

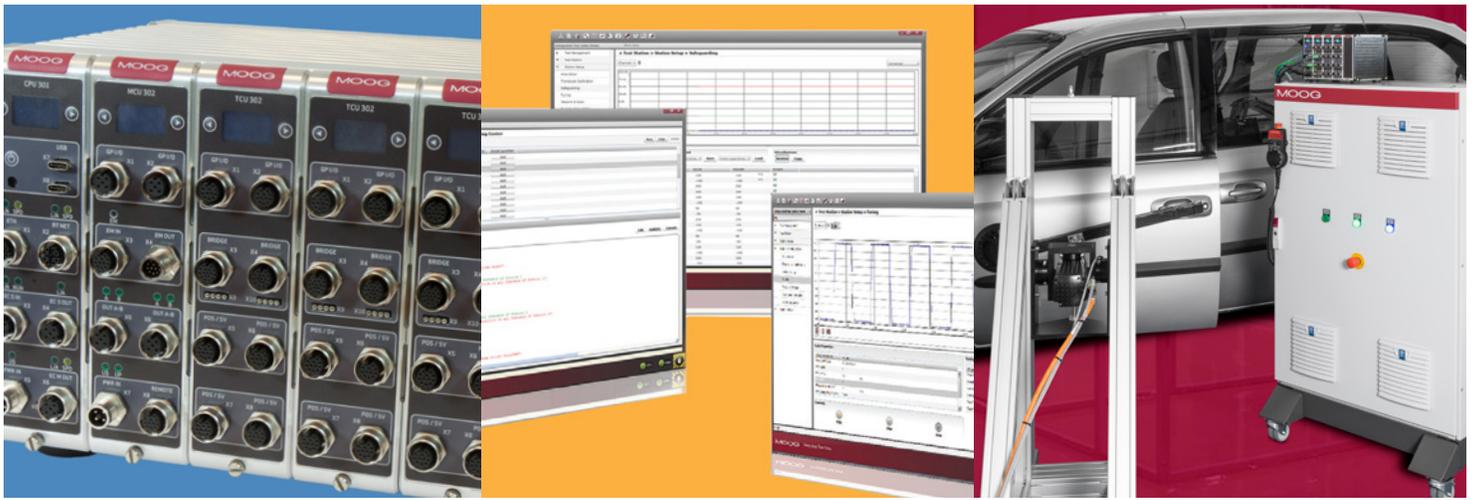
ELECTRIC MULTI-AXIS TEST SYSTEMS

PLUG-IN READY FOR
LOAD/DEFLECTION OR
CYCLIC TESTS



Rev. A, July 2018

PRECISION, EFFICIENCY AND RELIABILITY.
VALUE FROM DAY ONE.



ELECTRIC MULTI-AXIS TEST SYSTEMS. RELIABLE. FLEXIBLE. PRECISE.

Choose Moog.

Rising energy costs and increasing environmental regulation drive test design engineers to seek an electro servo solution without sacrificing precision, speed, or productivity. Our Electric Multi-Axis Test Systems provide an alternative to traditional hydraulic and pneumatic applications. Moog delivers world-class motion control solutions to a variety of applications, ensuring high speed and high force in demanding industrial environments.

Reliable.

Boasting a typical product lifetime of 10+ years, Moog Electric Multi-Axis Test Systems provide the reliability you need, resulting in reduced waste due to maintenance issues or failures during testing.

Extraordinary Value.

Electric Multi-Axis Test Systems are designed with your bottom line in mind. The completed machines eliminate extra items, operation and maintenance costs needed with hydraulic or pneumatic test systems.

Unrivalled Precision.

We understand your need for precision and repeatability. A built-in Encoder allows precise position control or operate your test with bumpless mode switching to control force repeatably from very small to large loads.

Easily Configurable.

Our plug-n-play electric actuators and simplified feature-rich user interface provide a functioning platform out of the box to perform tests the same day, without needing hours of configuration to start.

