SERVO VALVES
PILOT OPERATED

FLOW CONTROL VALVE
WITH ANALOG INTERFACE

72 SERIES
ISO 10372-06-05-0-92

HIGH PERFORMANCE, TWO-STAGE DESIGN PROVIDING FLOW CONTROL IN A SIMPLE, RUGGED, DEPENDABLE, LONGLIFE DESIGN
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, and help take your thinking further than you ever thought possible.

INTRODUCTION........................................................................2
   Product Overview.............................................................3
   Description of Operation..................................................5

TECHNICAL DATA.....................................................................6
   72 Series Servo Valves..........................................................6
   Installation Drawings..........................................................10
   Mounting Requirements.....................................................12
   Electrical Connection.........................................................13

BACKGROUND..........................................................................14
   Flow Calculation.................................................................14

ORDERING INFORMATION.......................................................15
   Accessories and Spare Parts.................................................15
   Related Products.................................................................16
   About Moog........................................................................17
   Ordering Code....................................................................19

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 in this document 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.
The 72 Series flow control servo valves are throttle valves for 3 and preferably 4-way applications. They are a high performance, 2-stage design that covers the range of rated flows from 95 to 225 l/min (25 to 60 gpm) at 35 bar (500 psi) valve pressure drop per spool land.

The output stage is a closed center, four-way sliding spool. The pilot stage is a symmetrical double-nozzle and flapper, driven by a double air gap, dry torque motor. Mechanical feedback of spool position is provided by a cantilever spring. The valve design is simple and rugged for dependable, long life operation.

These valves are suitable for electrohydraulic position, speed, pressure or force control systems with high dynamic response requirements.

The 72 Series is ideally suited for applications in the 95 to 225 l/min (25 to 60 gpm) when superior dynamics are a must.

Intrinsically safe valve versions are available for use in applications with potentially hazardous environments. Specific models are certified to FM, ATEX, CSA, TIIS and IECEx standards.

### Valve design
- 2-stage, with spool and bushing and dry torque motor

### Mounting pattern
- ISO 10372-06-05-0-92

### Maximum operating pressure - ports P, A, B and X
- Aluminium body: 210 bar (3,000 psi)
- Steel body: 350 bar (5,000 psi)
- Filterless body: 490 bar (7,000 psi)

### Maximum operating pressure - port T
- 210 bar (3,000 psi)

### Pilot valve
- Nozzle flapper

### Rated flow at $\Delta p_{35}$ bar/spool land (500 psi/spool land)
- 95 to 225 l/min (25 to 60 gpm)

### Step response time for 0 to 100 % stroke
- 95 l/min: 11 ms
- 150 l/min: 18 ms
- 225 l/min: 33 ms

Intrinsically safe and explosion proof valve versions are available for use in potentially hazardous environments. Specific models are certified to FM, ATEX, CSA, TIIS and IECEx standards. Contact Moog for details.

### Documents

<table>
<thead>
<tr>
<th>Part name</th>
<th>Description</th>
<th>Remark</th>
<th>Moog part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog</td>
<td>72 series general information</td>
<td>Note: Visit <a href="http://www.moog.com/industrial">www.moog.com/industrial</a></td>
<td>CDL6266</td>
</tr>
<tr>
<td>Manual</td>
<td>-072</td>
<td></td>
<td>CDS6211</td>
</tr>
<tr>
<td></td>
<td>-072K intrinsically safe Series</td>
<td></td>
<td>CDS6754</td>
</tr>
<tr>
<td>Installation drawing</td>
<td>-072 Series</td>
<td></td>
<td>CA79668</td>
</tr>
<tr>
<td></td>
<td>-072K intrinsically safe Series</td>
<td></td>
<td>CA33638</td>
</tr>
<tr>
<td></td>
<td>-072 filterless Series</td>
<td></td>
<td>CA35144</td>
</tr>
</tbody>
</table>
## FEATURES AND BENEFITS

