HYDRAULIC TEST ACTUATOR

DOUBLE-ENDED

Rev.C, July 2024

DELIVERING FLEXIBILITY AND RELIABILITY FOR A RANGE OF SINGLE-AND MULTI-AXIS TEST SYSTEMS

MOOG | Shaping the way our world moves™

Whenever the highest levels of motion control performance and design flexibility are required, you'll find Moog expertise at work. Through collaboration, creativity and world-class technological solutions, we help you overcome your toughest engineering obstacles. Enhance your machine's performance, achieve greater effiiencies and help take your thinking further than you ever thought possible.

PRODUCT OVERVIEW

Fatigue rated actuators are the heart of high performance test systems. For years, test engineers have been looking for actuators that deliver dependability, less maintenance and high performance, yet are available at an affordable price. Their goal has been to expedite tests to obtain accurate test results more efficiently.

With deep roots in electro-hydraulic servo control expertise and global test experience, Moog has designed servo actuators for some of the world's most demanding applications—from Primary Flight Control System Actuators to Automatic Gap Control Actuators used in a steel mill product line.

Today, Moog has further developed a new series of Actuators, the C086A7 Double-Ended Hydraulic Test Actuator to meet the critical test needs of test engineers.

Actuator Series Code: C086A7

Features	Benefits
8 rated dynamic forces: 15 kN (3.3kip) to 1000 kN (220 kip) 4 standard working strokes: 100mm (4 inch), 150mm (6 inch), 250mm (10 inch) , 500 mm (20 inch) Multiple combinations: Building-block design and other options to create different actuator configurations to suit your unique application needs	Many standard offerings for a wide variety of applications
High performance seal solution, long life bearings Robust and rigid servo valves, contact-less linear position sensors and fatigue-rated load cells	Long life and low friction
High side-load capacity hybrid polymer bearings	Higher side-load capacity and increased durability, longer service time for more demanding applications
Industrial leading Moog G761, 72 and 79 series Servo Valves are installed to provide high dynamic, accurate and robust actuator control	High performance servo control

Solutions Built Around You

Moog Polymer Bearing Test Actuator delivers higher reliability, less maintenance for test labs that seek a cost-effective solution yet expect to maintain their competitive edge in the market.

Moog engineers combine the use of the latest tools and their vast experience in a variety of applications to ensure high performance from design to delivery. A rigorous physical testing program ensures that our customers receive components that they can rely on for years of trouble-free operation. The combination of innovative design, world-class manufacturing and responsive worldwide customer support makes Moog components the ideal solution for test labs that offer more reliability and the highest performance.

Typical Applications:

- Automotive durability testing
- Rolling stock structural testing
- Aerospace fatigue testing
- Civil engineering structural testing
- Package vibration testing

SPECIFICATIONS

Key Actuator Specifications

Model Number	Nominal Force	Static Force*	Full Stroke	Working Stroke	Cushion Length/ End	Rod Dia.	Dore Dia.	Piston Area
Unit	**kN (kip)**	**kN (kip)**	**mm (in)**	**mm (in)**	**mm (in)**	**mm (in)**	**mm (in)**	**cm² (in²)**
C086A73	15 (3.3)	19.9 (4.5)	180,230,330 (7.1,9.1,13.0)	100,150, 250 (4,6,10)	20 (0.79)	45 (1.8)	57 (2.2)	9.6 (1.5)
C086A74	25 (5.5)	31.6 (7.1)	180,230,330 (7.1,9.1,13.0)	100,150, 250 (4,6,10)	20 (0.79)	45 (1.8)	63 (2.5)	15.3 (2.37)
C086A75	50 (11)	58.5 (13.2)	180, 230, 330, 580 (7.1, 9.1, 13.0, 22.8)	100, 150, 250, 500 (4, 6, 10, 20)	20 (0.79)	80 (3.1)	100 (3.9)	28.3 (4.39)
C086A76	100 (22)	130.1 (29.2)	140, 190, 290, 540 (5.5, 7.5, 11.4, 21.3)	100, 150, 250, 500 (4, 6, 10, 20)	20 (0.79)	80 (3.1)	120 (4.7)	62.8 (9.74)
C086A77	150 (33)	170.7 (38.4)	140, 190, 290, 540 (5.5, 7.5, 11.4, 21.3)	100, 150, 250, 500 (4, 6, 10, 20)	20 (0.79)	80 (3.1)	130 (5.1)	82.4 (12.8)
C086A79	250 (55)	280.0 (63.0)	140, 190, 290, 540 (5.5, 7.5, 11.4, 21.3)	100, 150, 250, 500 (4, 6, 10, 20)	20 (0.79)	100 (3.9)	165 (6.5)	135 (20.9)
C086A7A	500 (110)	617.8 (138.9)	124, 174, 274, 524 (4.9, 6.9, 10.8, 20.7)	100, 150, 250, 500 (4, 6, 10, 20)	12 (0.47)	140 (5.5)	240 (9.4)	298 (46.2)
C086A7B	1000 (220)	1047.4 (235.5)	124, 174, 274, 524 (4.9, 6.9, 10.8, 20.7)	100, 150, 250, 500 (4, 6, 10, 20)	12 (0.47)	160 (6.3)	300 (11.8)	506 (78.4)

