HYDRAULIC SERVICE MANIFOLD

Rev.D, May 2018

PROVIDING OFF/LOW/HIGH ISOLATION CONTROL
FOR TEST SYSTEMS AND HYDRAULIC ACTUATORS

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.

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 21 or 28 MPa system pressure, and the maximum rated flow capacity is ranged from 80 to 880 l/min. The HSM, except the smallest size model 80 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.

Moog offers the option of CE complied HSM design:

• A TÜV certificated safety relief valve is provided to protect the operation within a safe pressure level.

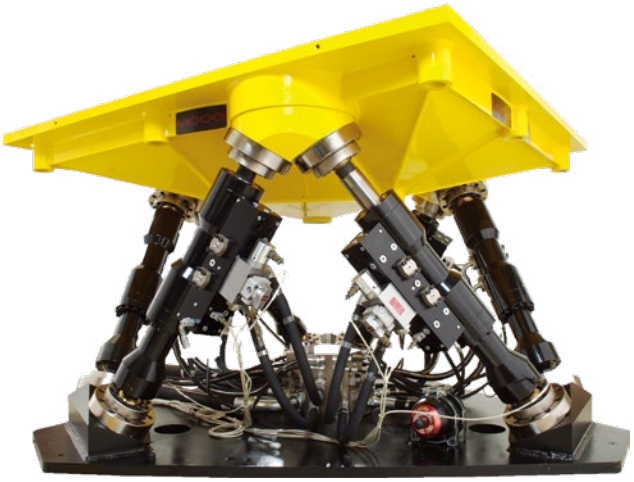
• A shut-off valve to isolate the pilot pressure line from the pressure line, in order to avoid any unexpected movement, for example on the actuator.

Hydraulic Service Manifold

Features	**Benefits**
"Safety" HSM option	With an additional TÜV "Safety Relief Valve" - compliant with European regulations. An additional Pilot Control is designed - user can cut off the pilot line during an E-STOP.
Selection to connect with 1 to 4 control stations (except HSM80 model)	A flexibility to connect with different number of control stations to meet specific application.
"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 close 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 (3.5 to 7 MPa) 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.

Features	Benefits
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 close-loop. Option to have an additional solenoid valve to provide an ON/OFF control to the Pilot Pressure.
Solenoid valve with 24 VDC 1 A maximum	Safety and high adaptability to controller

Due to variety designs (options), C050D4 HSM can be used in different hydraulic test systems; some typically test systems such as:
- Moog Hydraulic Simulation Table
- Moog Tire Coupled Simulation System
- Multiple Axis Testing System



SPECIFICATIONS

Model	HSM80	HSM200	HSM400	HSM880
Number of station	1	1 to 4	1 to 4	1 to 4
Rated flow	80 l/min	200 l/min	400 l/min	880 l/min
Operating pressure	21/28 MPa	21/28 MPa	21/2 8 MPa	21/28 MPa
Low pressure setting (factory setting)	3.5 MPa	3.5 MPa	3.5 MPa	3.5 MPa
Solenoid control				
Low pressure control	Yes	Yes	Yes	Yes
High pressure control	Yes	Yes	Yes	Yes
Pilot pressure control (optional)	No	Yes	Yes	Yes
Supply voltage	24 VDC	24 VDC	24 VDC	24 VDC
Maximum current	1 A	1 A	1 A	1 A
Filtration				
Pressure line	20 µm	20 µm	20 µm	20 µm
Pilot line	N.A.	3 µm	3 µm	3 µm
Accumulation				
Pressure line	2.5 l	6 l	6 l	10 l
Return line	1 l	2.5 l	2.5 l	6 l
Pilot line	N.A.	0.5 l	0.5 l	0.5 l
Soft shift function	0.32 l	0.32 l	0.32 l	0.32 l
Dimensions, maximum (L×W×H)	748×421×375 mm	933×737×640mm	943×808×643 mm	969×923×750 mm
Weight (approx.)				
With pilot pressure block	N.A.	294/352/399/446 kg	378/503/423/407 kg	759/805/878/877 kg
Without pilot pressure block	93 kg	293/321/368/415 kg	347/472/454/376 kg	728/771/847/846 kg

ADDITIONAL SPECIFICATIONS

Hydraulic oil temperature	24 °C (75 °F) to 57 °C (134 °F)
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)
Seal material	NBR as standard
Safety relief valve (factory setting)	315 bar

CONTROL MODULE CONFIGURATION

Model	**One Station**	**Two Stations**	**Three Stations**	**Four Stations**
HSM200	1x 200 l/min module	2x 200 l/min module	3x 200 l/min module	4x 200 l/min module
HSM400	1x 400 l/min module	2x 200 l/min module	3x 200 l/min module	4x 200 l/min module
HSM880	1x 880 l/min module	2x 400 l/min module	3x 400 l/min module	4x 200 l/min module
Note: HSM80 has a stand-alone manifold to provide 80 l/min output. No additional control module is required.				