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 % factory tested to ensure critical specification performance</td>
<td>Ensures smooth and easy startup, reduces downtime and insures long life in critical industrial applications</td>
</tr>
<tr>
<td>2-stage design</td>
<td>Enables high machine performance, faster cycle times and greater accuracy – all resulting in higher productivity</td>
</tr>
<tr>
<td>Dual coil torque motor</td>
<td>Redundancy for high reliability</td>
</tr>
<tr>
<td>Dual precision nozzles in torque motor</td>
<td>Precision flow control and predictability</td>
</tr>
<tr>
<td>Dry torque motor design</td>
<td>Eliminates potential contamination issues in the air gaps of the torque motor that could cause machine downtime</td>
</tr>
<tr>
<td>Hardened 440C bushing and spool</td>
<td>Provides for high life, wear resistance when used in the harsh environments; provides for low sliding friction during use</td>
</tr>
<tr>
<td>Carbide, ball-in-hole feedback mechanism</td>
<td>Extends lifetime of servo valve when compared to slotted spool and sapphire ball designs</td>
</tr>
<tr>
<td>Emergency fail-safe positioning</td>
<td>Most valves are set up to return to a fail-safe position when the command signal is interrupted or eliminated</td>
</tr>
<tr>
<td>Field replaceable pilot stage filter</td>
<td>Enables preventive maintenance in the field, saving precious machine downtime and service costs</td>
</tr>
<tr>
<td>External null bias adjustment</td>
<td>Enables technicians to manually adjust the null bias of the valve to adapt to the conditions of the machine. This feature provides a simple adjustment to machine performance without the need to adjust a controller.</td>
</tr>
<tr>
<td>Standard field configurable 5th port for separate pilot supply</td>
<td>Provides for the precise control of low pressure applications and allows adaptability in service.</td>
</tr>
<tr>
<td>Many customizable options available</td>
<td>High adaptability to many applications.</td>
</tr>
<tr>
<td>Compliant to SAE-ARP-490 Valve Design Standard</td>
<td>Electrohydraulic Servo Valves according to this ARP standard are applicable to fluid power systems in all types of flight vehicles, and it is applicable to Military, Civil and Space design/certification standards</td>
</tr>
<tr>
<td>Port pattern per ISO Standard</td>
<td>Readily available mounting manifolds</td>
</tr>
</tbody>
</table>
The 72 Series Flow Control Servo Valve consists of a polarized electrical torque motor and two stages of hydraulic power amplification. The motor armature extends into the air gaps of the magnetic flux circuit and is supported in this position by a flexure tube. The flexure tube acts as a seal between the electromagnetic and hydraulic sections of the valve. The 2 motor coils surround the armature, one on each side of the flexure tube.

The flapper of the first stage hydraulic amplifier is rigidly attached to the midpoint of the armature. The flapper extends through the flexure tube and passes between 2 nozzles, creating two variable orifices between the nozzle tips and the flapper. The pressure controlled by the flapper and nozzle variable orifice is fed to the end areas of the second stage spool.

The second stage is a conventional four-way spool design in which output flow from the valve, at a fixed valve pressure drop, is proportional to spool displacement from the null position. A cantilevered feedback spring is fixed to the flapper and engages a slot at the center of the spool. Displacement of the spool deflects the feedback sprint which creates a force on the armature/flapper assembly.

Input signals induce a magnetic charge in the armature and cause a deflection of the armature and flapper. This assembly pivots about the flexure tube and increases the size of one nozzle orifice and decreases the size of the other.

The differential pressure created by this action causes spool motion. The resulting spool displacement induces a linear force in the feedback wire which opposes the original input signal torque. Spool movement continues until the feedback wire force equals the input signal force.
# 72 SERIES SERVO VALVES

## General Technical Data

<table>
<thead>
<tr>
<th>Valve design</th>
<th>2-stage with spool and bushing and dry torque motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot valve</td>
<td>Nozzle flapper standard dynamics</td>
</tr>
<tr>
<td>Mounting pattern</td>
<td>ISO 10372-06-05-0-92</td>
</tr>
<tr>
<td>Installation position</td>
<td>Any position, fixed or movable</td>
</tr>
<tr>
<td>Weight with steel body</td>
<td>7.26 kg (16.0 lb)</td>
</tr>
<tr>
<td>Weight with aluminium body</td>
<td>3.52 kg (7.8 lb)</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 to +60 °C (-40 to +140 °F)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-29 to +135 °C (-20 to +275 °F) 1)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>30 g, 3 axis, 10 Hz to 2 kHz</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>30 g, 3 axis</td>
</tr>
</tbody>
</table>

1) Option available for higher temperature ranges up to 400 °F.

