and require minimal maintenance, resulting in lower overall system costs.

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.

APPLICATIONS FOR seaPLUS ROAD SIMULATORS

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

- ▶ Durability
- ▶ End-of-Line Production
- ▶ Noise, Vibration and Harshness (NVH)

- ▶ Research & Development
- ▶ Buzz, Squeak and Rattle (BSR)
- ▶ Accelerated Life

seaPLUS ROAD SIMULATOR SPECIFICATIONS

SPECIFICATIONS	SYMBOL	UNITS	sea+ 13	sea+ 27	sea+ 40	sea+ 54	sea+ 108
Typical Applications			Body Coupled*	NVH 4-Post	4-Post Durability	4-Post Durability	4-Post Durability
xxx= A Stroke M working Stroke, peak - peak	S	m (in)	330* (13)*	160 (6.3) / 260 (10.2)	160 (6.3) / 260 (10.2)	160 (6.3) / 260 (10.2)	160 (6.3) / 260 (10.2)
Motor Dynamic Peak Force Motor Peak Force	$F_{pk, mot}$	N (lbF)	13486 (3028)	26910 (6050)	40326 (9066)	53820 (12100)	107640 (24200)
Motor Continuous Dynamic Force** Motor Continuous or rms Force	$F_{n, mot}$	N (lbF)	5018 (1128)	10530 (2367)	21060 (4735)	21060 (4735)	42120 (9469)
Static Load Support Max Air Spring Capacity at Prated	$F_{pk, air}$	N (lbF)	8900 (2000)	17800 (4000)	17800 (4000)	17800 (4000)	35600 (8000)
Total Continuous Force Fpk, mot + Fpk, air	$F_{pk, total}$	N (lbF)	13918 (3129)	28330 (6369)	38860 (8737)	38860 (8737)	77720 (17473)
Total Peak Force Fn,mot + Fpk,air	$F_{cont, tot}$	N (lbF)	22368 (5029)	44710 (10052)	58126 (13068)	71620 (16102)	143240 (32203)
Velocity max at Fn,mot	$V_{max, fn}$	ms/ (in/s)	4.6 (181)	4.2 (165)	4.2 (165)	4.2 (165)	4.2 (165)
Velocity max at Fpk,mot	$V_{max, fpk}$	m/s (in/s)	2.0 (78.7)	1.9 (74.8)	1.9 (74.8)	1.9 (74.8)	1.9 (74.8)
Acceleration max (unloaded)	g_{max}	G	26	30 / 24	30 / 24	36 / 30	36 / 30
Absolute Digital Encoder Resolution	Enc res	Nm	10.0 for playback and monitoring				
Noise Level – Typical (NVH Mode)	SPL(A)	dbA	<55				
Safety Rating, DIN EN 61508***	SIL		2				
Safety Rating, DN EN ISO 13849-1***	Cat		3				
Performance, DIN EN ISO 13849-1***	PL		D				
Bearing Materials			Qty 4 - Prelubricated, preloaded t-rail caged roller bearings. Replacement interval: 15 years under designed usage.				
Facility Requirements		V A	380-480Vac, 3φ, 50-60 Hz Current Rating based on motor sizing and system performance requirements.				
Air Supply, Rated	Prated	Psi (bar)	100 (6.9), higher Static Load Support possible at higher supply pressures.				
Recommend Liquid Cooling Flow, approximately 20deg delta C	Q	Lpm gpm	20 5.3	22 5.8 / 22 5.8	26 6.9	26 6.9 / 26 6.9	52 13.7 / 52 13.7
Max Motor Heat Removal @100% duty cycle, full durability rating	Qp	kW Btu/hr ton	15.5 52832 4.4	29.4 100205 8.4 / 29.4 100205 8.4	53.8 183713 15.3	53.8 183713 15.3 / 53.8 183713 15.3	53.8 183713 15.3 / 107.7 367426 30.6

Notes:

1. 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.
2. Interpretation and use of the data are the sole responsibility of the user.

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eMpulse Test Systems
Global Installations

eMpulse Test Systems
TEL +1-616-239-1511
info@empulsetestsystems.com
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