HYDRAULIC FITTING SPECIFICATION

HPU to HSM Interface

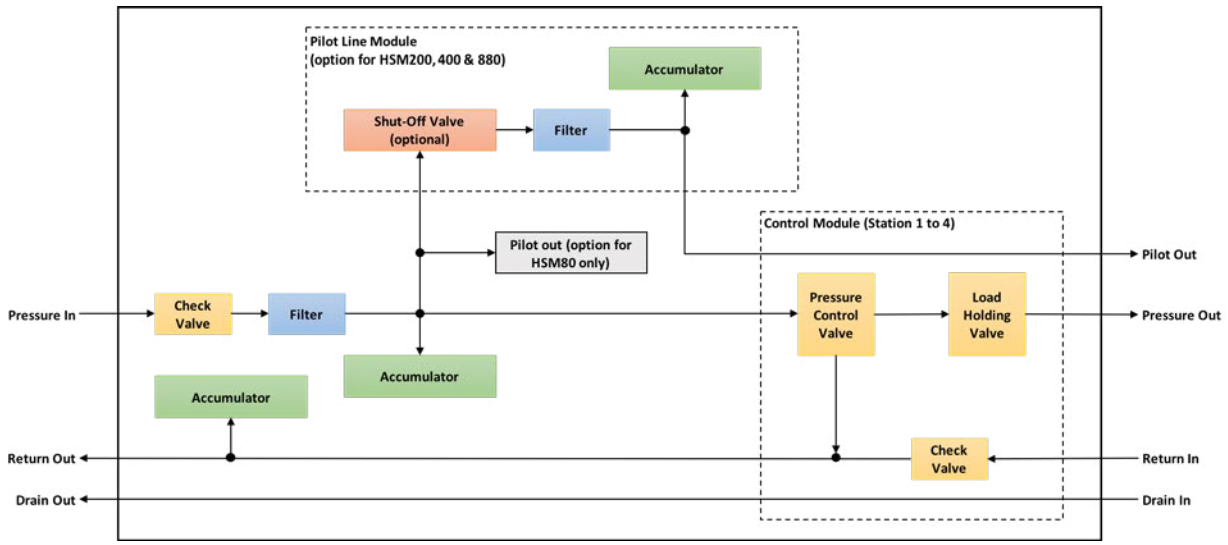
Model	Port Designation	Port Type	
		Non CE	CE Compliance
HSM80	P	JIC 37° Flare -12	DIN 24° Cone 20-S
	R	JIC 37° Flare -12	DIN 24° Cone 20-S
	D	JIC 37° Flare -6	DIN 24° Cone 12-L
HSM200	P	JIC 37° Flare -16	DIN 24° Cone 25-S
	R	JIC 37° Flare -16	DIN 24° Cone 25-S
	D	JIC 37° Flare -8	DIN 24° Cone 18-L
HSM400	P	SAE Flange Code 62-24	SAE Flange Code 62-24
	R	SAE Flange Code 61-24	SAE Flange Code 61-24
	D	JIC 37° Flare -8	DIN 24° Cone 18-L
HSM880	P	SAE Flange Code 62-32	SAE Flange Code 62-32
	R	SAE Flange Code 61-32	SAE Flange Code 61-32
	D	JIC 37° Flare -8	DIN 24° Cone 18-L