## Hydraulic Data 1)

### Maximum operating pressure port P, X, A, B

- Aluminium body: 210 bar (3,000 psi)
- Steel body: 350 bar (5,000 psi)
- Filterless body: 490 bar (7,000 psi)

### Minimum operating pressure

14 bar (200 psi)

### Rated flow at $\Delta p = 35$ bar (500 psi)/spool land

- 95 l/min (25 gpm)
- 150 l/min (40 gpm)
- 225 l/min (60 gpm)

### Maximum flow $Q_{\text{max}}$

355 l/min (93.8 gpm)

### Typical leakage

- 3.50 l/min (0.92 gpm)
- 4.60 l/min (1.22 gpm)
- 5.20 l/min (1.39 gpm)

### Maximum total leakage (axis cut)

- 5.82 l/min (1.54 gpm)
- 7.62 l/min (2.01 gpm)
- 9.00 l/min (2.38 gpm)

### Pilot flow

0.80 l/min (0.21 gpm)

### Null adjust authority 2)

Greater than 10% of rated flow

### Hydraulic fluid

- Hydraulic oil as per DIN 51524 parts 1 to 3 and ISO 11158

### Seal material

- FKM (fluorocarbon) 90 Shore
- EPR (ethylene-propylene copolymer) 90 Shore
- Others upon request

### Hydraulic fluid temperature range

-29 to +135 °C (-20 to +275 °F)

### Recommended viscosity range at 38 °C (100 °F)

10 to 85 mm²/s (cSt)

### Recommended cleanliness class as per ISO 4406 for functional safety

17/14/11

### Recommended cleanliness class as per ISO 4406 for longer service life

15/13/10

### Recommended filter rating for functional safety

$\beta_{10} \leq 75$ (10 μm absolute)

### Recommended filter rating for longer service life

$\beta_{5} \leq 75$ (5 μm absolute)

---

1) Measured at 210 bar (3,000 psi) pilot or operational pressure, oil viscosity 32 mm²/s and oil temperature +40 °C (+104 °F)
# 72 SERIES SERVO VALVES

## Typical Static and Dynamic Data

| Step response time for 0 to 100% stroke | 95 l/min (20 gpm) = 11 ms  
150 l/min (40 gpm) = 18 ms  
225 l/min (60 gpm) = 33 ms |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold, typical</td>
<td>≤ 1.5%</td>
</tr>
<tr>
<td>Hysteresis, typical</td>
<td>≤ 4.0%</td>
</tr>
<tr>
<td>Null shift per ΔT = 38 °C (100 °F)</td>
<td>≤ 2.0%</td>
</tr>
<tr>
<td>Rated flow tolerance</td>
<td>±10%</td>
</tr>
</tbody>
</table>
STANDARD RESPONSE

The low flow pilot stage (F) ensures a uniform pressure output. A high flow pilot stage (G) is available for improved dynamics.

<table>
<thead>
<tr>
<th>Type</th>
<th>Type 2 description</th>
<th>-3 dB point</th>
<th>90 deg phase lag</th>
<th>Step response</th>
</tr>
</thead>
<tbody>
<tr>
<td>S09.FOF</td>
<td>S09 low response</td>
<td>48 Hz</td>
<td>80 Hz</td>
<td>11 ms</td>
</tr>
<tr>
<td>S09.FOG</td>
<td>S09 high response</td>
<td>56 Hz</td>
<td>92 Hz</td>
<td>8.8 ms</td>
</tr>
<tr>
<td>S15.FOF</td>
<td>S15 low response</td>
<td>41 Hz</td>
<td>84 Hz</td>
<td>18 ms</td>
</tr>
<tr>
<td>S15.FOG</td>
<td>S15 high response</td>
<td>80 Hz</td>
<td>95 Hz</td>
<td>13.5 ms</td>
</tr>
</tbody>
</table>

Typical Characteristic Curves

Measured with 40% signal amplitude, at 3,000 psi (210 bar) pilot or operating pressure, fluid viscosity of 24 cSt, and fluid temperature of 104 °F (40 °C)
STANDARD RESPONSE

The low flow pilot stage (F) ensures a uniform pressure output. A high flow pilot stage (G) is available for improved dynamics.

