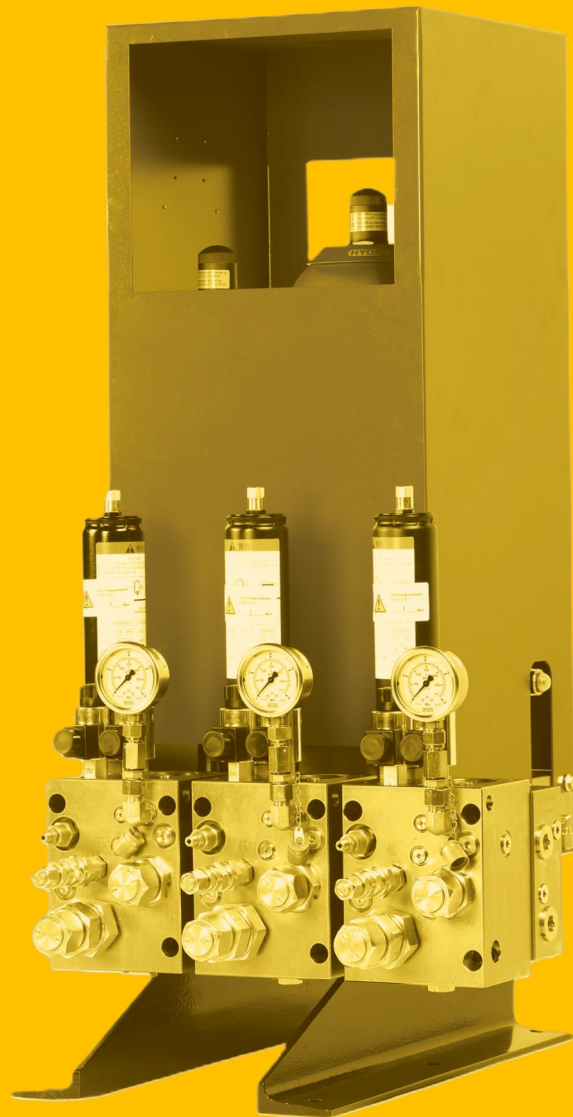


HYDRAULIC SERVICE MANIFOLD

HSM

C050E4 SERIES



Rev.F, January 2023

DESIGNED FOR TESTING APPLICATIONS
DEMANDING HIGH PERFORMANCE, RELIABILITY
AND VERSATILITY

WHAT MOVES YOUR WORLD

MOOG

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.

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CONTACT



This catalog is for users with technical knowledge. To ensure all necessary characteristics for function and safety of the system, 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.

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

PRODUCT OVERVIEW

Moog Hydraulic Service Manifold (HSM) provides an effective hydraulic engagement and isolation control to a test system or individual hydraulic actuator. Typically, the HSM inlet ports are connected to a central Hydraulic Power Unit (HPU). The outlet ports are connected to servo hydraulic systems or actuators. Moog HSM is designed to be working under 210 bar system pressure, and the maximum rated flow capacity is ranged from 200 to 1,000 l/min. The HSM, except the largest size model 1,000 l/min, can maximum connect with 4 control stations.

The HSM can provide Off/Low/High controlled hydraulic pressurization to the test system thus to establish a smooth hydraulic engagement to avoid possible impulse to the test system or damage to the specimen.



Due to variety of designs (options), C050E4 HSM can be used in different hydraulic test systems; some typically test systems such as:

- Moog Hydraulic Simulation Table
- Moog Tire Coupled Simulation System
- Moog Multiple Axis Testing System



