

HYDRAULIC TEST ACTUATOR SINGLE-ENDED



Rev. - February 2018

DELIVERING FLEXIBILITY AND
RELIABILITY FOR A RANGE OF SINGLE
AND MULTIPLE CHANNEL TEST SYSTEMS

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 efficiencies and help take your thinking further than you ever thought possible.

INTRODUCTION

Overview3

TECHNICAL DATA

Specifications4

Dimensions.....6

Technical Features9

ORDERING INFORMATION

Ordering Code.....11

BACKGROUND

Support12

Test Products13



This catalog is for users with technical knowledge. To ensure that all necessary characteristics for function and safety of the system are given, the user has to check the suitability of the products described herein. The products described herein are subject to change without notice. In case of doubt, please contact Moog.

Moog is a registered trademark of Moog Inc. and its subsidiaries. All trademarks as indicated herein are the property of Moog Inc and its subsidiaries. For the full disclaimer refer to www.moog.com/literature/disclaimers.

For the most current information, visit www.moog.com/industrial or contact your local Moog office.

©Moog Inc. 2018. All rights reserved. All changes are reserved.

OVERVIEW

Actuators are at the heart of high performance test systems such as those used for aerospace structural testing. 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 expectation 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 steel mill production line.

Today, Moog engineers have further developed a new series of Actuators, the C086A3 Single-Ended Hydraulic Test Actuator to meet the critical test needs of test engineers.

Actuator Series Code: C086A3

Features	Benefits
8 force sizes as standard (Tension force): • 14 kN (3.0 kip) • 31 kN (6.8 kip) • 63 kN (13.8 kip) • 98 kN (21.5 kip) • 149 kN (32.7 kip) • 284 kN (62.4 kip) • 453 kN (99.6 kip) • 1137 kN (250.1 kip) 4 stroke lengths as standard: • 300 mm (12 in) • 500 mm (20 in) • 750 mm (30 in) • 1000 mm (40 in)	Wide array of sizes and flexibility Easy to size and fit the applications
<ul style="list-style-type: none"> • Regular manifold with up to 2xG761 high performance servo valves • Safety-Abort Manifold for large scale, multiple channel and synchronized aerospace testing • Filter add-on 	Wider servo valve selection – meet the speed and response required Ultimate safety and protection to test article Contamination free and protect servo valve
<ul style="list-style-type: none"> • “Building Block” concept and COTS (Commercial-Off-The-Shelf) components 	Quick selection and short lead time Lower acquisition cost
<ul style="list-style-type: none"> • Contact-less, coaxial linear position sensors • Position sensor multiple output signal format 	Performance – higher durability and more reliable Easy to adapt to any test controller
High accuracy loadcell, dual-bridge	Higher test accuracy and test safety
Multiple mounting options	Wider mounting options to ease the selection and adaptation to application
Multiple hydraulic porting	Easy and flexibility to adapt to specific application scenarios

Solutions Built Around You

Moog Single-Ended Hydraulic Test Actuator delivers higher reliability, less maintenance and cost-effective performance for test labs seeking the competitive edge.

Typical Applications:

- Aerospace structural static and fatigue testing
- Civil engineering testing
- General industrial servo control applications