HSM to Actuator Interface

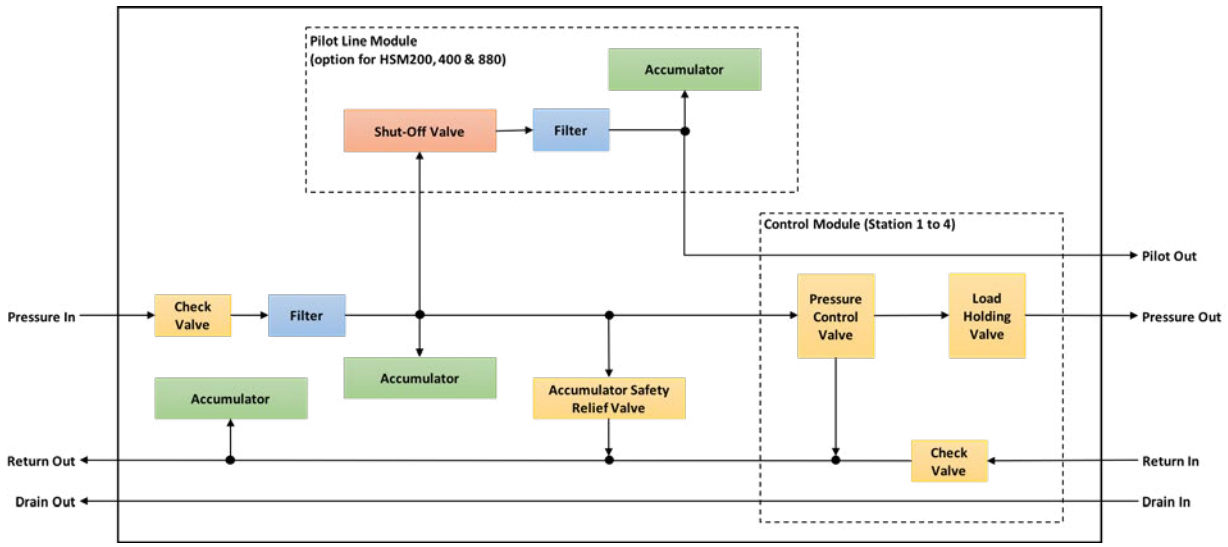
Control Station Module	Port Designation	Port Type	
		None CE	CE Compliance
80 l/min (Only for HSM80)	P1	JIC 37° Flare -12	DIN 24° Cone 20-S
	R1	JIC 37° Flare -12	DIN 24° Cone 20-S
	D1	JIC 37° Flare -6	DIN 24° Cone 12-L
	PP1	JIC 37° Flare -6	DIN 24° Cone 12-L
200 l/min	P1	JIC 37° Flare -16	DIN 24° Cone 25-S
	R1	JIC 37° Flare -16	DIN 24° Cone 25-S
	D1	JIC 37° Flare -6	DIN 24° Cone 12-L
	PP1	JIC 37° Flare -6	DIN 24° Cone 12-L
400 l/min	P1	SAE Flange Code 62-24	SAE Flange Code 62-24
	R1	JIC 37° Flare -24	DIN 24° Cone 42-L
	D1	JIC 37° Flare -6	DIN 24° Cone 12-L
	PP1	JIC 37° Flare -6	DIN 24° Cone 12-L
880 l/min	P1	SAE Flange Code 62-32	SAE Flange Code 62-32
	R1	SAE Flange Code 61-32	SAE Flange Code 61-32
	D1	JIC 37° Flare -8	DIN 24° Cone 18-L
		JIC 37° Flare -6	DIN 24° Cone 12-L
Note: Please refer to Control Module Configuration table to choose the control module according station number.			

HYDRAULIC SCHEMATIC

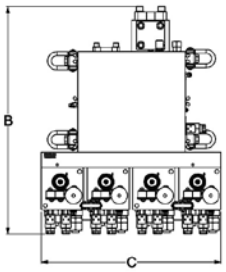
HSM, ordinary design

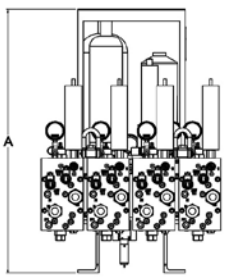


HSM, design with safety relief valve, CE complied



DIMENSIONS





Model	Number of Station	A (mm)	B (mm)	C (mm)
HSM80	1	748	421	375
HSM200	1	933	687	471
	2	933	737	471
	3	933	737	479
	4	933	737	640
HSM400	1	943	817	506
	2	943	808	506
	3	943	808	506
	4	943	808	643
HSM880	1	969	894	750
	2	969	932	750
	3	969	927	750
	4	969	923	750

CONFIGURATION TO MEET YOU NEEDS

A variety of building blocks is available to configure the HSM for specific need of the application. The rated flow of the HSM sized from 80 to 880 l/min and an option of 1 to 4 control stations are provided to help the application engineer to pick up an appropriate configuration to meet the requirements.

OPTIONS

In addition to the size and number of control stations, other options are available.

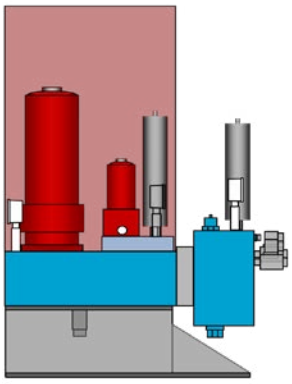
- Pilot pressure (PP) and Shut-off valve
  - A pilot pressure block (expect HSM80), if selected, supplies the pilot pressure for example to the actuator which requires an external pilot pressure supply.
  - An optional shut-off valve is available to cut off the pilot pressure line as an additional safety measure.