Clean Lab Integration.

The low noise actuators have no oil or air leaks to manage, can operate in hot or cold environments, and save all the idle energy of pumps and air compressors.

Unsurpassed Support.

We've seen it all. Moog expertise in test laboratories like yours ensures high value test results every time. With leadership and support available in 26 countries, Moog delivers technology, innovation, and service around the globe.

Choose Electric for your Test

There are plenty of choices when selecting the technology best suited for your test system. Here are a few reasons why electric should be your top pick.

Longer Lifetime

Long-lasting performance and reliability increases machine lifetime and your return on investment. The lifetime of Moog Electric Multi-Axis Test Systems is typically 10+ years. Request a lifetime calculation data sheet from your Moog representative.

Smaller Footprint

Electric systems are typically smaller with three main components in contrast with hydraulic systems which include the HPU, oil coolers, piping, HSMs, hoses, and actuator.

No Extra Cost

There is typically no extra cost in selecting an electric system vs. hydraulic. Without the need for expensive food grade oils, tanks, hoses, pumps, filtering systems, etc., electric systems are extremely cost effective.

Total Control

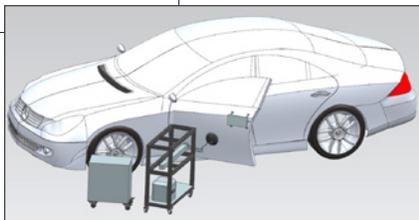
Electric Multi-Axis Test Systems feature infinite and extremely accurate control of speed, position, and force – all crucial elements to your testing.

Cleaner Operations

Electric Multi-Axis Test Systems are better for the environment, as they do not require disposal of oils. Many industries are moving away from costly oil-based systems to reduce energy, reduce their carbon footprint, and remove oil from their sites.



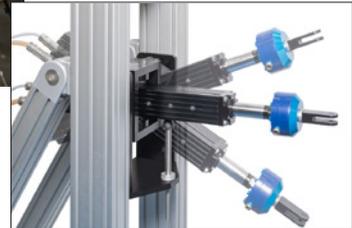
Seat Track Sliding Test



Door Closure Test



Seat Back Fatigue Test



Gimbal for Adjustable Loading

Easier To Install

Moog Electric Multi-Axis Test Systems are relatively low maintenance. Electric systems are much easier to install and control with digital and analogue signals to control speed, force, and precision.

Lower Noise Levels

Health and safety directives place pressure on companies to reduce factory noise. Moog Electric Multi-Axis Test Systems typically produce 30% lower noise levels, resulting in less stress over meeting regulations.

No Flow Rate Problems

Low temperatures can often result in flow rate issues. Electric Multi-Axis Test Systems can operate in hot or cold environments with simple insulating or cooling actions.

Health And Safety Benefits

In addition to lower noise levels, electric systems do not have the ability to create dangerous high pressure hydraulic oil leaks. Slip hazards, exposure to cancer-causing fluids, and dirty oil contamination are not of concern when using Moog Electric Multi-Axis Test Systems.

No Fire Risks

In high temperature applications, there is no fire risk of oil in electric system. Therefore, no fire resistance fluids are needed, resulting in less expense and health concerns.