SPECIFICATIONS

Model Number	Construction Style	Nominal Force		Rod Dia	Bore Dia	Effective Area		Working Stroke
		Tension	Compression			Tension	Compression	
		kN (kip)	kN (kip)	mm (in)	mm (in)	mm ² (in ²)	mm ² (in ²)	mm (in)
CO86A31	Tie Rod Style	14 (3.1)	40 (9.0)	40 (1.6)	50 (2.0)	710 (1.1)	1963 (3.04)	300,500,750,1000 (12,20,30,40)
CO86A32		31 (7.0)	64 (14.4)	45 (1.8)	63 (2.5)	1527 (2.37)	3117 (4.83)	300,500,750,1000 (12,20,30,40)
CO86A33		63 (14.2)	104 (23.4)	50 (2.0)	80 (3.1)	3063 (4.75)	5027 (7.79)	300,500,750,1000 (12,20,30,40)
CO86A34		98 (22)	162 (36.4)	63 (2.5)	100 (4.0)	4737 (7.34)	7854 (12.17)	300,500,750,1000 (12,20,30,40)
CO86A35		149 (33.5)	253 (56.9)	80 (3.1)	125 (4.9)	7245 (11.23)	12272 (19.02)	300,500,750,1000 (12,20,30,40)
CO86A36		284 (63.8)	416 (93.5)	90 (3.5)	160 (6.3)	13744 (21.3)	20106 (31.16)	300,500,750,1000 (12,20,30,40)
CO86A37	Column Style	453 (101.8)	650 (146.1)	110 (4.3)	200 (7.9)	21913 (33.97)	31416 (48.69)	300,500,750,1000 (12,20,30,40)
CO86A38		1137 (255.6)	1663 (373.9)	180 (7.1)	320 (12.6)	54978 (85.22)	80425 (124.66)	300,500,750,1000 (12,20,30,40)

*Calculated at 207 Bar (3000 psi)



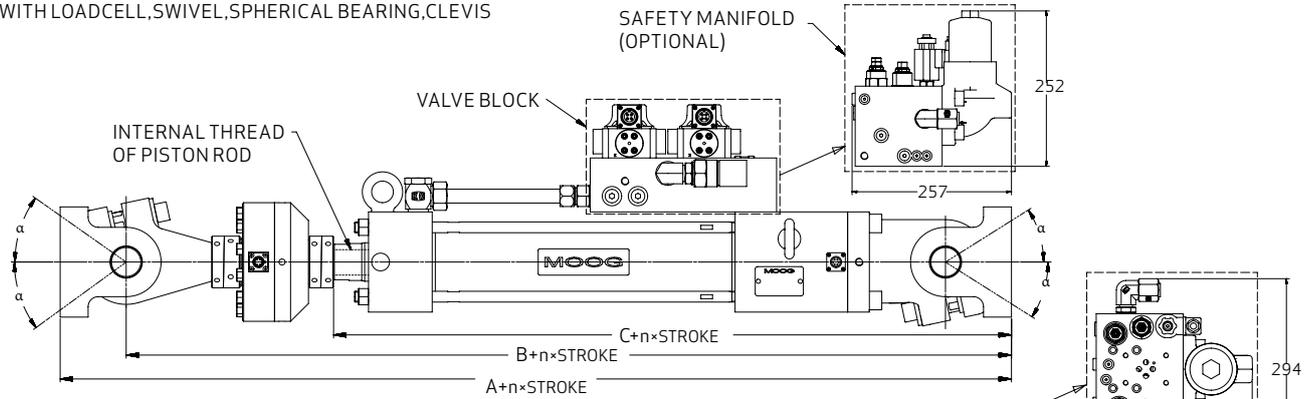
Additional Actuator Specifications

Pressure	
Operating pressure	21 MPa (3000 psi)
Maximum return pressure	1.4 MPa (200 psi)
Maximum drain pressure	0.35 MPa (50 psi)
Seal	
Material	NBR as standard
Hydraulic Interface	
Pressure line	JIC 37° Flare End (SAE -12), or Male quick coupling 1/2"-14 BSPP
Return line	JIC 37° Flare End (SAE -12), or Female quick coupling 1/2"-14 BSPP
Drain line	JIC 37° Flare End (SAE -6), or Male quick coupling 1/4"-19 BSPP
Operation Temperature Range	
Hydraulic oil temperature	24 °C (75 °F) to 57 °C (134 °F)
Oil Requirements	
System fluid	Hydraulic oil as 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)
Standard electrical connector mates with following, or equivalent (IP65)	
G761 servo valve	MS3106F14S-2S
Position transducer & load cell	PT06A-10-6S