<table>
<thead>
<tr>
<th>Type</th>
<th>Type 2 description</th>
<th>-3 dB point</th>
<th>90 deg phase lag</th>
<th>Step response</th>
</tr>
</thead>
<tbody>
<tr>
<td>S22.FOF</td>
<td>S22 low response</td>
<td>32 Hz</td>
<td>75 Hz</td>
<td>33 ms</td>
</tr>
<tr>
<td>S22.FOG</td>
<td>S22 high response</td>
<td>52 Hz</td>
<td>88 Hz</td>
<td>25 ms</td>
</tr>
</tbody>
</table>

Typical Characteristic Curves

Measured with 40% signal amplitude, at 3,000 psi (210 bar) pilot or operating pressure, fluid viscosity of 24 cSt, and fluid temperature of 104 °F (40 °C)
1. Typical wiring schematic
2. Location pin (refer to section Hole Pattern for position)
3. Filter
4. 4X Ø 10.31 mm (0.406 in) thru
5. Mechanical Null Adjust screw (requires 3/8" wrench and 3/32” hex key)
6. Optional Magnetic Null Adjust
7. 4-Pin connector mates with MS3106-14S-2S
   6-Pin connector mates with MS3106-14S-6S
1. Typical wiring schematic
2. Location pin (refer to section Hole Pattern for position)
3. 4X Ø 10.31 mm (0.406 in) thru
4. Bushing pin is locked and cannot be adjusted
5. Optional Magnetic Null Adjust
6. 4-Pin connector mates with MS3106-14S-25
   6-Pin connector mates with MS3106-14S-6S
MOUNTING REQUIREMENTS REF. ISO 10372-06-05-0-92  
(PORT CIRCLE DIAMETER 2.0)

Surface

Surface to which valve is mounted requires:

- Flatness of 0.05 mm (0.002 in) over 100 mm (3.94 in)
- Average finish Rₐ better than 0.8 μm (0.000032 in)

Ports

For maximum flow ports must be designed as follows:

- P, T, A, B with diameters of 18 mm (0.709 in), 15.88 mm (0.625 in) Ø counter-bored 18.94 mm (0.746 in) inside Ø by 23.81 mm (0.937 in) outside Ø

Recommended Mounting Seals

Standard o-rings, 90 +/- 5 durometer, compatible with the hydraulic fluid

SAE AS568 size -019 for P, A, B, T port
SAE AS568 size -012 for X port

See section 'Spare parts'
ELECTRICAL CONNECTION

Rated Current and Coil Resistance

A variety of coils are available for 72 Series Servo Valves, which offer a wide choice of rated currents.

<table>
<thead>
<tr>
<th>Standard ordering code</th>
<th>Command signal (mA)</th>
<th>Coil resistance [Ohms/coil at 25 °C (77 °F)]</th>
<th>Power consumption [W]</th>
<th>Coil inductance [H] measured at 50 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single coil</td>
<td>Series coil</td>
<td>Parallel coil</td>
<td>Single coil</td>
</tr>
<tr>
<td>4</td>
<td>±8</td>
<td>±4</td>
<td>±8</td>
<td>1,000</td>
</tr>
<tr>
<td>H</td>
<td>±15</td>
<td>±7.5</td>
<td>±15</td>
<td>206</td>
</tr>
<tr>
<td>L</td>
<td>±40</td>
<td>±20</td>
<td>±40</td>
<td>80</td>
</tr>
</tbody>
</table>

1) Others optional

2) The resistance and inductance of standard coils are given below. The 2 coils in each Servo Valve are wound with equal turns giving a normal production tolerance on coil resistance of ±10%. Copper magnet wire is used, so the coil resistance will vary significantly with temperature. The effects of coil resistance changes can be essentially eliminated through use of a current feedback servo amplifier having high output impedance.