*Calculated at 207 bar (3000 psi).

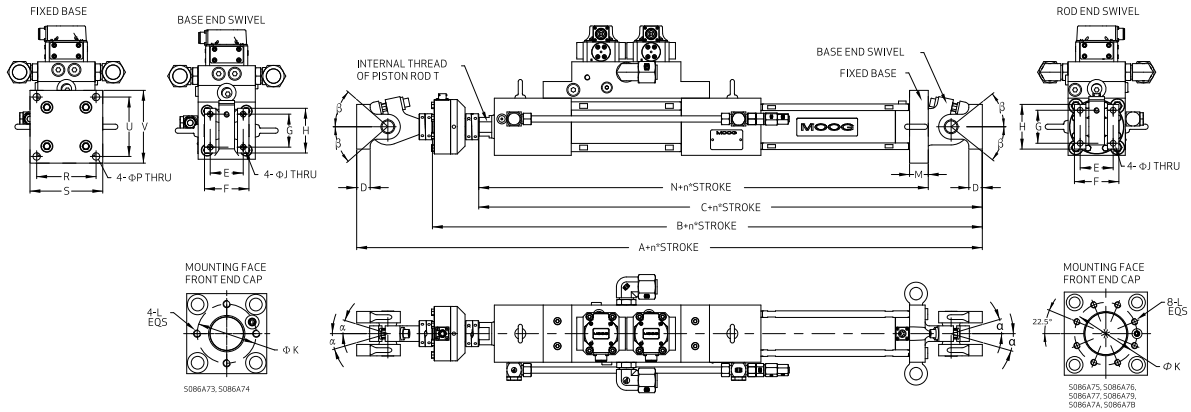
SPECIFICATIONS

Additional Specifications

Pressure	
Operating Pressure	210 bar (3000 psi)
Maximum Return Pressure	14 bar (200 psi)
Maximum Drain Pressure	3.5 bar (50 psi)
Seal	
Material	NBR
Hydraulic Interface	
Pressure Line	SAE 37 ° FLARE (ISO8434-2) -16 (G761 Manifold) -24 (72, 79-100 and 79-200 series Manifold)
Return Line	SAE 37 ° FLARE (ISO8434-2) -16 (G761 Manifold) -24 (72, 79-100 and 79-200 series Manifold)
Drain Line	SAE 37 ° FLARE (ISO8434-2) -6
Operation Temperature Range	
Hydraulic Oil Temperature	24 to 57 °C (75 to 134 °F)
Oil Requirements	
System Fluid	Industrial hydraulic fluid per DIN 51524 parts 1 to 3 and ISO VG 32, 46, or equivalent
Cleanliness Level	ISO 4406 (SAE J1165) 15/14/11 (NAS 5)
Electrical Interface	
Transducer Specification	
LVDT Position Transducer	LVDT excitation (3.5 Vrms @ 3kHz)
Standard electrical connector mates with the following, or equivalent (waterproof, IP65)	
G761 Servo Valve	MS3106F14S-2S
72 Servo Valve	MS3106F14S-2S
79 Servo Valve	MS3106F14S-2S (Pilot Valve) MS3106F14S-5S (Main Stage LVDT)
Position Transducer and Load cell	PT06A-10-6S
Delta-P Pressure Transducer	PT06A-8-4S