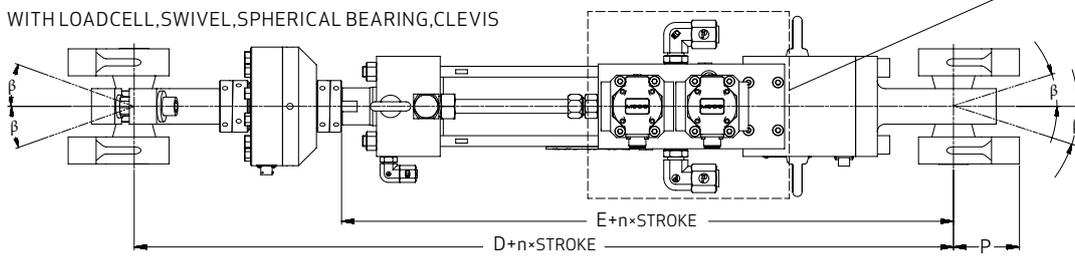


DIMENSIONS - TIE ROD STYLE (C086A31/A32/A33/A34/A35/A36)

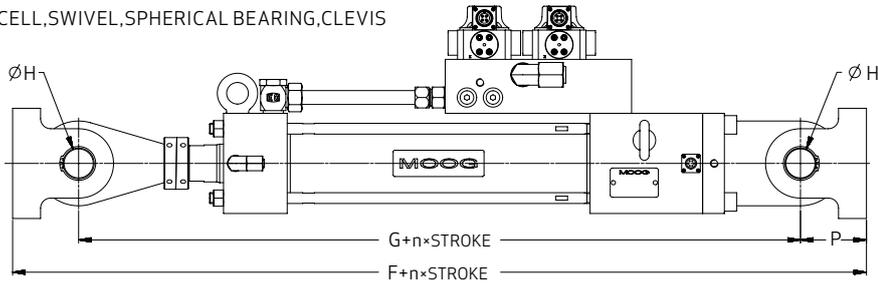
WITH LOADCELL, SWIVEL, SPHERICAL BEARING, CLEVIS



WITH LOADCELL, SWIVEL, SPHERICAL BEARING, CLEVIS

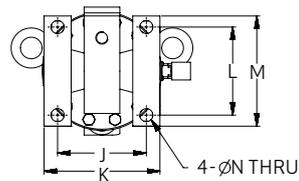
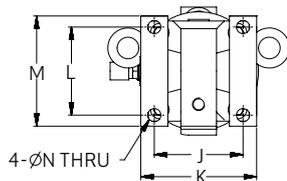