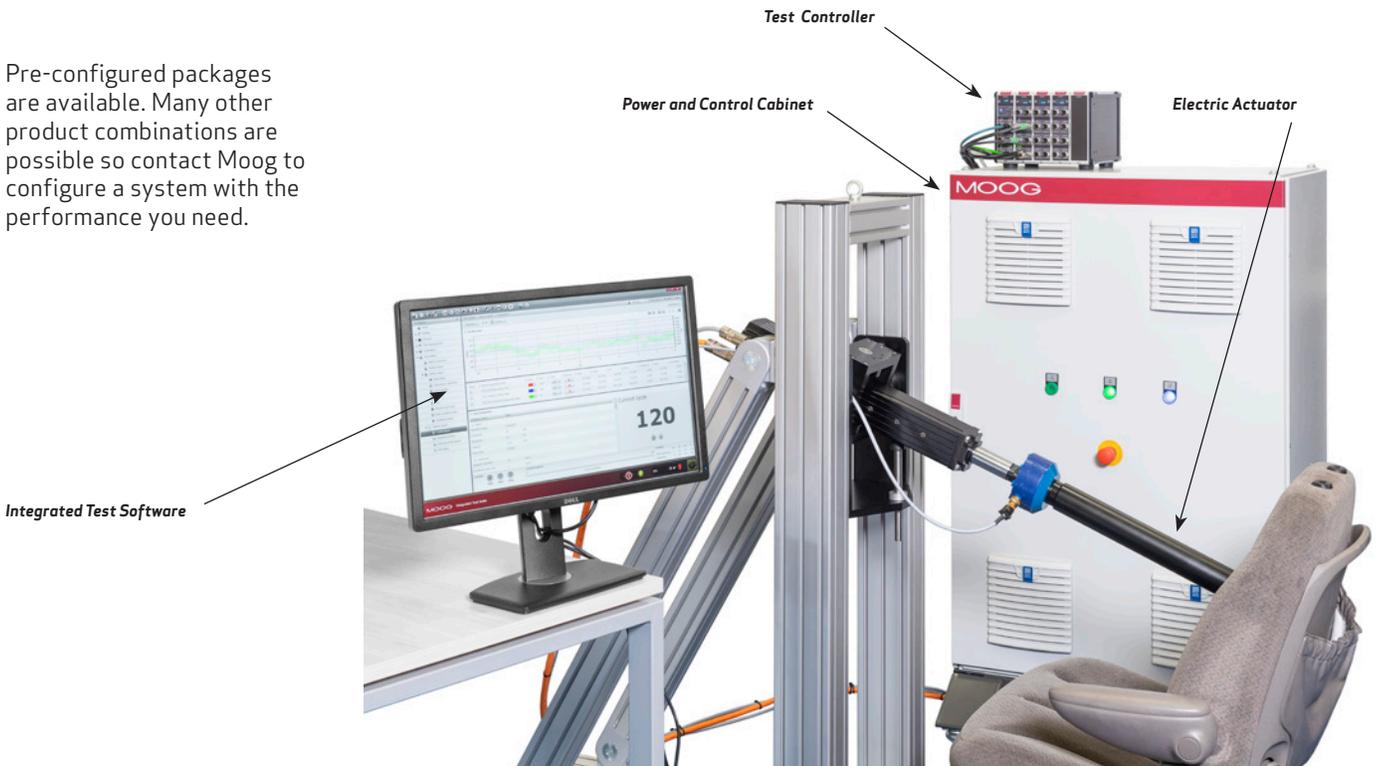
SYSTEM OVERVIEW

With the Electric Multi-Axis Test System, Moog offers a complete testing solution. These systems provide an alternative to traditional hydraulic or pneumatic actuation and include one or multiple electro-mechanical actuators with a matched motor drive control cabinet and a real-time test controller. A range of electric high performance Moog actuators with different strokes, velocities and forces are

available for a wide range of applications. All necessary electronics to control the actuators (servo-drives, circuit breakers, line filters, etc) are contained in a control cabinet. The motor drive cabinet can be fixed or portable, and has an intuitive, quick inter-connection panel for cabling to supply power, the actuator, and the Moog Test Controller.

FEATURES	BENEFITS
Plug-n-play pre-engineered test systems with a servoactuator, servodrive, test controller and software	Easy installation, setup and operation Lower audible noise than pneumatics or hydraulics 70-90% energy savings over hydraulics and pneumatics
Genuine Moog components Brushless servomotor and ball screw technology State-of-the-art servodrive Real-time test controller and advanced software	Components designed and manufactured by Moog ensure system optimization and long term support at a competitive price
High efficiency Electro-mechanical Actuator	Low maintenance and energy usage costs Wide operating temperature range and IP65 Rating allow loading tests under different climate conditions
Built-in functional safety on the servo drive and cabinet Sized to the actuator Communicates via network to test controller	Compliance with IEC/EN 61508 A servo drive for every application EtherCAT fieldbus avoids potentially noisy analog signals
Real-time test controller integration	No new training for current users; new users will appreciate the simplified interfaces that allow complex tasks with minimal training

Pre-configured packages are available. Many other product combinations are possible so contact Moog to configure a system with the performance you need.