SPECIFICATIONS

Critical Dimensions



MODEL NUMBER	Nominal FORCE (kN/kip)	A		B		C		D mm(in)	E mm(in)
		FULLY RETRACTED n=2 mm(in)	FULLY EXTENDED n=3 mm(in)	FULLY RETRACTED n=2 mm(in)	FULLY EXTENDED n=3 mm(in)	FULLY RETRACTED n=2 mm(in)	FULLY EXTENDED n=3 mm(in)		
C086A73	15 (3.3)	904 (35.6)	984 (38.7)	758 (29.8)	838 (33.0)	669 (26.3)	749 (29.5)	26 (1.0)	63.5 (2.5)
C086A74	25 (5.5)	904 (35.6)	984 (38.7)	758 (29.8)	838 (33.0)	669 (26.3)	749 (29.5)	26 (1.0)	63.5 (2.5)
C086A75	50 (11)	1092 (43.0)	1172 (46.1)	861 (33.9)	941 (30.0)	735 (28.9)	815 (32.1)	36 (1.4)	114.3 (4.5)
C086A76	100 (22)	1198 (47.2)	1238 (48.7)	904 (35.6)	944 (37.2)	783 (30.8)	823 (32.4)	57 (2.2)	146 (5.7)
C086A77	150 (33)	1258 (49.5)	1298 (51.1)	969 (38.1)	1009 (39.7)	823 (32.4)	863 (34.0)	57 (2.2)	146 (5.7)
C086A79	250 (55)	1411 (55.6)	1451 (57.1)	1051 (41.4)	1091 (43.0)	905 (35.6)	945 (37.2)	60 (2.4)	184 (7.2)
C086A7A	500 (110)	1879 (74.0)	1903 (74.9)	1383 (54.4)	1407 (55.4)	1182 (46.5)	1206 (47.5)	80 (3.1)	241.3 (9.5)
C086A7B	1000 (220)	2057 (81.0)	2081 (82.0)	1510 (59.4)	1534 (60.4)	1247 (40.1)	1271 (50.1)	90 (3.5)	298.4 (11.7)

MODEL NUMBER	Nominal FORCE (kN/kip)	F mm(in)	G mm(in)	H mm(in)	J mm(in)	K mm(in)	T	L	M mm(in)
C086A73	15 (3.3)	85.5 (3.4)	63.5 (2.5)	86 (3.4)	11 (0.43)	81.3 (3.2)	M27X2 DEP.46	M10X1.5 DEP.16	36 (1.4)
C086A74	25 (5.5)	85.5 (3.4)	63.5 (2.5)	86 (3.4)	11 (0.43)	81.3 (3.2)	M27X2 DEP.46	M10X1.5 DEP.16	36 (1.4)
C086A75	50 (11)	149.3 (5.9)	114.3 (4.5)	143 (5.6)	17 (0.67)	120 (4.7)	M27X2 DEP.46	M12X1.75 DEP.20	47 (1.9)
C086A76	100 (22)	186 (7.3)	146 (5.7)	188 (7.4)	17 (0.67)	120 (4.7)	M33X2 DEP.46	M12X1.75 DEP.25	60 (2.4)
C086A77	150 (33)	186 (7.3)	146 (5.7)	188 (7.4)	17 (0.67)	145 (5.7)	M33X2 DEP.46	M16X2 DEP.25	60 (2.4)
C086A79	250 (55)	234 (9.2)	184 (7.2)	230 (9.1)	26 (1.0)	172 (6.8)	M42X2 DEP.53	M16X2 DEP.25	72 (2.8)
C086A7A	500 (110)	314.5 (12.4)	241.3 (9.5)	317.5 (12.5)	33.5 (1.3)	200 (7.9)	M72X2 DEP.90	M24X3 DEP.38	80 (3.1)
C086A7B	1000 (220)	378.4 (14.9)	298.4 (11.7)	406.4 (16.0)	43.9 (1.7)	320 (12.6)	M90X3 DEP.90	M30X3.5 DEP.45	80 (3.1)