FEATURES AND BENEFITS

Features	Benefits
Multi stations options	A flexibility to select different numbers of control stations to serve multiple independent applications.
"Off/Low/High" pressure control	Low pressure (adjustable) provides a "Safe-Mode" during system installation, commissioning and tuning. High pressure mode provides the full power to the normal test and operation.
"Soft-Start" of "Off-to-Low"; a soft transition from "Low-to-High" pressure	The "Soft-Start" will create a smooth engagement of the hydraulic power into an actuator's closed-loop control. This is especially critical to those test applications where test specimen are sensitive and fragile and the test only utilizes a small percentage of the maximum output force of an actuator. Eliminating the jerk and impact will protect the specimen from being damaged and achieve more accurate test results. The wide range of Low Pressure setting (35 to 70 bar) creates a soft transition time from "Low-to-High", and select a nice working point to take a balance between safety and the tuning accuracy.
Rapid "Pressure-Unloading" when switching to "Off" mode	Quickly remove pressure from actuator(s). This will bring the system from a "Pressurized-Mode" down to a "Safe-Mode" as soon as possible.
20 μm filter for pressure line 3 μm filter for pilot line	Minimize and eliminate possible contaminations introduced from HPU or piping lines.
Accumulator certification to meet various regulations	Accumulator Certification of US, EU, China, etc. available, to meet regulation of different countries/regions.
Pilot Pressure (PP) and Shut-Off control as an addition	Pilot Pressure to provide an "earlier engagement" for devices like servo valve with pilot stage, hydrostatic bearing etc., to ensure proper servo control from open-loop to closed-loop. Option to have an additional solenoid valve to provide an ON/OFF control to the Pilot Pressure.
Solenoid valve with 24 V _{DC} 1 A maximum	Safety and high adaptability to controller.

SPECIFICATIONS

Model	HSM200	HSM400	HSM1000
Number of station	1 to 4	1 to 4	1
Rated flow	200 l/min	400 l/min	1,000 l/min
Maximum flow of pilot line	20 l/min	40 l/min	100 l/min
Rated pressure	210 bar	210 bar	210 bar
Low pressure setting (factory setting)	35 bar	35 bar	35 bar
Solenoid control			
Low pressure control	Yes	Yes	Yes
High pressure control	Yes	Yes	Yes
Pilot pressure control (optional)	Yes	Yes	Yes
Supply voltage	24 V _{DC}	24 V _{DC}	24 V _{DC}
Maximum current for each solenoid valve	1 A	1A	1A
Filtration			
Pressure line	20 µm	20 µm	20 µm
Pilot line	3 µm	3 µm	3 µm
Accumulation			
Pressure line	6 l	6 l	10 l
Return line	2.5 l	2.5 l	6 l
Pilot line	0.5 l	0.5 l	0.5 l
Soft shift function	0.32 l	0.32 l	0.32 l
Dimensions (LxWxH) maximum	616×705×1,030 mm	616×838×1,040 mm	466×672×1,121 mm
Mass (approx.) station 1 to 4			
With pilot pressure block	215/246/279/313 kg	228/280/323/366 kg	287 kg
Without pilot pressure block	194/225/258/292 kg	207/260/303/346 kg	284 kg

ADDITIONAL SPECIFICATIONS

Hydraulic oil temperature (recommended)	40 to 50°C
System fluid	Hydraulic oil as per DIN 51524 parts 1 to 3 and ISO VG 32, 46 or equivalent
Cleanliness level	ISO 4406 16/14/11 (NAS 5)
Seal material	NBR
Ambient temperature range	4 to 50°C
Humidity	0 to 80% relative, non-condensing
Pressure in drain line	3 bar maximum

CONTROL MODULE CONFIGURATION

Model	2 stations	3 stations	4 stations
HSM200	2x control module ¹⁾	3x control module ¹⁾	4x control module ¹⁾
HSM400	2x control module ¹⁾	3x control module ¹⁾	4x control module ¹⁾

¹⁾Each control module has rated flow 200 l/min

HYDRAULIC FITTING SPECIFICATION

HPU to HSM Interface			
Model	Port Designation ¹⁾	Hydraulic Fitting Type ²⁾³⁾⁴⁾	
		"B"	"C"
HSM200-1/2/3/4	P	JIC 37° Flare -16	EO24° Cone, 25S, M36×2
	R	JIC 37° Flare -16	EO24° Cone, 25S, M36×2
	D	JIC 37° Flare -8	EO24° Cone, 18L, M26×1.5
HSM400-1	P	JIC 37° Flare -20	EO24° Cone, 30S, M42×2
	R	JIC 37° Flare -20	EO24° Cone, 30S, M42×2
	D	JIC 37° Flare -8	EO24° Cone, 22L, M30×2
HSM400-2/3/4	P	JIC 37° Flare -20	EO24° Cone, 30S, M42×2
	R	JIC 37° Flare -20	EO24° Cone, 30S, M42×2
	D	JIC 37° Flare -12	EO24° Cone, 18L, M26×1.5
HSM1000-1	P	SAE Flange 2" Code 61	SAE Flange 2" Code 61
	R	SAE Flange 2" Code 61	SAE Flange 2" Code 61
	D	JIC 37° Flare -12	EO24° Cone, 22L, M30×2

