

MOTION SYSTEMS

P60 SERIES

Integrated Pneumatic Support.
Exceptional Fidelity and Reliability.
High Energy Efficiency.



Rev. C, November 2024

MOOG | Shaping the way our world moves™

IMPROVED POWER MANAGEMENT AND SIMPLIFIED MAINTENANCE

Lower Operating and Support Costs

The Moog Motion System P60 Series delivers lower operating and support costs without sacrificing quality, efficiency, or reliability. Actuator redesign allows easier field repairs in the end-of-stroke buffer.

Improved Power Management

We designed the Motion System P60 Series using the latest technology and with your power demands in mind. It provides up to 40% reduction in continuous power compared to previous generations of motion systems with integrated pneumatic support, which means a lower demand on your facility electrical infrastructure and above all lower operating cost compared to conventional full electric motion systems.

Exceptional Reliability and Performance

We've been using electric motion systems with integrated pneumatic support in the field for over 20 years. With an improvement in MTBF (mean time between failures) from previous generations, motion systems provide exceptional reliability and performance. This is the reliability and longevity you've come to expect from Moog.

Global Support

Our international support team is always ready and on time, which means our local crew can access spares, conduct repairs, and refresh rotatable stock without wasting valuable resources.

Leader in Motion Systems

How did we get here? Moog has an installed base of over 2,000 high-quality motion systems globally which are certified level D by 24 country civil aviation authorities. Nobody else has reached this level! Our global engineering teams are on-call to tailor one of our motion systems to your specific requirements. Challenge us with your unique needs.

Pneumatic System

The passive pneumatic system simply carries the static GML (Gross Moving Load) weight, as if the system was balanced on springs. The servo drives and motors of the actuators therefore only need to accelerate and decelerate the Motion System P60 Series. In practice, this means that the servo drives and motors have a very light duty-cycle, resulting in the advantages below.

Advantages

- With integrated pneumatic support, the P60 Series significantly lowers electricity consumption - up to 75% less than fully electric Motion Systems, depending on the flight profile. This energy-efficient design makes the P60 Series an ideal choice for more sustainable, and cost-effective operations.
- Helping to achieve your sustainability objectives.
- Smaller power components, such as servo drive and motor.
- The power components and actuator life increases due to a very light duty-cycle.
- The heat dissipation is improved.
- The actuators provide smoother motion cues.



WHY CHOOSE A MOTION SYSTEM WITH BETTER ENERGY EFFICIENCY? SMART IMPROVEMENTS.

The Moog Motion System Provides Unprecedented Performance, Unrivalled Reliability

SMALLER IS SMARTER

Reduced actuator peak forces by using bi-directional reusable buffer result in smaller joints. Smaller and thus lighter moving joints provide increased payload capability. Smaller base joints decrease the footprint of the system.

LESS IS MORE

Total parts count reduced for less parts to maintain and improved uptime. The new design has a significant lower part count as the previous generation motion systems. This simplifies troubleshooting.

MAKE REPLACEMENTS IN REAL-TIME

The crash tube of the previous generations is replaced by a bi-directional reusable buffer.

With field-replaceable shocks in the end-of-stroke buffer, the actuator remains connected to the Motion System P60 Series while you replace the shock on site.

KEEP IT COOL

Heat dissipated by the servo drives is directly guided outside the control cabinet, while at the same time fresh air is sucked into the control cabinet, keeping the cabinet nice and cool.

PRODUCT LIFECYCLE MANAGEMENT

Key components are sourced from Moog, providing enhanced control of Product Lifecycle Management.

KEEP IT SIMPLE

The mechanical brake of the previous generations is replaced by a lock spring to lock the actuator in the retracted position. Higher availability, as the locking spring has negligible wear and improved performance due to lower inertia.