WITHOUT LOADCELL, SWIVEL, SPHERICAL BEARING, CLEVIS



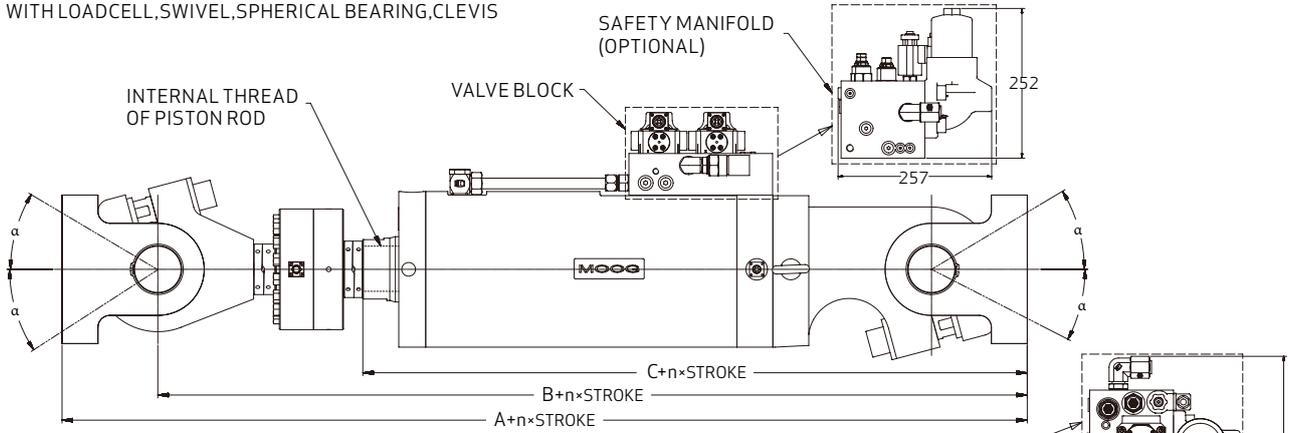
BASE END

ROD END

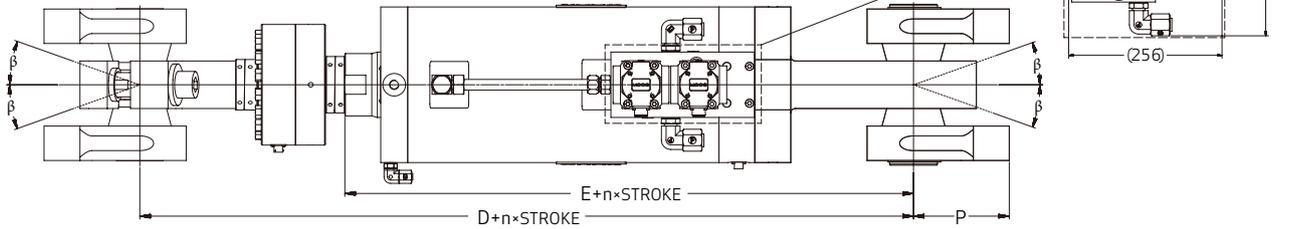


DIMENSIONS - COLUMN STYLE (C086A37/A38)

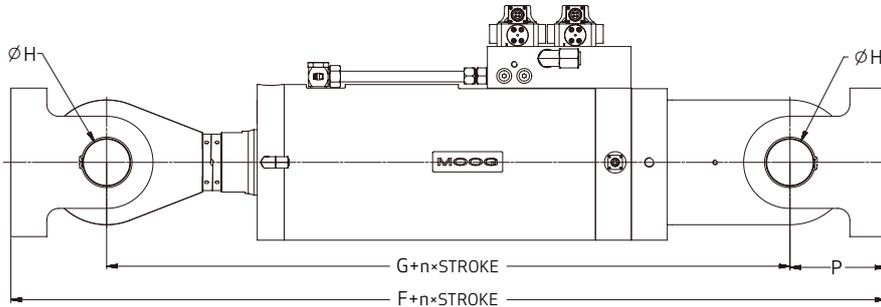
WITH LOADCELL, SWIVEL, SPHERICAL BEARING, CLEVIS



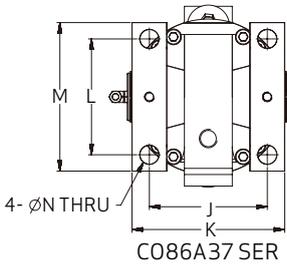
WITH LOADCELL, SWIVEL, SPHERICAL BEARING, CLEVIS



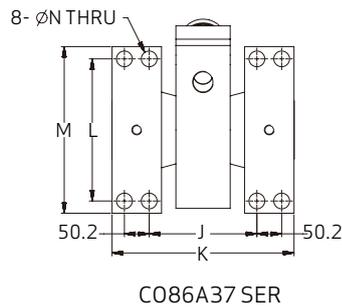
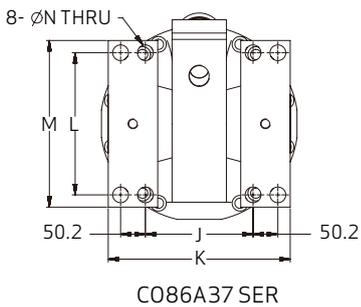
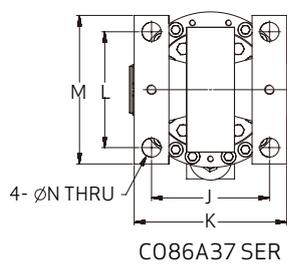
WITHOUT LOADCELL, SWIVEL, SPHERICAL BEARING, CLEVIS