3) Inductance is determined under pressurized operating conditions and is greatly influenced by back electromagnetic forces of the torque motor. These effects vary with most operating conditions, and vary greatly with signal frequencies above 100 Hz. The apparent coil inductance values given are determined at 50 Hz.

Coil Connections

A 4-pin electrical connector that mates with an MS3106F14S-2S is standard. All 4 torque motor leads are available at the connector so that external connections can be made for series, parallel or single operation.

72 Series Servo Valves can be supplied on special order with other connectors or pigtail.

Standard Configuration for Valve Opening P → B, A → T

Single

A (+), B (-) or C (+), D (-)

Series

A (+), D (-), B and C connected

Parallel

A and C (+), B and D (-)
FLOW CALCULATION

The actual flow is dependent upon electrical command signal and valve pressure drop. The flow for a given valve pressure drop can be calculated using the square root function for sharp edge orifices.

\[ Q = Q_{\text{r}} \cdot \sqrt{\frac{\Delta \rho}{\Delta \rho_{\text{r}}}} \]

- \( Q \) [l/min (gpm)] Actual flow
- \( Q_{\text{r}} \) [l/min (gpm)] Rated flow
- \( \Delta \rho \) [bar (psi)] Actual pressure drop per spool land
- \( \Delta \rho_{\text{r}} \) [bar (psi)] Rated pressure drop

**Null-cut Options**

**Standard Axis Cut**

- Minimal change in gain through null region. Best overall performance for most closed loop systems.

**Underlap Spool**

- Null region flow gain is higher than normal. Always allows some small amount of flow past the spool.

**Overlap Spool**

- Null region flow gain is lower than normal. Spool types can range from minimal overlap to completely blocked flow.

**Flow Diagram for 4-way Operation**

- Graph showing flow (Q) vs. control flow (I) with different pressure drops (\( \Delta \rho \)).
- Different lines indicate different pressure drops and flow rates.
- Legend includes flow rates and pressure drops.
## ACCESSORIES AND SPARE PARTS