APPLICATIONS AND SOLUTIONS

SEAT BACK FATIGUE SYSTEMS

The servoactuator provides precise control of position or force perfectly suited for testing of seating systems and components. Electric multi-axis test systems provide better control of the loading, stroke, and frequency required for these tests because appropriately sized electric actuators with low inertia servomotors have no difficulty with loading ranges based on occupant movement nor the pressure fluctuation and seal friction issues of hydraulics and pneumatics at these loads.



DOOR CLOSURE TEST SYSTEMS



Closure tests are a vital part of measuring vehicle durability and quality. With the hood, door, sliding door, tailgate, decklid and more requiring cyclic durability regularly combined with hot/cold/humidity environments, Electric Multi-axis test systems can provide precise and repeatable position, velocity and force and record it all to provide reliability and confidence in your test results.

SEAT BELT ANCHORAGE TEST SYSTEMS

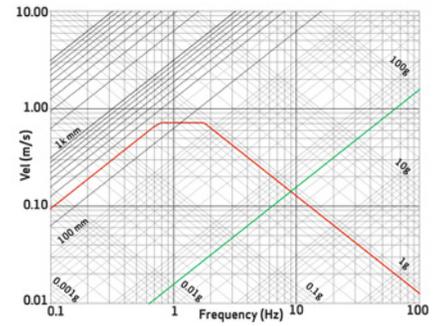
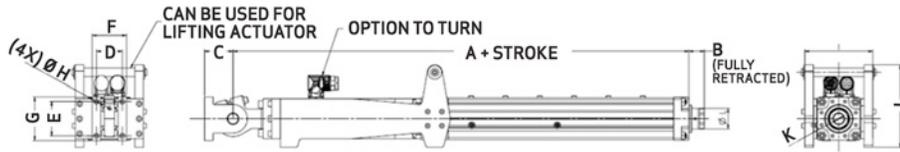
Moog electric multi-axis test systems are well suited for seat belt anchorage or similar strength tests because the industry standard load cells and absolute encoders provide fine resolution, the servomotors ramp loads smoothly and quickly, and the real-time test controller synchronizes all actuators by providing commands, recording signals, and monitoring safety data at thousands of points per second.



ELECTRIC ACTUATOR



High performance solutions delivers world-class motion control to a wide array of linear applications, ensuring high speed and high force in today's most demanding industrial environments.

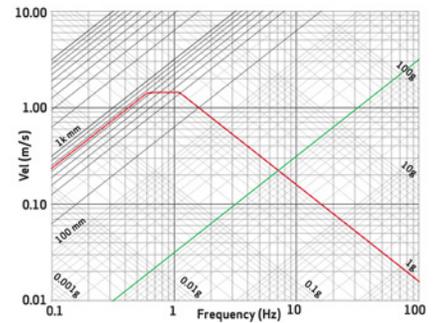


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ACTUATOR SPECIFICATIONS

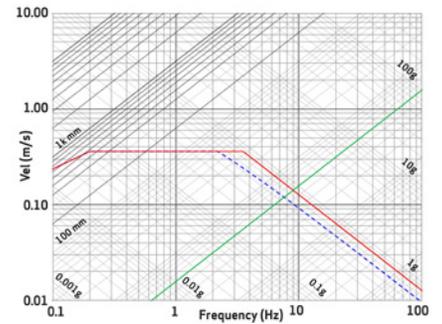
Actuator	A	B	C	D	E	F	G	H	I	J	K	L	
SIZE 3	496.5	27.0	50	45.0	60.0	60.0	76	9	132	143.0	M20x1.5	28	36
SIZE 5	814.5	60.0	85	114.3	114.3	149.3	143	17	210	231.5	M33x2	56	70
SIZE 6	1111.5	74.5	85	114.3	114.3	149.3	143	17	255	279.0	M42x2	56	85