BASE END



ROD END



Model Number	Nominal Force kN (kip)	A		B		C		D	
		FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)	FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)	FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)	FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)
CO86A31	14/40 (3.1/9.0)	691 (27.2)	691 (27.2)	631 (24.8)	631 (24.8)	455 (17.9)	455 (17.9)	571 (22.5)	571 (22.5)
CO86A32	31/64 (6.9/14.4)	725 (28.5)	725 (28.5)	665 (26.2)	665 (26.2)	489 (19.3)	489 (19.3)	605 (23.8)	605 (23.8)
CO86A33	63/104 (14.1/23.4)	925 (36.4)	925 (36.4)	840 (33.1)	840 (33.1)	573 (22.6)	573 (22.6)	755 (29.7)	755 (29.7)
CO86A34	98/162 (22.0/36.4)	952 (37.5)	952 (37.5)	867 (34.1)	867 (34.1)	599 (23.6)	599 (23.6)	782 (30.8)	782 (30.8)
CO86A35	149/253 (33.5/56.9)	1125 (44.3)	1125 (44.3)	997 (39.3)	997 (39.3)	704 (27.7)	704 (27.7)	869 (34.2)	869 (34.2)
CO86A36	284/416 (63.9/93.6)	1293 (50.9)	1293 (50.9)	1135 (44.7)	1135 (44.7)	792 (31.2)	792 (31.2)	977 (38.5)	977 (38.5)
CO86A37	453/650 (101.9/146.2)	1313 (51.7)	1313 (51.7)	1153 (45.4)	1153 (45.4)	810 (31.9)	810 (31.9)	993 (39.1)	993 (39.1)
CO86A38	1137/1663 (255.8/374.1)	1702 (67.0)	1702 (67.0)	1492 (58.7)	1492 (58.7)	967 (38.1)	967 (38.1)	1492 (59.7)	1492 (59.7)

Model Number	Nominal Force kN (kip)	E		F		G		H mm (in)	T mm (in)
		FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)	FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)	FULLY RETRACTED n=1 mm (in)	FULLY EXTENDED n=2 mm (in)		
CO86A31	14/40 (3.1/9.0)	395 (15.6)	395 (15.6)	601 (23.7)	601 (23.7)	481 (18.9)	481 (18.9)	25 (1.0)	M27X2 T40
CO86A32	31/64 (6.9/14.4)	429 (16.9)	429 (16.9)	635 (25.0)	635 (25.0)	515 (20.3)	515 (20.3)	25 (1.0)	M27X2 T40
CO86A33	63/104 (14.1/23.4)	488 (19.2)	488 (19.2)	800 (31.5)	800 (31.5)	630 (24.8)	630 (24.8)	40 (1.6)	M27X2 T60
CO86A34	98/162 (22.0/36.4)	514 (20.2)	514 (20.2)	826 (32.5)	826 (32.5)	656 (25.8)	656 (25.8)	40 (1.6)	M27X2 T50
CO86A35	149/253 (33.5/56.9)	576 (22.7)	576 (22.7)	999 (39.3)	999 (39.3)	743 (29.3)	743 (29.3)	60 (2.4)	M27X2 T50
CO86A36	284/416 (63.9/93.6)	634 (25.0)	634 (25.0)	1142 (45.0)	1142 (45.0)	842 (33.1)	842 (33.1)	80 (3.1)	M27X2 T60
CO86A37	453/650 (101.9/146.2)	650 (25.6)	650 (25.6)	1162 (45.7)	1162 (45.7)	842 (33.1)	842 (33.1)	80 (3.1)	M52X2 T105
CO86A38	1137/1663 (255.8/374.1)	1282 (50.5)	1282 (50.5)	1463 (57.6)	1463 (57.6)	1043 (41.1)	1043 (41.1)	120 (4.7)	M52X2 T110