TECHNICAL DATA

Model			P60 Series MB-EP-6DOF/60/14000KG
DOF max. excursion	Surge	Single	-1.170 m / +1.420 m -46.1 in / +55.9 in
		Max.	-1.520 m / +1.480 m -59.8 in / +58.3 in
	Sway	Single	± 1.170 m ± 46.1 in
		Max.	± 1.660 m ± 65.4 in
	Heave	Single	± 0.960 m ± 37.8 in
		Max.	± 0.960 m ± 37.8 in
	Roll	Single	± 25.0 °
		Max.	± 31.0 °
	Pitch	Single	-25.0 ° / +27.0 °
		Max.	-31.0 ° / +35.0 °
	Yaw	Single	± 29.0 °
		Max.	± 33.0 °
DOF max. velocity	Surge		± 1.00 m/s ± 39.4 in/s
	Sway		± 1.00 m/s ± 39.4 in/s
	Heave		± 0.80 m/s ± 31.5 in/s
	Roll		± 22.0 °/s
	Pitch		± 21.0 °/s
	Yaw		± 25.0 °/s
DOF max. acceleration	Surge		± 6.5 m/s ² ± 0.66 g
	Sway		± 6.5 m/s ² ± 0.66 g
	Heave		± 9.0 m/s ² ± 0.92 g
	Roll		± 150 °/s ²
	Pitch		± 150 °/s ²
	Yaw		± 250 °/s ²
Maximum customer payload (MCP) up to			13,316 kg 29,357 lb
Gross moving load (GML) up to			14,000 kg 30,865 lb
GML moment of inertia about X-axis			50,000 kg m ² 36,878 slug ft ²
GML moment of inertia about Y-axis			50,000 kg m ² 36,878 slug ft ²
GML moment of inertia about Z-axis			50,000 kg m ² 36,878 slug ft ²
GML CoG above moving platform centroid up to			1.80 m 70.9 in
Top of platform			2.339 m 92.1 in
Ground frame diameter			7.322 m 288.3 in
Actuator stroke			1.706 m 67.2 in
Power requirements			360 - 500 VAC, 3-phase, 50/60 Hz
Peak current consumption			500 A at 400 VAC
Average power consumption			2 kVA
Peak power consumption			35 kVA
Electronics and software			Motion control cabinet, computer, software, maintenance & diagnostic web interface, Ethernet UDP API
Typical application			FAA & EASA level C/D full flight, land and sea vehicle training devices

System performance specifications are estimates that are subject to change.

Please consult with Moog for technical information.

Model number explanation:

Example	MB - EP - 6DOF / 60 / 14000KG
Motion Base	
Electric/Electric Pneumatic	
Number of DOF	
Stroke (inch)	
Gross Moving Payload (kg)	

FLEXIBLE SERVICE WITH A GLOBAL REACH

At Moog, we are committed to providing exceptional support to our customers, no matter where they are located. Our extensive network of service providers spans over 20 countries across five continents, ensuring that help is always within reach.

With more than 2,000 motion systems installed worldwide, we have the right personnel in the right places at the right times. Our experts ensuring that your training programs run smoothly, efficiently, and profitably.

Our range of services supports you throughout the entire life cycle of your system, from commissioning and planned maintenance to upgrades. Whether you need support or spare parts, we are ready to assist you.



Not ready for the latest Motion System? Consider these key programs:

- Actuator life extension
- Motion computer upgrade
- Electropneumatic motion cabinet replacement
- Control Loading upgrade
- Hydraulic to electromechanical conversion



ADDITIONAL SIMULATION PRODUCTS

Moog has a complete suite of flight simulation products to complete your program.

CONTROL LOADING SYSTEMS

Moog control loading solutions range from basic flight training to high fidelity full flight simulations that meet global certifications from EASA, FAA, and military equivalents.

www.moog.com/products/control-loading-systems/



G-SEATS

Simulate realistic, sustained G-Force in helicopter and fighter G-Seats with high fidelity controllers and user-friendly interfaces.

www.moog.com/products/g-seats/



MORE PRODUCTS. MORE SUPPORT.

Moog designs a range of motion control products to complement those featured in this document. Moog also provides service and support for all of our products. For more information, contact the Moog facility closest to you.

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