HSM to Actuator Interface			
Model	Port Designation ¹⁾	Hydraulic Fitting Type ²⁾³⁾⁴⁾	
		"B"	"C"
HSM200-1/2/3/4, and HSM400-2/3/4	P1	JIC 37° Flare -16	EO24° Cone, 25S, M36×2
	R1	JIC 37° Flare -16	EO24° Cone, 25S, M36×2
	D1	JIC 37° Flare -6	EO24° Cone, 12L, M18×1.5
	PP1	JIC 37° Flare -6	EO24° Cone, 12L, M18×1.5
HSM400-1	P1	JIC 37° Flare -20	EO24° Cone, 30S, M42×2
	R1	JIC 37° Flare -20	EO24° Cone, 30S, M42×2
	D1	JIC 37° Flare -6	EO24° Cone, 12L, M18×1.5
	PP1	JIC 37° Flare -6	EO24° Cone, 12L, M18×1.5
HSM1000-1	P1	SAE Flange 2" Code 61	SAE Flange 2" Code 61
	R1	SAE Flange 2" Code 61	SAE Flange 2" Code 61
	D1	JIC 37° Flare -8	EO24° Cone, 18L, M26×1.5
	PP1	JIC 37° Flare -8	EO24° Cone, 18L, M26×1.5

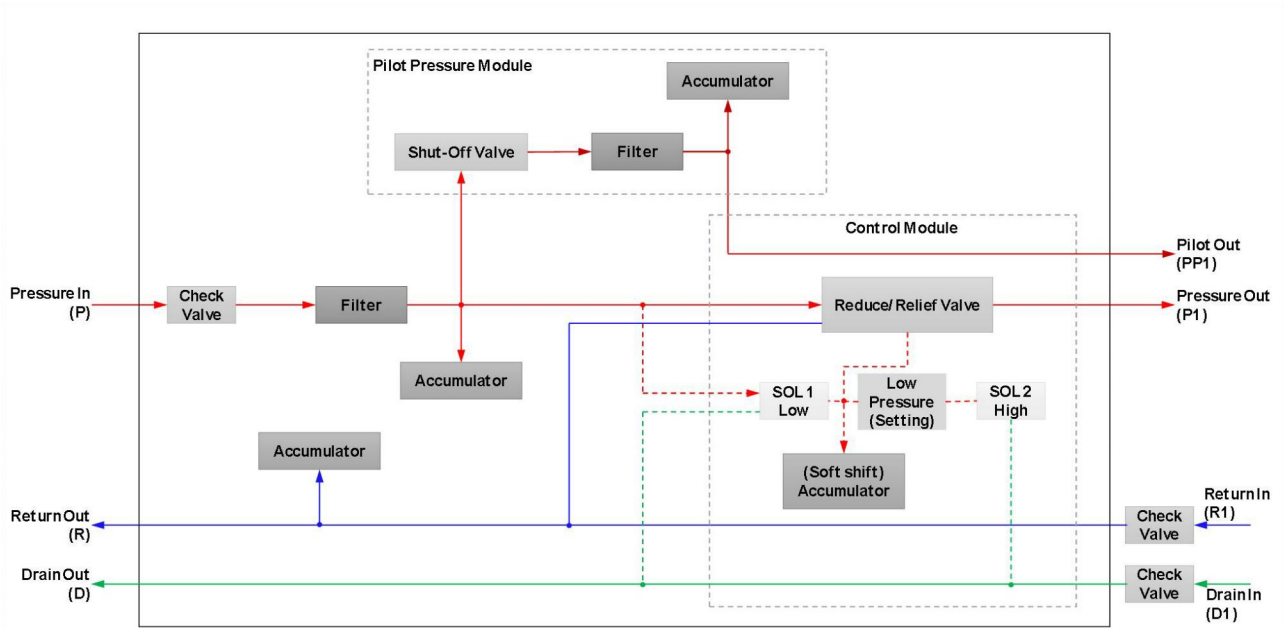
¹⁾ Port designations please refer to hydraulic schematic

²⁾ JIC fitting adopted is conformed to ISO 8434-2 standard

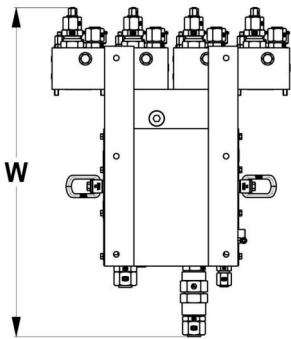
³⁾ SAE flange (code 61 flange) adopted is conformed to ISO 6162-1 standard