Actuator	Stroke	Actuator + Rear Interface weight (kg)
-883-813A0300GXX0B	300	17.4
-883-813A0750GXX0D	750	23.25
-885-813A0750GXX0B	750	116.9
-886-913A0750GXX0D	750	243.15

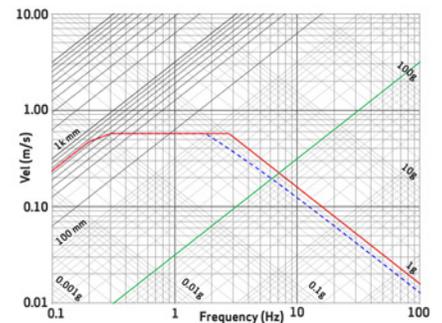


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Actuator	Stroke [mm]	Continuous Force (Still) [kN]	Peak Force (<1 min) [kN]	Max Velocity [m/sec]	Max Acceleration [m/s ²]
-883-813A0300G110B	300	2	7	0.720	8.0
-883-813A0750G110B	750				
-883-813A0300G110D	300	1	3.5	1.440	10.0
-883-813A0750G110D	750				
-884-913A0300G110B	300	6	20	0.500	8.0
-884-913A0750G110B	750				
-884-913A0300G110D	300	3	10	1.000	10.0
-884-913A0750G110D	750				
-885-813A0300G110B	300	13	34	0.360	8.0
-885-813A0750G110B	750				
-886-913A0300G110B	300	40	115	0.286	8.0
-886-913A0750G110B	750				
-886-913A0300G110D	300	20	61	0.571	10.0
-886-913A0750G110D	750				



-885-813A0750G110B



-886-913A0750G110D

- Continuous
- Peak
- min stroke for continuous cyclic movement

These actuators represent a subset of the available models and have been identified to meet the performance of similar testing applications. The models in **BOLD** represent the selected models for the test applications on the previous page and the performance plots on this page.

MOOG TEST CONTROLLER

The Moog Test Controller is a 1 to 32 channel real-time modular control system that can control or collect data from any hydraulic or electric test system. The robust and compact modules have a wide range of transducer inputs and control outputs that can be easily configured for optimum use. The Moog test software allows the end user to control and record all of these signals in an easy to use format providing maximum value for many years of reliable usage.



FEATURES	BENEFITS
Familiar feature-rich software: configurable hardware bindings, wizard for calibration, powerful control loops	No new training for current users; new users will appreciate the simplified interfaces that allow complex tasks with minimal training
Easier 1 piece modules	With less parts to manage, moving hardware between controllers is safer
Easier upgrades in future with CPU module and Manifold Control Unit	Modular design permits low cost upgrades to take advantage of rapidly improving technology or controller expansion
Higher density I/O per module	Lower cost per connection with more I/O packed into less space
Flexible I/O - Configurable Digital Input, Digital Output, Analog Input or Accelerometer (ICP)	One connection can be used to serve different functions giving you no added cost options as your test needs change
1 to 32 channel expansion easier	Low cost controller expansion with space saving channel or data acquisition modules avoiding expensive racks with limited slots
Better 24-bit signal resolution	32 times improvement in signal resolution over 19-bit, giving better precision to control or recorded data

CONTROL CABINET

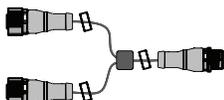
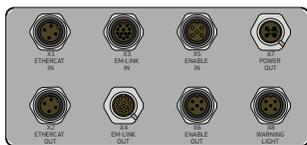
All electronics to control the actuators (servo-drives, circuit breakers, line filters, etc) are contained in a control cabinet. The control cabinet can be delivered free-standing or with transport wheels, and has an intuitive and quick connection panel to interface to the Moog Test Controller. Multiple cabinets can easily be put in series to the same controller, creating extra flexibility in the test setup.