- Two levels of working pressure, 21 and 28 MPa, can be selected

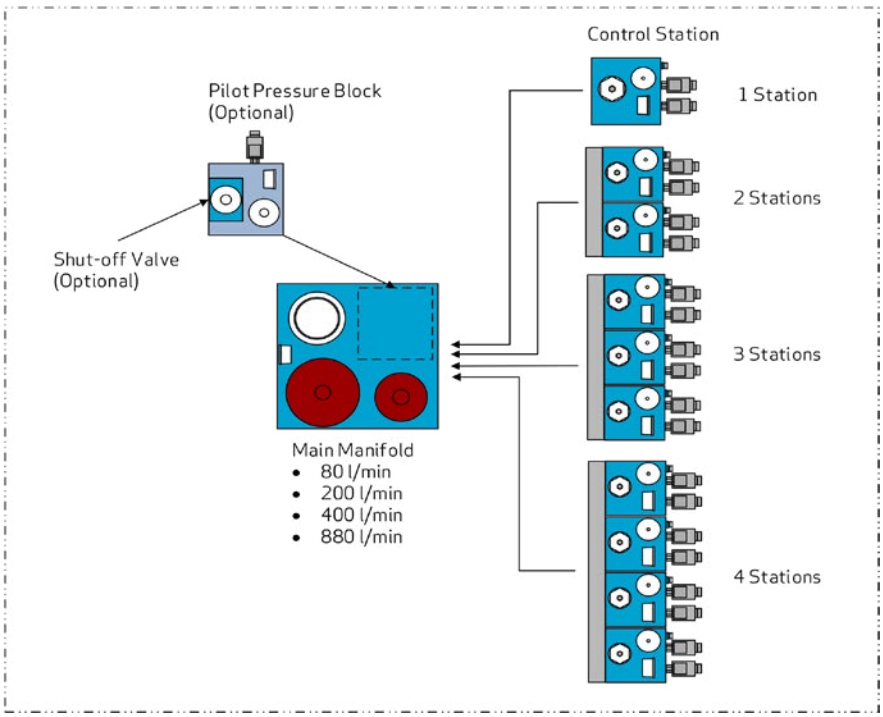
- 6x choices of accumulator certification to meet regulations of different countries/regions

- Hydraulic port fittings:
  - SAE thread for general use
  - BSPP thread for CE compliant version

- An option with a TÜV certificated safety pressure relief valve can be selected, which is provided to protect the operation within a safe pressure level as required for CE regulation.



HSM Assembly



ORDERING CODE

C050 D 4 X X X X X X X X XXXX

Manifold Package

Modle Revision

Manifold Type	
4	Hydraulic Service Manifold

Size(Rated Flow)	
Specify	Identifier(l/min)
1	HSM80(80)
2	HSM200(200)
3	HSM400(400)
4	HSM880(880)

Station Number	
Specify	Identifier
1	1 Station*
2	2 Stations
3	3 Stations
4	4 Stations
* Only 1 station available for HSM80	

Pilot Pressure (PP) Options	
Specify	Identifier
0	With out PP*
1	With PP and Shut-Off Valve**
2	With PP ,without Shut-Off Valve***

Note:
- HSM80 PP w/o control and extra filtration
- Filter as default on the PP block
*"w/o PP" option has no shut-off valve as default
** "with PP and shut-off valve" option is not available for HSM80
***"with PP, w/o shut-off valve" option is not CE complied

Working Pressure Designation & Compliance		Port Thread
-	21 MPa non - CE	SAE - ORE
7	28 MPa non - CE	
8	21 MPa w/CE Compliance	BSPP
9	28 MPa w/CE Compliance	

Note:Port thread selection must match the port thread of hydraulic fitting type

Accumulator Certification Code	
A	China
B	USA
C	Japan
D	EU Member States
E	Canada
F	Australia

Accumulator Volume (Pressure/Retutn)	
B2	2.5 L/1 L for HSM80
D3	6 L/2.5 L for HSM200&HSM400
E6	10 L/6 L for HSM880

Hydraulic Fitting Type(P/R/D)		Port Thread
B	JIC 37° Flare (ISO 8434-2)	SAE-ORB
C	DIN 24° Cone (ISO 8434-1)	BSPP

Note:
-Port thread selection must match the port thread type of CE compliance selection
- In addition to SAE - ORE and BSPP ports, see details in specification table

Special	
* SXXX	Special
Blank	Standard
* S001 and subsequent	

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, Moog 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 seal 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.

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