⁴⁾ EO24° Cone adopted is conformed to ISO 8434-1 standard

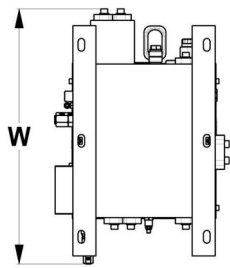
HYDRAULIC SCHEMATIC



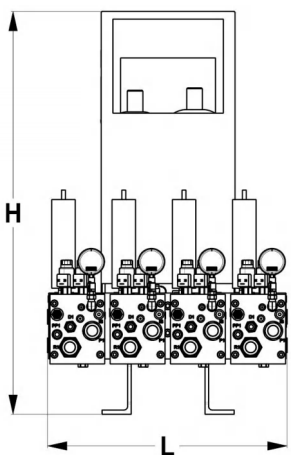
DIMENSIONS



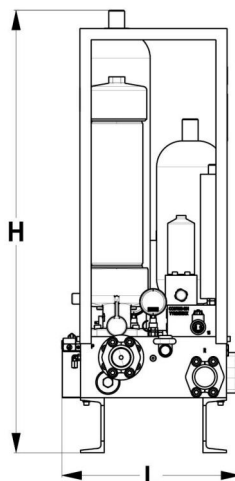
HSM200, HSM400 (Bottom View)



HSM1000 (Bottom View)



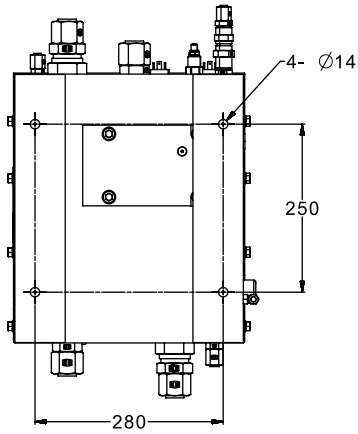
HSM200, HSM400 (Front View)



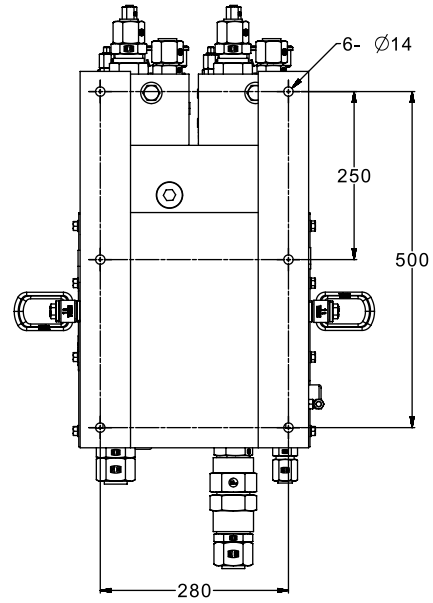
HSM1000 (Front View)

Model	Number of station	L (mm)	W (mm)	H (mm)
HSM200	1	536	618	1,030
	2	536	705	1,025
	3	578	705	1,025
	4	616	705	1,025
HSM400	1	536	760	1,040
	2	536	838	1,040
	3	574	838	1,040
	4	616	838	1,040
HSM1000	1	466	672	1,121

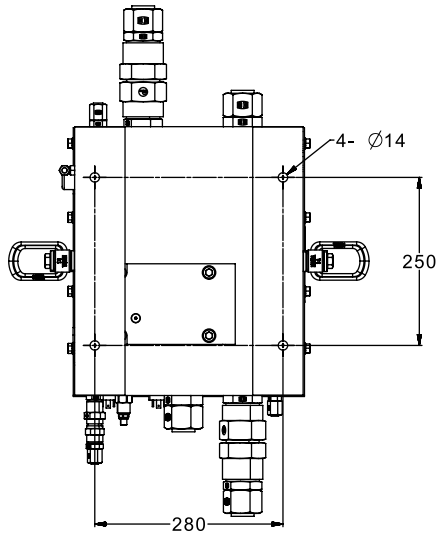
MOUNTING INTERFACE



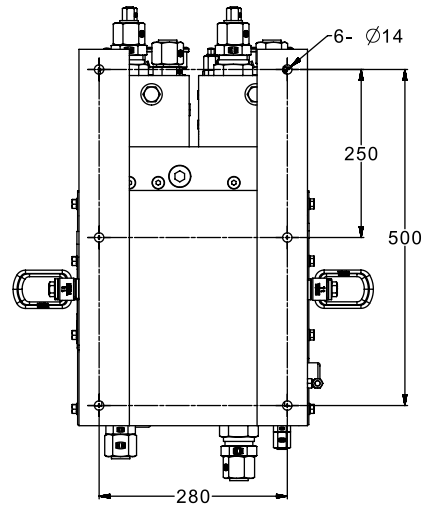
HSM200-1 (Bottom View)