Dimensions	Depth: 612mm Height: 1400mm Width options: 600 / 800 / 1200mm Cabinet width is depending on channel count and size. Multiple cabinets can be selected to support a maximum of 9 channels
Ambient Operating Temperature	10-30°C Non operating -20-55°C Storage -25-55°C
Mains power	3x400VAC - 440VAC - 460VAC +- 10% 50/60 Hz Three Phase + PE
Fusing	Mains fuse type C Mains fuse rating depends on amount of channels and size of channels. Fuse starts at 3x16A
Power Consumption	Power Consumption is depending on channel count and applied signal. 1 Size 3 actuator typical: 1000W
Cabinet base options	- Fixed base (forklift transportable) - Wheels
Operating Relative Humidity	20-80% non-condensing Non operating/storage 10-95%
IP rating	IP54

CABINET CONNECTIONS

For Moog Servo Drive 6A, 12A, 24A and 60A



Power Cable
CB88616-503-015
Y distributor cable
Parallel - 4P-MS/2x 4P-F5



Ethercat Cable
CB88616-130-010
Network cable - NBC-MSD/L1,0-93G/MSD SCO



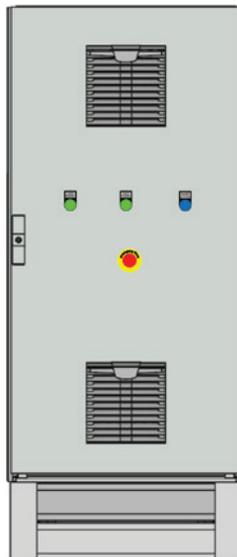
Emergency Coupling Circuit
CB88616-505-010
EM cable - 12P-MS/12P-F5



Emergency Loopback Terminal
CB88613-502
EM-Jumper - EM-OUT



Enable Cable
CB88616-170-010
Sensor/actuator cable - SAC-5P-MS/5,0-186/FS SCO



Included in cabinet order



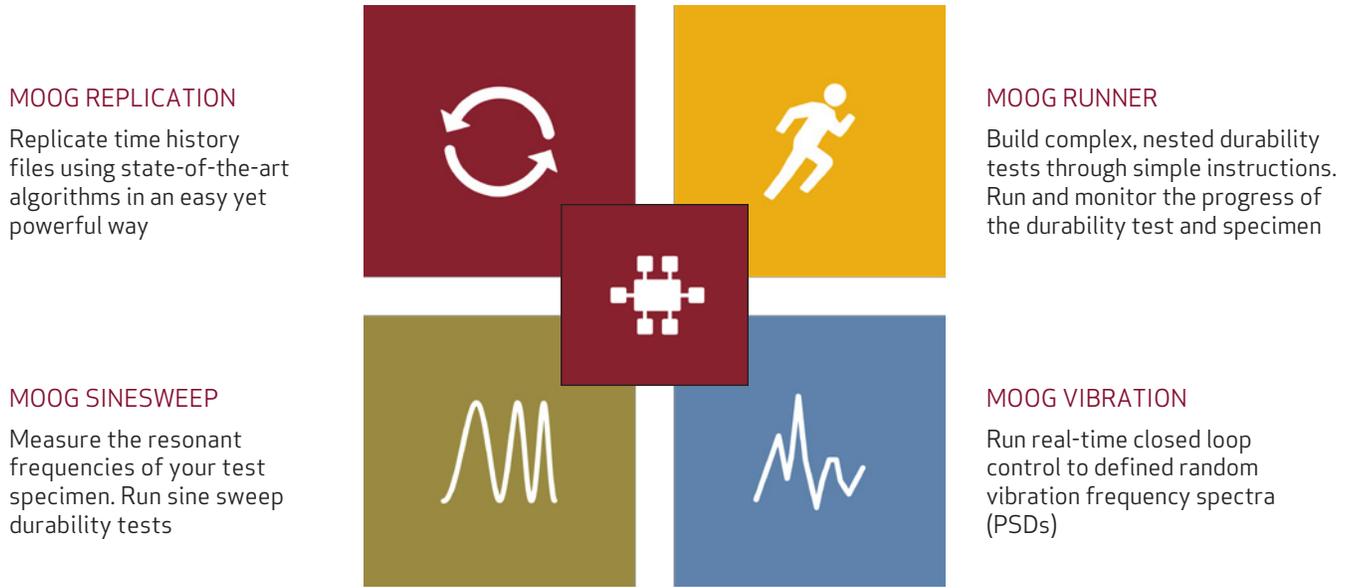
- Cabinet provides :
- Moog Servo Drive installation: CE conformity
 - Safety Circuit (slave)
 - EtherCAT (slave)
 - Supply Power for Moog Servo Drive
 - Actuator Protection (Position Velocity Guard)
 - Optional Manual Actuator Control (Slow extend / retract)