MODEL NUMBER	Nominal FORCE (kN/kip)	N		P mm(in)	R mm(in)	S mm(in)	U mm(in)	V mm(in)	α	β
		FULLY RETRACTED n=2 mm(in)	FULLY EXTENDED n=3 mm(in)							
C086A73	15 (3.3)	565 (22.2)	645 (25.4)	14.2 (0.56)	114.3 (4.5)	140 (5.5)	114.3 (4.5)	140 (5.5)	±7°	±90°
C086A74	25 (5.5)	565 (22.2)	645 (25.4)	14.2 (0.56)	114.3 (4.5)	140 (5.5)	114.3 (4.5)	140 (5.5)	±7°	±90°
C086A75	50 (11)	576 (22.7)	656 (25.8)	17.3 (0.68)	146 (5.75)	188 (7.40)	146 (5.75)	188 (7.40)	±17°	±90°
C086A76	100 (22)	566 (22.3)	606 (23.9)	17.3 (0.68)	150 (5.9)	188 (7.40)	150 (5.9)	188 (7.40)	±17°	±90°
C086A77	150 (33)	606 (23.9)	646 (25.4)	17.3 (0.68)	165 (6.5)	200 (7.9)	165 (6.5)	200 (7.9)	±17°	±90°
C086A79	250 (55)	629 (24.8)	669 (26.3)	26 (1.0)	190 (7.5)	240 (9.4)	190 (7.5)	240 (9.4)	±14°	±90°
C086A7A	500 (110)	742 (29.2)	766 (30.1)	33.5 (1.3)	280 (11.0)	350 (13.8)	280 (11.0)	350 (13.8)	±6°	-30º±90°
C086A7B	1000 (220)	742 (29.2)	766 (30.1)	43.9 (1.7)	436 (17.2)	510 (20.1)	270 (10.6)	390 (15.4)	±8°	-30º±90°

NOTE: Factor n=2 (fully retracted); n=3 (fully extended)
Stroke = 100, 150, 250, and 500 mm

TECHNICAL FEATURES

Configurable Actuator To Meet Your Needs

Built-in Co-axial LVDT Position Sensor

Using just simple tools, the integrated co-axial LVDT can be null adjusted easily.

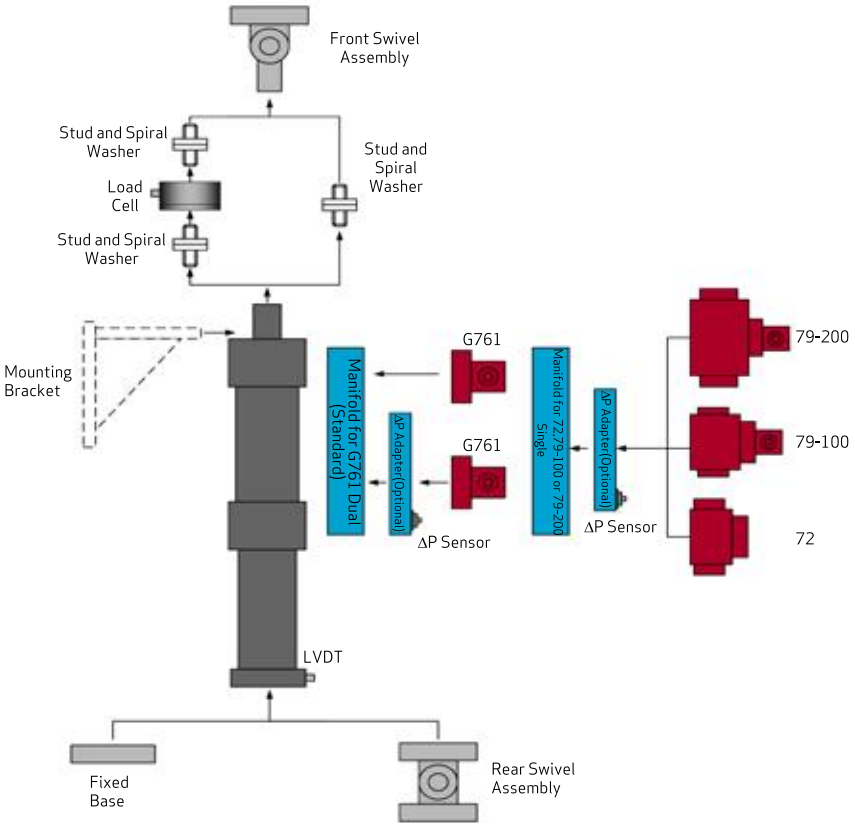
A variety of building blocks are available to configure the exact actuator per test rig design or application requirements (see illustrative drawing).