Model Number	Nominal Force kN (kip)	J mm (in)	K mm (in)	L mm (in)	M mm (in)	N mm (in)	P mm (in)	α	β
CO86A31	14/40 (3.1/9.0)	63.5 (2.5)	85.5 (3.4)	63.5 (2.5)	86 (3.4)	11 (0.4)	60 (2.4)	7°	80°
CO86A32	31/64 (6.9/14.4)	63.5 (2.5)	85.5 (3.4)	63.5 (2.5)	86 (3.4)	11 (0.4)	60 (2.4)	7°	80°
CO86A33	63/104 (14.1/23.4)	114.3 (4.5)	149.3 (5.9)	114.3 (4.5)	143 (5.6)	17 (0.7)	85 (3.3)	17°	90°
CO86A34	98/162 (22.0/36.4)	114.3 (4.5)	149.3 (5.9)	114.3 (4.5)	143 (5.6)	17 (0.7)	85 (3.3)	17°	90°
CO86A35	149/253 (33.5/56.9)	146 (5.7)	186 (7.3)	146 (5.7)	188 (7.4)	17 (0.7)	128 (5.0)	17°	90°
CO86A36	284/416 (63.9/93.6)	148 (7.2)	234 (9.2)	184 (7.2)	230 (9.1)	26 (1.0)	158 (6.2)	14°	90°
CO86A37	453/650 (101.9/146.2)	197 (7.8)	255 (10.0)	195 (7.7)	250 (9.8)	32 (1.3)	160 (6.3)	14°	90°
CO86A38	1137/1663 (255.8/374.1)	218.1 (8.6)	368.5 (14.5)	290 (11.4)	340 (13.4)	32 (1.3)	210 (8.3)	6°	90°

Notes:
 FACTOR n = 1 (FULLY RETRACTED)
 n = 2 (FULLY EXTENDED)
 STROKE = 300 mm, 500 mm, 750 mm, AND 1000 mm

CONFIGURATION ACTUATOR TO MEET YOUR NEEDS

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

Various Moog high performance servo valves and load cells are provided to help application engineer to pick up the right one for a specific actuator to avoid over-sizing or under-sizing. Mounting joints and bases are also provided to adapt to the installation requirements.

OPTIONS

Regular Manifold and Safety-Abort Manifold

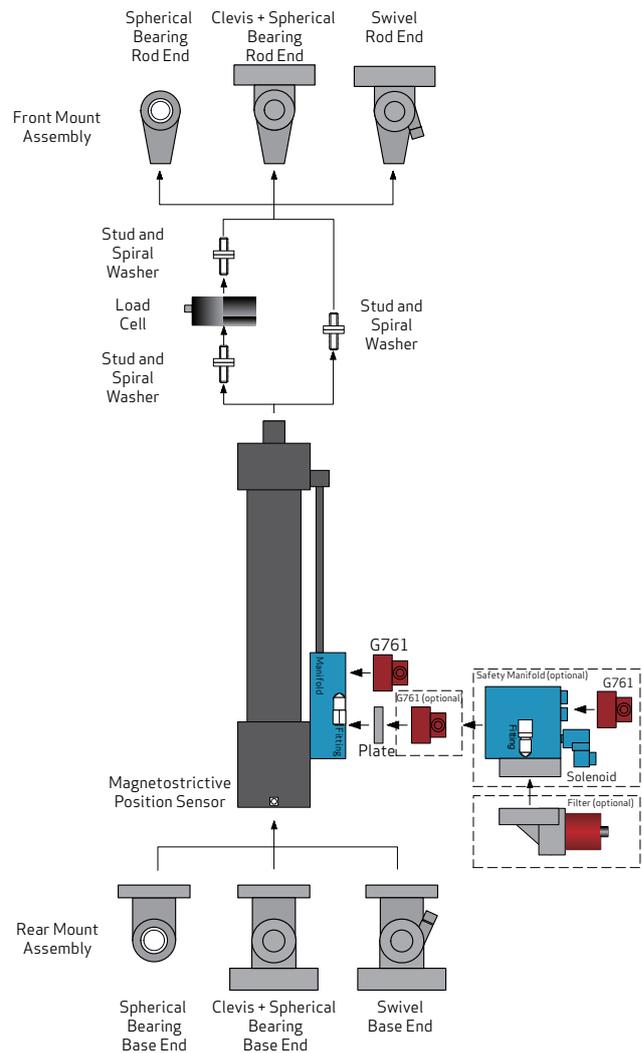
Two types of Servo Valve manifolds available:

- Regular servo valve block
- Safety Abort Manifold

Regular servo valve block allows 2x G761 to be sized to meet the application needs. Maximum flow 126 l/min.