Required 
Motor Cable 10[m]
C08336-001-xxx
CB05708-001-xxx
CA98676-001-xxx

Required 
Encoder cable: 10[m]
CB05269-507-XXX

SOFTWARE TO MEET YOUR NEEDS

Moog Integrated Test Suite is the core to operating complex tasks in easy-to-use ways. Complementing the Integrated Test Suite software are several optional application packages to expand control, capability and test performance.



CONTROL YOUR TEST WITH THE MOOG INTEGRATED TEST SUITE

Configure, calibrate and tune equipment with easy-to-use setup screens and then build and play simple to complex test sequences for durability tests.

Key Features	User Benefits
<p>Supports multiple test systems</p> <ul style="list-style-type: none"> Single and multi-axis hydraulic or electric test systems, Hydraulic Simulation Tables, Electric Simulation Tables, Tire Coupled Simulation Systems 	<p>One controller platform for many uses</p> <ul style="list-style-type: none"> User interface includes configuration, calibration, tuning and test players for strength, fatigue or vibration tests
<p>Integrated suite</p> <ul style="list-style-type: none"> Utilize a variety of functions for simple or complex tasks 	<p>User friendly and intuitive</p> <ul style="list-style-type: none"> One learning curve for operating different test rigs Supports less experienced operators or total control for advanced users High value software without hidden extras Additional capability with optional application software
<p>Real time motion control</p> <ul style="list-style-type: none"> Multiple control loops, amplitude and phase matching, bumpless control switching, data acquisition 	<p>Test accuracy and efficiency</p> <ul style="list-style-type: none"> Optimal control and data recording across all channels minimizes setup and run time
<p>Maximum access to configurable hardware</p> <ul style="list-style-type: none"> Bind the high density I/O needed to the test station, easily calibrate sensors 	<p>Cost effective hardware and software combination</p> <ul style="list-style-type: none"> High utilization of available I/O Quick setup leads to more testing uptime
<p>Customize your user interface</p> <ul style="list-style-type: none"> Multi-language support (9 languages including English, German, and Chinese) Save/load user interface layouts (scopes/meters) User authentication (levels of access) 	<p>Efficient localization</p> <ul style="list-style-type: none"> Preferred language Time saving monitor sets Control access to key information
<p>Several players built-in to run your test</p> <ul style="list-style-type: none"> Cycle player- multi-axis phased operation with target matching and recording Sequence player- create custom tests with ramp, cycle, drive file instructions, recordings and/or triggered actions 	<p>One software package to run simple or advanced tests</p> <ul style="list-style-type: none"> One user interface to run and monitor simple fatigue tests, or monitor complex tests with nested instructions, data recording, and dozens of triggered actions

TEST PRODUCTS

Moog engineers are always ready to meet your unique application needs with building blocks or complete turnkey systems that include hydraulic and electric test actuators, servo valves, hydraulic service manifolds, test controllers, software and more.