### Spare Parts

<table>
<thead>
<tr>
<th>Part name</th>
<th>Description</th>
<th>Material</th>
<th>Moog part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter replacement kit</td>
<td>Contains the following:</td>
<td>FKM 90 Shore</td>
<td>B52555RK099K001</td>
</tr>
<tr>
<td></td>
<td>• 2 pieces o-ring, 26.7 mm (1.051 in) x Ø 1.8 mm (0.07 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 piece o-ring 9.2 mm (0.364 in) x Ø 1.8 mm (0.07 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2 pieces o-ring, 4 mm (0.161 in) x Ø 1.8 mm (0.07 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2 pieces o-ring, 3.3 mm (0.130 in) x Ø 1.8 mm (0.07 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 piece filter tube 44 μm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 piece Field replaceable filter 20 μm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 piece motor cap gasket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting screws</td>
<td>4 pieces, inner Ø 20.4 mm (0.801 in) x Ø 1.8 mm (0.07 in)</td>
<td>FKM 90 Shore</td>
<td>-42082-040</td>
</tr>
<tr>
<td>P.T.A.B</td>
<td>Equivalent MIL-R-83248 size-019.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O-ring for ports P.T.A.B</td>
<td>1 piece, inner Ø 9.3 mm (0.36 in) x Ø 1.8 mm (0.07 in). Equivalent MIL-R-83248 size-012.</td>
<td>FKM 90 Shore</td>
<td>-42082-013</td>
</tr>
<tr>
<td>Replaceable filter</td>
<td>44 μm nominal</td>
<td>-23020</td>
<td></td>
</tr>
<tr>
<td>Field replaceable filter</td>
<td>20 μm nominal</td>
<td>-23050</td>
<td></td>
</tr>
<tr>
<td>O-ring for port X</td>
<td>4 pieces, inner Ø 20.4 mm (0.801 in) x Ø 1.8 mm (0.07 in). Equivalent MIL-R-83248 size-019.</td>
<td>FKM 90 Shore</td>
<td>-42082-040</td>
</tr>
<tr>
<td>Replaceable filter</td>
<td>44 μm nominal</td>
<td>-23020</td>
<td></td>
</tr>
<tr>
<td>Field replaceable filter</td>
<td>20 μm nominal</td>
<td>-23050</td>
<td></td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Part name</th>
<th>Description</th>
<th>Remark</th>
<th>Moog part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting screws inch</td>
<td>4 pieces 3/8-16 UNC by 2.0 long, tightening torque 318 ibf-in</td>
<td>NA51352N6-32 or equivalent</td>
<td>C66391-332B</td>
</tr>
<tr>
<td>Metric</td>
<td>4 pieces M10x50 ISO 4762-10.9, tightening torque 36 Nm</td>
<td>NA0069A100050 or equivalent</td>
<td>B64929-009B050</td>
</tr>
<tr>
<td>AMO manifold</td>
<td>Adjustable metering orifice manifold used to bleed fluid between A and B ports for better pressure control</td>
<td></td>
<td>A96920AM015</td>
</tr>
<tr>
<td>Flushing plate</td>
<td>Manifold employed in place of valve when initially cleaning hydraulic fluids (O-ring included)</td>
<td></td>
<td>G4321AM001</td>
</tr>
<tr>
<td>Mating connector</td>
<td>4 pin electrical connector</td>
<td>MS3106F14S-2S</td>
<td>-49054F01450025</td>
</tr>
<tr>
<td>Mounting manifold</td>
<td>Base mounting manifold, 4 ports</td>
<td></td>
<td>-22236AM003</td>
</tr>
<tr>
<td>CRV Manifold</td>
<td>Cross port relief manifold used to limit pressure levels in ports A and B</td>
<td></td>
<td>-65711AM004-XXXX</td>
</tr>
<tr>
<td>Safety Manifold</td>
<td>Sandwich manifold used to lock, extend and retract cylinder upon loss of electrical signal or hydraulic pressure</td>
<td></td>
<td>B64467AM</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

Moog 72 Series Flow Control Servo Valves

Rev. Y, October 2022
**RELATED PRODUCTS**

**DIN Rail Modules - Analog Control Cards**

Moog's DIN rail mounted module analog control cards are ideal for use in enclosures where space is limited. Modules include servo amplifiers, transducer conditioning electronics, command and auxiliary function modules, valve drive amplifiers and power supplies. All of these modules are CE marked and require a 24 V DC supply. The modules mount to standard 35 mm DIN rail mount for easy installation and removal.

**Portable Valve Testers - Evaluates Valves in the Field**

Valve testers are a cost effective method for evaluating valves in the field. They provide a quick and easy means of differentiating between hydraulic and electronic problems. There are five models to choose from, each with different levels of capability and flexibility to meet your specific requirements. All valve testers have a compact, easily portable design.

**Mounting Manifolds - Easier Installation and Maintenance**

Various mountings manifolds are available for standard industrial valves, including base and adapter types for mounting and flushing requirements. Other hardware such as bolts and connectors are also available.

The specific accessories you may need for a particular model are listed in the relevant product catalogs and can be ordered through your local office.

**Filtration - Oil Filtration Requirements for Industrial Servo Systems**

The most effective way to reduce life cycle costs of an oil hydraulic system is through close attention to contamination control.

For industrial servo systems with 72 Series Servo Valves the ideal system filter arrangement is summarized as follows:

- Use a 10 micron (beta 10 ≥ 75) high pressure filter without by-pass just before the valve or critical parts of the valve (e.g. pilot).
- Use a 5 micron (beta 5 ≥ 75) low pressure filter in the return or bypass line.
- Use a filter in the tank breather that is at least the same filtration level as the finest filter in the system.