Safety-Abort Manifold is a more safe configuration to provide a mechanism to dump the hydraulic pressure thus to remove the loading force from the test specimen. This is particularly needed for typical aerospace structure testing.

- An additional solenoid/coil is equipped to provide a control to dump the pressure within actuator back to tank;
- 2x sequence valves to independently setup the maximum working pressure for both chambers;
- 2x needle valves to provide an offloading speed setup for both chambers;
- Only 1xG761 is needed;
- Customer can select an additional 10 micron filter to provide further protection to the Servo Valve from oil contamination
- Porting style:
 - JIC 37° flare
 - Quick Coupling



Load Cell

High performance load cell can be adapted to the actuators to provide a force feedback to a closed loop control.

Dual-bridge is the default selection.

Spiral washer can be provided as well for preload creation.

Load cell Accuracy: $\leq 0.5\%$ F.S.

Position Sensor

Although in some applications the position feedback is not a must, sensing the position is always adding an extra dimension to know the status of the actuator beyond the loadcell itself.

- Contact-less style.
- Internal, co-axial installed position sensor as standard configuration.
- Signal type:
 - Analog voltage signal output as standard
 - SSI signal output is also available.
- Repeat accuracy: $\leq \pm 10 \mu\text{m}$
- Non-linearity: $\leq \pm 0.01\%$ F.S.

Mounting Interface

Either for rod end or actuator base, three mounting options are available to adapt to different needs of applications:

- Spherical Bearing
- Clevis + Spherical Bearing
- Swivel

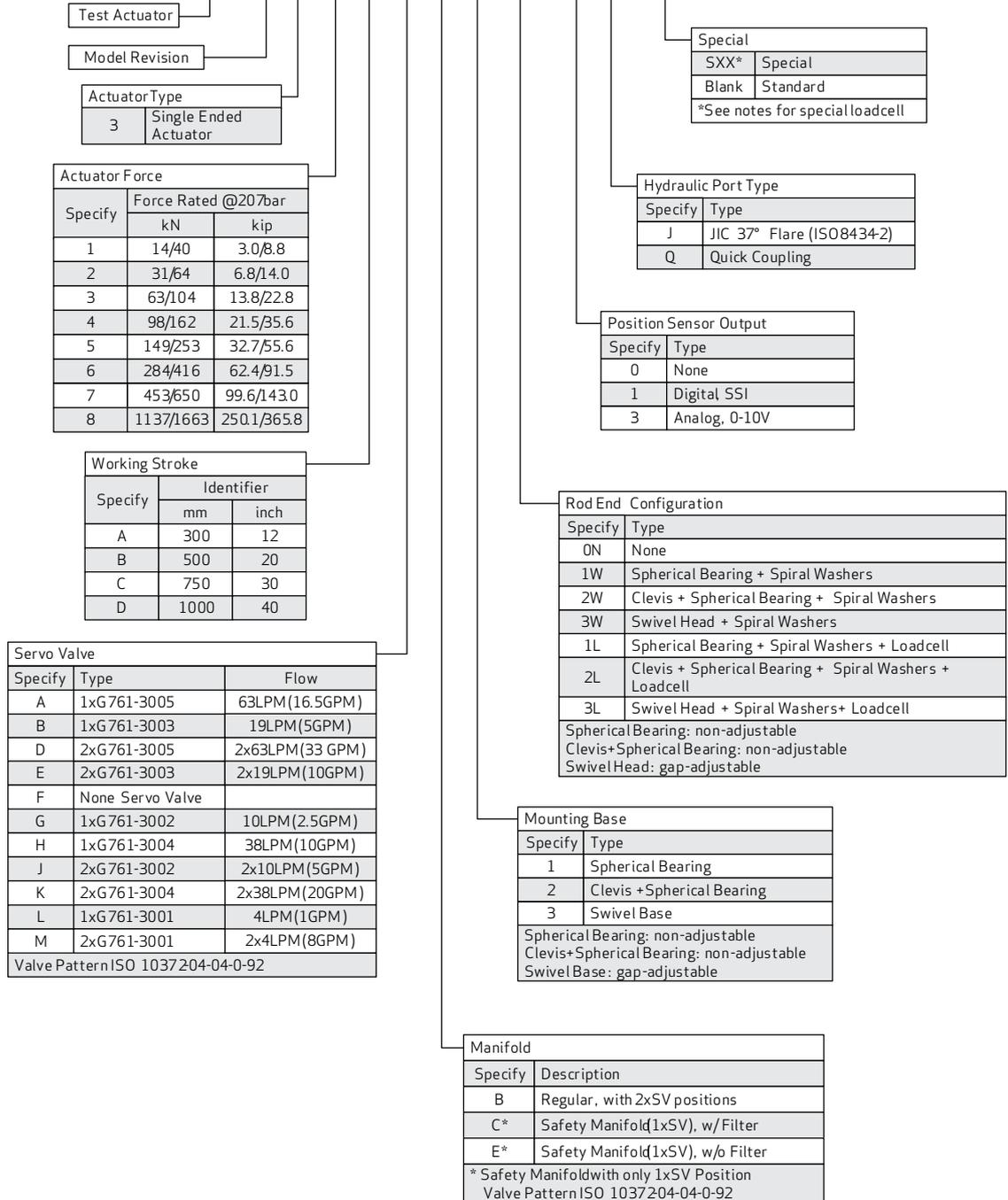
Spherical bearing provides a Pin-to-Pin interfacing with the customer's test article