SERVO VALVES



Because we design our renowned Moog Servo Valves, the world standard in performance and durability, you're assured of a system tailored to your exacting requirements.

HYDRAULIC SERVICE MANIFOLDS



The Moog Hydraulic Service Manifold (HSM) provides on/off hydraulic pressure with an adjustable transition from off to high pressure. Filters protect sensitive servo valves and accumulators provide instantaneous flow or pressure damping when needed. Several flow-rating sizes with 1 to 4 station options are available.

POLYMER BEARING ACTUATOR



The Moog Polymer Bearing Actuator was designed for higher reliability and safety. The 086-4 series actuator has a cushion at each end to ensure that the actuator will be decelerated before reaching end of stroke in both directions. The actuator's advanced coating used on the rod significantly improves seal wear for long life and less maintenance. A stainless steel rod utilizes proprietary seals and this unique rod coating to provide several performance advantages. This design also provides for a cleaner hydraulic operation creating a more environmentally friendly lab.

HYDRAULIC AND ELECTRIC SIMULATION TABLES



The human rated Electric Simulation Table, with the small Stewart platform footprint, incorporates electric actuators to deliver 6 degree-of-freedom motion. The test controller plays vibration spectra or time histories to provide exact control for comfort evaluation.

SERVICE AND SUPPORT

Five Point Inspection Process

Our number one goal is to eliminate downtime and make repairs that will deliver reliability and cost savings for years to come. When you send in your repair, it must work like new when you get it back. This is the Moog Global Support® promise.

- Incoming inspection will provide the customer details on the performance of the assembly. For actuators it could be leakage or response. For electronic modules it could be a non-functional connection. The inspection will also provide details to our technicians in regards to critical performance specs that need to be addressed.
- Technicians will then review engineering notes for any design improvements that may have been initiated since inception.
- Servo valves are removed and sent through the same rigorous evaluation, disassembly and test.
- Finally, the individual component or assembly will be tested to original specs to ensure the overhauled unit meets all design and performance criteria as if it were new.

Moog Engineering On Call For You

In today's competitive manufacturing environment, machine performance plays a significant role in determining your bottom line. Moog Global Support is key to achieving cost-effective machine operation, day in and day out.

We are committed to providing world-class motion control products and solutions, taking customer support far beyond the initial sale. Our dedicated approach solves your problems, addresses your machine challenges, and allows you to achieve maximum productivity on a daily basis.

Repair Capabilities

Moog Global Support® is designed to keep your critical machines up and running at peak performance with only 100% genuine Moog replacement parts. Only Moog replacement parts can deliver the reliability, versatility and long life that you would expect from a world leader in motion control solutions. Each Moog part delivers essential components with precise dimensions, close tolerances and specifications. Because we understand the key role our parts play in the overall operation of your machine, we carefully inspect and test each repair to identify only those components that need replacement.

The Moog Difference

It's time you worked with a partner who can offer both the world-class products you desire and collaborative expertise you need to reach the next level of performance. Contact us today to see the difference Moog can make.



THINKING ABOUT AN UPGRADE?

Our servo valve products include cleaning, repair and trade-in programs to keep you running or using the latest technology.

Our software maintenance agreements keep you up-to-date with the latest features, stabilizing updates, and ease-of-use improvements.

Our control hardware includes updates to processors, storage space, and multi-range conditioners as changes occur to add years of useful life to your initial purchase.

Do you have an analog test controller? Moog can provide a digital controller to provide commands to the existing controller as a transition to full digital or a drop-in replacement in one step. Why not take advantage of the many features digital controls can bring to your tests like advanced control loops and sequenced tests, built-in data acquisition, and settings that can be saved for future use. Contact Moog for more details!



TAKE A CLOSER LOOK.

Moog designs a range of products that complement the performance of those featured in this catalog. Visit our website for more information or contact the Moog facility nearest you.

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