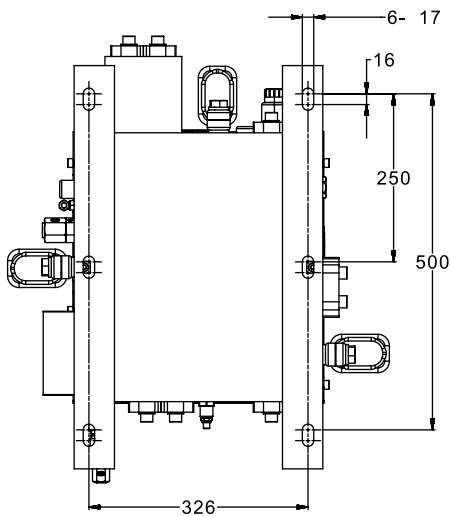
HSM400-2,3,4 (Bottom View)



HSM400-1 (Bottom View)



HSM200-2,3,4 (Bottom View)



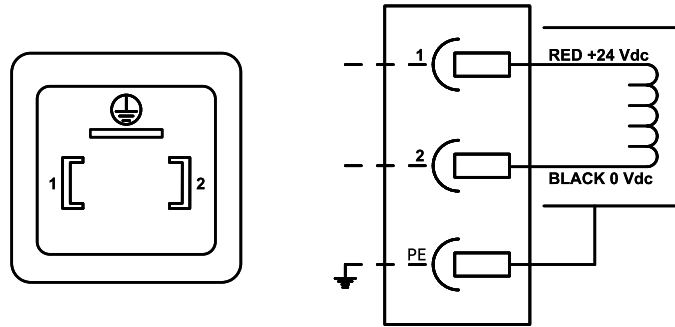
HSM1000-1 (Bottom View)

ELECTRONICS

The HSM is controlled by 24V_{DC} power, with 3 solenoid valves:

- Low pressure solenoid valve, S1
- High pressure solenoid valve, S2
- Shut-off solenoid valve (Optional), S3

The solenoid coil has a standard pin-out. The control/mating cable should be with a connector, pin assignments of DIN 43650-1 connector:



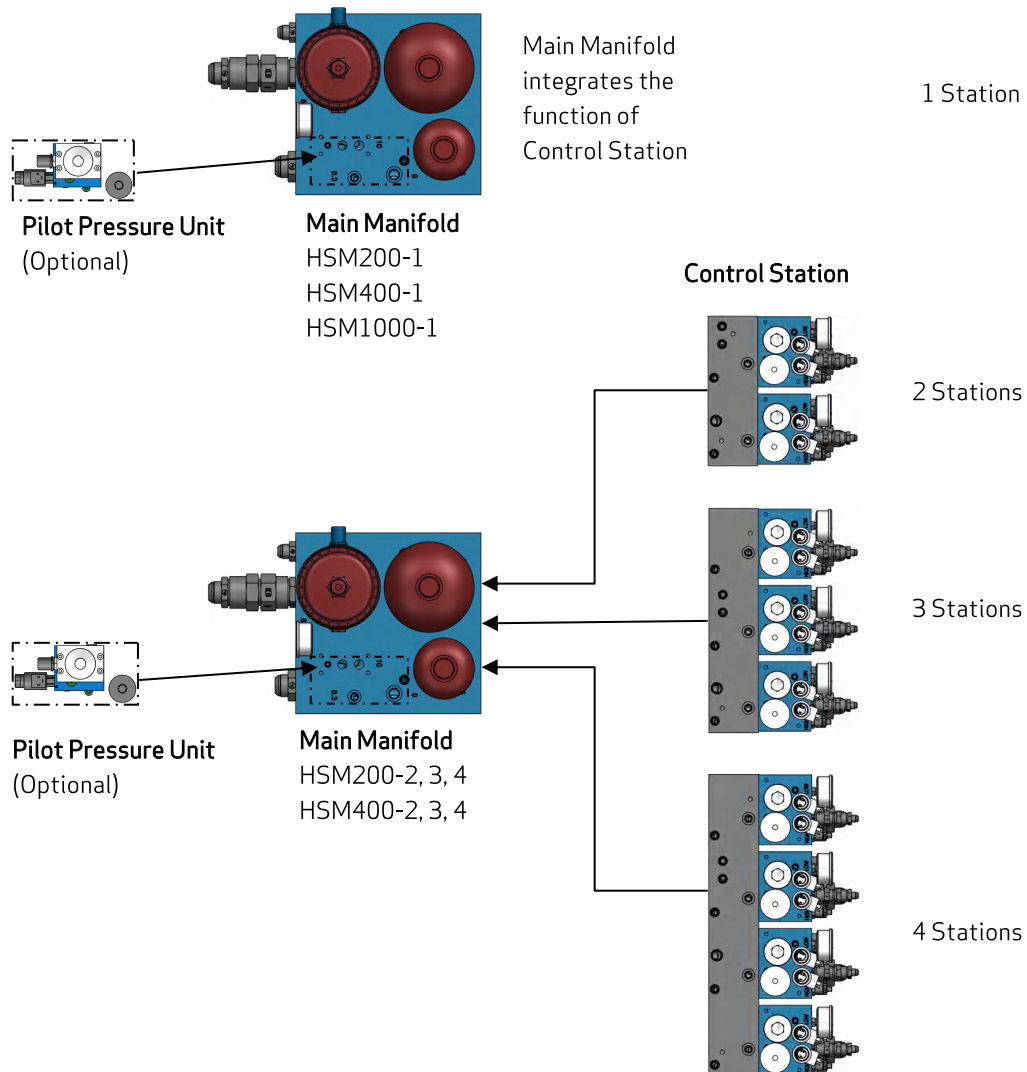
Solenoid status for pressure output

Operation mode	S1	S2	S3
System off	OFF	OFF	OFF
Low pressure	ON	OFF	ON
High pressure	ON	ON	ON
Pilot pressure	ON	ON	ON
Emergency stop	OFF	OFF	OFF

CONFIGURATIONS TO MEET TO YOUR NEEDS

A variety of building blocks is available to configure the HSM for specific needs of an application. HSM200 and HSM400 have options of 1 to 4 control stations. HSM1000 has one control station only. Application engineers can pick up the appropriate configuration to meet the requirements. In addition to the size and number of control stations, other options are available.

- Pilot pressure (PP) and Shut-off valve
 - A pilot pressure block, if selected, supplies the pilot pressure for example to the actuator which requires an external pilot pressure supply.
 - An optional shut-off valve is available to cut off the pilot pressure line as an additional safety measure.
- 6 choices of accumulator certification to meet regulations of different countries/regions



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 Integrated Test Suite



Moog Replication



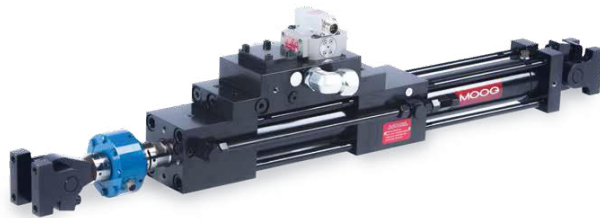
Moog Runner



Moog Sinesweep



Moog Vibration



Polymer Bearing Actuator

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.

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.





C086A3 Single Ended Actuator

The Moog Single-Ended Hydraulic Test Actuator delivers higher reliability, less maintenance and cost-effective performance to meet critical needs of test engineers. A wide array of sizes and variety of options of features are available providing a high adaptability to users' need.

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 wear for long life and less maintenance
- Fully integrated manifold eliminates the need for any external piping



Moog Global Support

Moog Global Support is our promise to offer world-class Repair and Maintenance Services delivered expertly by our trained technicians. With facilities around the world, Moog offers you service and expertise you can count on to keep your equipment operating as it should.