Various Moog high performance servo valves and load cells are provided to achieve optimal performance and sizing efficiency. Contact Moog for further customized solutions.

Mounting joints and bases are also provided to adapt to the installation requirements.

Key for configurations

- Joints and Bases
- Servo Valves
- Manifolds/Valve Adapters
- Load Cells
- Accessories



EXTENSIVE OPTIONS

Servo Valve Manifolds

- The G761 servo valve manifold is designed for two pieces of G761 servo valves to provide up to 126 l/min (33 gpm) of rated flow
- A high flow manifold ported for one of the Moog 72, 79-100 or 79-200 series servo valves can be selected to allow even higher velocities

Delta-P Sensor

- A Differential Pressure (Delta P) manifold block (including sensor) is an option that when connected to control electronics can enhance actuator dynamics and control

Mounting

- A front flange or bracket mounting bolt-circle is provided on the front end-bell
- Swivels can be selected for most common mounting configurations
- A fixed mounting base is also an option

Load Cell

- Fatigue-rated load cells are properly sized to provide reliable force feedback. Accessories such as Studs and Spiral Washers are typically provided together with the load cell

ORDER INFORMATION

C086 A 7XX X - X X X XXXX

Test Actuators

Model Revision

Actuator Type	
7	Double-Ended Actuator

Actuator Force Rating		
Specify	Frame Size	
	kN	kip
3	15	3.3
4	25	5.5
5	50	11.0
6	100	22.0
7	150	33.0
9	250	55.0
A	500	110.0
B	1000	220.0

Working Stroke Length		
Specify	Identify	
A	100 mm	4in
B	150mm	6in
D	250mm	10in
G*	500mm	20in

Servo Valve with Manifold		
Specify	Type	Max Rated Flow
A	G761 (ISO 10372-04-04-0-92)	63 l/min (16.5 gpm)
B	G761 HR (ISO 10372-04-04-0-92)	19 l/min (5 gpm)
C*	72(ISO 10372-06-05-0-92)	227 l/min (60 gpm)
D*	79-100 (ISO 10372-06-05-0-92)	227 l/min (60 gpm)
E	2 xG761 (ISO 10372-04-04-0-92)	2x 63 l/min (16.5 gpm)
F	2x G761 HR (ISO 10372-04-04-0-92)	2x 19 l/min (5 gpm)
J	G761 (ISO 10372-04-04-0-92)	38 l/min (10 gpm)
K	G761 (ISO 10372-04-04-0-92)	2x 38 l/min (10 gpm)
L*	79-200 (Moog standard Pattern)	378 l/min (100 gpm)
G	None - Manifold with Pattern ISO 10372-06-05-0-92	2x SV positions(G761)
H*	None - Manifold with Pattern ISO 10372-06-05-0-92	1x SV position(79-100)
P*	None - Manifold with 79-200 Pattern	1x SV position(79-200)
I	Special Manifold and/or SV	Consult Moog
* Valve options C, D, H, L and P are available only for 100 to 1000kN frame sizes		

Special	
SXXXX	Special
Blank	Standard

Force Sensor Coupling	
Specify	Type
N	None
W	Spiral Washers
L	Loadcell & Spiral Washers

Rod End Style	
Specify	Type
0	None
1	Swivel

Mounting Style	
Specify	Type
A	Swivel
B	Fixed Base

Delta-P Options	
Specify	Type
-	None
P	Delta-P Pressure Transducer

A HIGHER LEVEL OF SUPPORT

The actuator was designed to provide long life, and inexpensive, fast and easy repair when it is finally necessary. Moog can provide the typical wear items such as a replaceable bearing and the seals for your own repair. Or you can have Moog repair the actuator to a like-new condition.