Clevis + Spherical Bearing is a Face-to-Face interfacing solution with the customer's test article

Swivel provides more fatigue oriented Face-to-Face solution. The swivel also allow you to eliminate the possible free-play existing in the bearing due to a long time operation

ORDERING CODE

C086A3XXXXXX XXXX



Notes

1. Loadcell

- Dual bridge of INTERFACE 1200 series (non-fatigue rated) is the default selection
- If other loadcell model is requested, please consult Moog engineer

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 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.



The Moog Aerospace Test Software is the result of close and ongoing cooperation with leading aerospace OEMs and independent test laboratories, as well as research and development centers. This software remains the best-in-class option to successfully run both simple and complex solutions for aerospace static and dynamic tests.

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.



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.



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.

Australia
+61 3 9561 6044
info.australia@moog.com

Ireland
+353 21 451 9000
info.ireland@moog.com

South Africa
+27 12 653 6768
info.southafrica@moog.com

Brazil
+55 11 3572 0400
info.brazil@moog.com

Italy
+39 0332 421 111
info.italy@moog.com

Spain
+34 902 133 240
info.spain@moog.com

Canada
+1 716 652 2000
info.canada@moog.com

Japan
+81 46 355 3767
info.japan@moog.com

Sweden
+46 31 680 060
info.sweden@moog.com

China
+86 21 2893 1600
info.china@moog.com

Korea
+82 31 764 6711
info.korea@moog.com

Turkey
+90 216 663 6020
info.turkey@moog.com

France
+33 1 4560 7000
info.france@moog.com

Luxembourg
+352 40 46 401
info.luxembourg@moog.com

United Kingdom
+44 168 485 8000
info.uk@moog.com

Germany
+49 7031 622 0
info.germany@moog.com

The Netherlands
+31 252 462 000
test@moog.com

USA
+1 716 652 2000
info.usa@moog.com

Hong Kong
+852 2 635 3200
info.hongkong@moog.com

Russia
+7 8 31 713 1811
info.russia@moog.com

India
+91 80 4057 6666
info.india@moog.com

Singapore
+65 677 36238
info.singapore@moog.com

www.moog.com/industrial

Moog is a registered trademark of Moog Inc. and its subsidiaries.
All trademarks as indicated herein are the property of Moog Inc.
and its subsidiaries.

©2018 Moog Inc. All rights reserved. All changes are reserved.

Hydraulic Test Actuator - Single-Ended
MSH/PDF/Rev. - February, 2018. Id. CDL54621 - en