This promise offers many benefits to our customers including:

- Reduce your downtime by keeping critical machines running in peak performance
- Protect your investment by ensuring reliability, versatility and long-life of products
- Better plan your maintenance activities and make systematic upgrades
- Leverage our flexible programs to meet the unique service requirements of your facility

Look to Moog for global support including:

- Repair services using OEM parts are performed by trained technicians to the latest specifications
- Stock management of spare parts and products to prevent unplanned downtime

- Flexible programs, tailored to your needs such as upgrades, preventative maintenance and annual/multi-year contracts
- On-site services bring the expertise to you, providing quicker commissioning, set-up and diagnostics
- Access to reliable services that are guaranteed to offer consistent quality anywhere in the world

For more information on Moog Global Support visit www.moog.com/industrial/service.



ACCESSORIES AND SPARE PARTS

Spare Parts

Accumulators with certificate code "A" - China

HSM Size	Description	Remark	Part number
HSM200/HSM400	Pressure line, 6.0 l	Bladder type	CA79662-009
	Return line, 2.5 l	Bladder type	CA79662-004
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101
HSM1000	Pressure line, 10 l	Bladder type	CA79662-101
	Return line, 6.0 l	Bladder type	CA79662-009
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101

Accumulators with certificate code "B" - US

HSM Size	Description	Remark	Part number
HSM200/HSM400	Pressure line, 6.0 l	Bladder type	CA79662S009
	Return line, 2.5 l	Bladder type	CA79662S004
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101
HSM1000	Pressure line, 10 l	Bladder type	CA79662S101
	Return line, 6.0 l	Bladder type	CA79662S009
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101

Accumulators with certificate code "C" - Japan

HSM Size	Description	Remark	Part number
HSM200/HSM400	Pressure line, 6.0 l	Bladder type	CA79662P009
	Return line, 2.5 l	Bladder type	CA79662P004
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101
HSM1000	Pressure line, 10 l	Bladder type	CA79662P101
	Return line, 6.0 l	Bladder type	CA79662P009
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CA79662P009

Accumulators with certificate code "D" - EU

HSM Size	Description	Remark	Part number
HSM200/HSM400	Pressure line, 6.0 l	Bladder type	CA79662U009
	Return line, 2.5 l	Bladder type	CA79662U004
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101
HSM1000	Pressure line, 10 l	Bladder type	CA79662U101
	Return line, 6.0 l	Bladder type	CA79662U009
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101

Accumulators with certificate code "E" - Canada

HSM Size	Description	Remark	Part number
HSM200/HSM400	Pressure line, 6.0 l	Bladder type	CA79662S1009
	Return line, 2.5 l	Bladder type	CA79662S1004
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101
HSM1000	Pressure line, 10 l	Bladder type	CA79662S1101
	Return line, 6.0 l	Bladder type	CA79662S1009
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101

Accumulators with certificate code "F" - Australia

HSM Size	Description	Remark	Part number
HSM200/HSM400	Pressure line, 6.0 l	Bladder type	CA79662F009
	Return line, 2.5 l	Bladder type	CA79662F004
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101
HSM1000	Pressure line, 10 l	Bladder type	CA79662F101
	Return line, 6.0 l	Bladder type	CA79662F009
	Pilot line, 0.5 l	Piston type	CB97922-107
	Soft shift, 0.32 l	Piston type	CB97922-101

Filters

HSM Size	Description	Remark	Part number
HSM200	Pressure line, 20 µm	Qty. 1	CA79661-BAC431
	Pilot line, 3 µm	Qty. 1	CA79719-ABA-131
HSM400	Pressure line, 20 µm	Qty. 1	CA79661-BBC431
	Pilot line, 3 µm	Qty. 1	CA79719-ABA-131
HSM1000	Pressure line, 20 µm	Qty. 2	CA79661-BBC431
	Pilot line, 3 µm	Qty. 1	CA79719-ABA-131

Filter elements

HSM Size	Description	Remark	Part number
HSM200	Pressure line, 20 µm	Qty. 1	CA85236-0330-020
	Pilot line, 3 µm	Qty. 1	CA85236A0110-003
HSM400	Pressure line, 20 µm	Qty. 1	CA85236-0500-020
	Pilot line, 3 µm	Qty. 1	CA85236A0110-003
HSM1000	Pressure line, 20 µm	Qty. 2	CA85236-0500-020
	Pilot line, 3 µm	Qty. 1	CA85236A0110-003

Solenoid valves

HSM Size	Description	Remark	Part number
HSM200/400/1000	Low/High pressure control, 24VDC	-	CB39795-001
	Pilot pressure control, 24VDC	-	CB97998-001