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 actuator assembly such as leakage and response. 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.
- Actuator assembly will get completely disassembled to piece parts. Aqueous Ultrasonic cleaners are used to thoroughly clean each component before inspection and dimensional checks. Any components found too worn will be replaced with OEM parts. Critical components such as fitted rod and bearings will be dimensionally checked to ensure the component meets the print criteria. A complete seal kit replacement will be installed to ensure integrity of the structure.
- The servo valve will be removed and sent through the same rigorous evaluation, disassembly and test.
- Finally, the 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

Delivering world-class motion control products and solutions means taking customer support far beyond the initial sale. It requires a dedicated approach to solving your problems, addressing your machine challenges and helping you achieve maximum productivity on a daily basis. 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.

Actuator 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 specific materials 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.

Take The Next Step

Isn't it time you worked with a partner who can offer both the world-class products and collaborative expertise you need to reach the next level of performance? Contact us today and see for yourself the difference the right partner can make.

MOOG® GLOBAL SUPPORT

Spare Parts

Model Number	Seal Kit	Polymer Bearing (need 2 pieces/actuator)
C086A73	CB91979-901	CB85110A001
C086A74	CB89940-901	CB85110A001
C086A75	CB89971-901	CB85110A002
C086A76	CB91989-901	CB85110A002
C086A77	CC01299-901	CB85110A002
C086A79	CC03176-901	CB85110A003
C086A7A	CC03143-901	CB85110A004
C086A7B	CC48972-901	CB85110A005

MOOG TEST PRODUCTS-FOR EVERY TESTING NEED

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

Test Controllers and Software

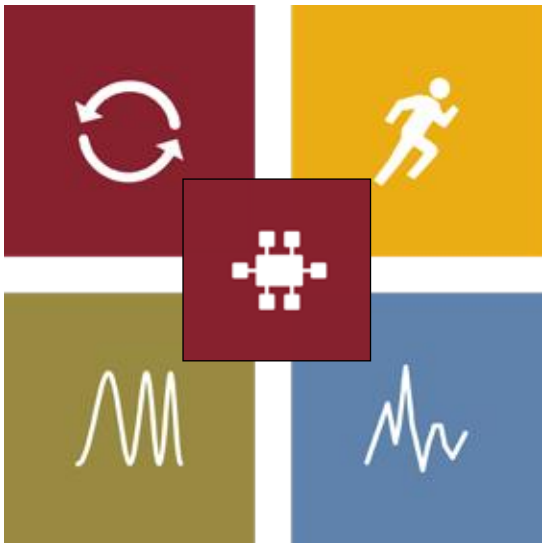
The Moog Test Controller is a real-time modular control system that can control or collect data from any hydraulic or electromechanical test system. The robust and compact modules have a wide range of transducer inputs and control outputs that can be easily configured for optimum use. The Moog Test Software 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.

MOOG REPLICATION

Replicate time history files using state-of-the-art algorithms in an easy yet powerful way

MOOG SINESWEEP

Measure the resonant frequencies of your test specimen. Run sine sweep durability tests



MOOG RUNNER

Build complex, nested durability tests through simple instructions. Run and monitor the progress of the durability test and specimen

MOOG VIBRATION

Run real-time closed loop control to defined random vibration frequency spectra (PSDs)

Hydrostatic Bearing Test Actuator

- Used in the Standard Hydraulic Simulation Table
- Innovative 8 pocket hydrostatic bearing increases side load capacity to 60% of stall output and reduces energy requirements
- Higher level of dynamic performance, reliability, and longevity
- Advanced coating used on the rod significantly improves seal wear for long life and less maintenance
- Fully integrated manifold eliminates the need for any external piping

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 stations options are available.

Moog 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.

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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Hydraulic Test Actuator - Double-Ended
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