Accessories

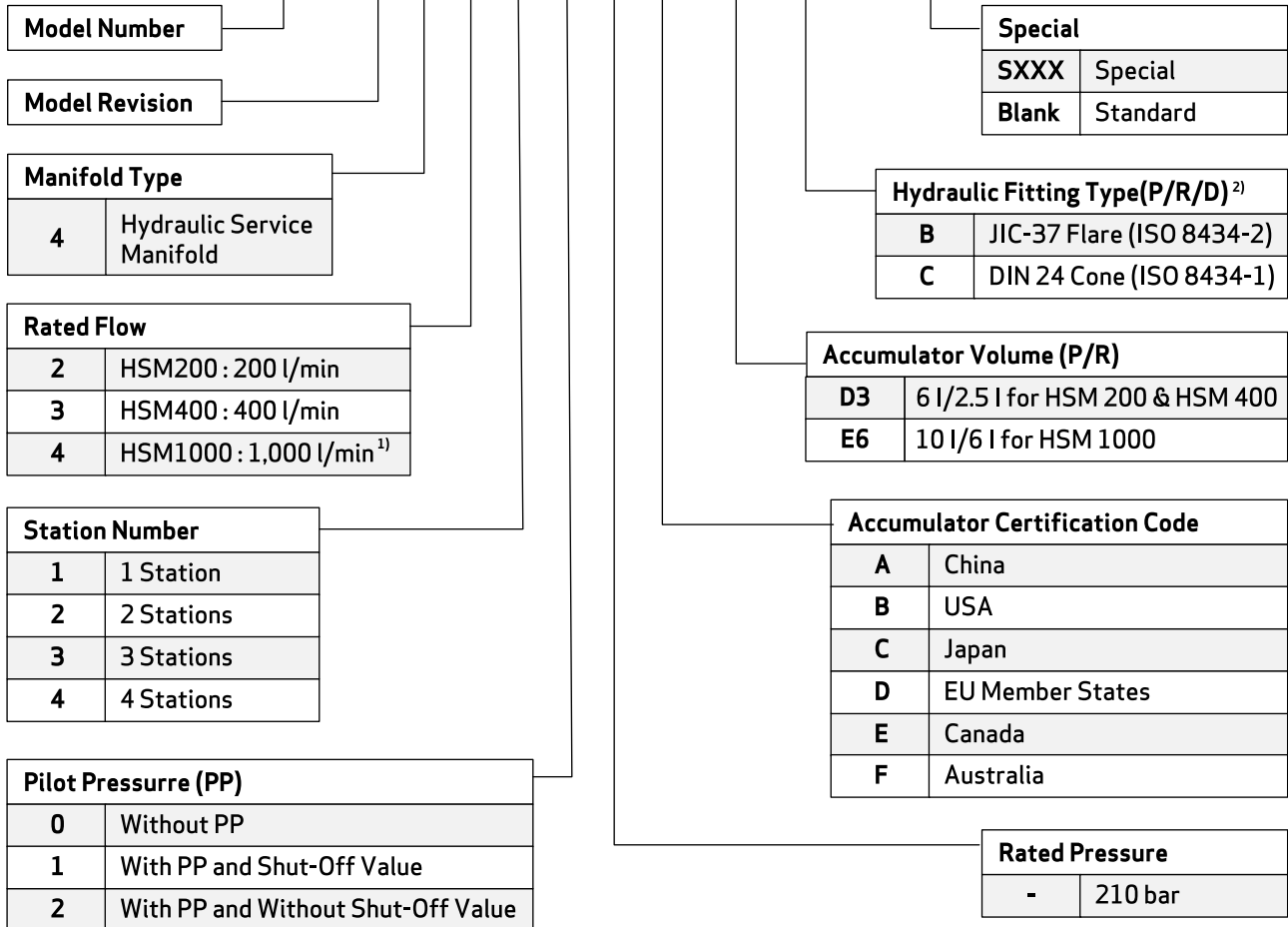
Part name / Description	Remark	Part number
Accumulator charging kit	For HSM200/400/1000	CA85351-001

Documents

Part name	Description	Document number
Manual	User Manual, Hydraulic Service Manifold	MRCE0140

ORDERING CODE

C050 E 4 X X X X X X X X X X X X X X



Note:

¹⁾ HSM1000 has only 1 station

²⁾ Code-61/62 flange used:

- HSM1000-1 station's P/R
- HSM400-1 station's P-in and P-out
- HSM400 multi-station's P-in

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 Service Manifold
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