This recommendation is based on the fact that most servo and proportional valves can accept the odd particle up to 25 microns so the pressure filter will protect the valve from catastrophic failure. The real work is done by the low pressure filter reducing small particle contamination which is the prime contributor to component wear and silting.

Assuming that the filters are properly dimensioned and care is taken during initial installation and maintenance, the aim should be to limit oil contamination to ISO 4406 17/14/11. For long life, the maximum levels are 15/13/10, respectively. It is important to note that these are maximum contamination levels and with proper care and regular filter change, significantly lower levels can and should be achieved. Attention must also be paid to a number of other factors that contribute to oil condition problems such as elevated temperatures, high tank humidity, "dirty" new oil.
ABOUT MOOG

Moog Inc. is a worldwide designer, manufacturer and integrator of precision control components and systems. Moog’s Industrial Systems Group designs and manufactures high performance motion control solutions combining electric, hydraulic, and hybrid technologies with expert consultative support in a range of applications including energy production and generation machinery, industrial production machinery and simulation and test equipment. We help performance-driven companies design and develop their next-generation machines. Moog Industrial Systems Group, with fiscal year 2020 sales of USD 909 million and over 40 locations worldwide, is part of Moog Inc. (NYSE: MOG.A and MOG.B) which has sales of USD 2.885 billion.

This vast scope ensures that our engineers remain close to the needs of machine builders and provide flexible design solutions and technical expertise tailored to our customers’ toughest challenges.

Moog experts work in close collaboration with machine builders and application engineers to design motion control systems for greater productivity, higher reliability, superior connectivity, less costly maintenance and more effective operations. Our regional presence, industry knowledge and design flexibility ensure Moog motion control solutions are tailored to their environment - from meeting operating regulations and performance standards, to taking machine performance to a higher level.

Products

At the heart of every Moog solution is an array of products engineered for precision, high performance and reliability. For more than six decades, Moog products have been specified for critical machine applications.

Some are developed specifically for unique operating environments. Others are standard equipment on machines across many industries. All are continuously improved to take advantage of the latest technology breakthroughs and advancements.

Moog products include:

- Servo Valves and Proportional Valves
- Servo Motors and Servo Drives
- Motion Controllers and Software
- Radial Piston Pumps
- Actuators
- Integrated Hydraulic Manifold Systems and Cartridge Valves
- Slip Rings
- Motion Bases
ABOUT MOOG

Hydraulic Solutions

Since Bill Moog invented the first commercially viable servo valve in 1951, Moog has set the standard for world-class hydraulic technology. Today, Moog products are used in a variety of applications - providing high power, enhanced productivity and ever better performance for some of the world’s most demanding applications.

Electric Solutions

Clean operation, low noise generation, less maintenance and reduced power consumption make Moog electric solutions ideal for applications worldwide. Moog is the ideal partner for applications where transitioning technologies require special expertise.

Hybrid Solutions

By incorporating the advantages of existing hydraulic and electric technologies - including modular flexibility, increased efficiency and cleanliness - into innovative hybrid solutions, Moog offers new performance potential in specialized applications.

MOOG GLOBAL SUPPORT

Moog Global Support is our promise to offer world-class Repair and Maintenance Services delivered expertly by our trained technicians. With the reliability only available from a leading manufacturer 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/multiyear 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.
**ORDERING CODE**

<table>
<thead>
<tr>
<th>Model number (assigned at the factory)</th>
<th>Type designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>-072</td>
<td>S</td>
</tr>
</tbody>
</table>

**Optional feature**
- S Series specification
- K Intrinsically safe

**Model designation (assigned at factory)**

<table>
<thead>
<tr>
<th>Factory identification (revised level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Valves version</td>
</tr>
<tr>
<td>S Standard response</td>
</tr>
</tbody>
</table>

**2 Rated flow in l/min (gpm)**

<table>
<thead>
<tr>
<th>Model number (assigned at factory)</th>
<th>Type designation</th>
<th>Rated flow in l/min (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
</tbody>
</table>

**3 Maximum operating pressure in bar (psi)**

<table>
<thead>
<tr>
<th>Model number (assigned at factory)</th>
<th>Type designation</th>
<th>Rated flow in l/min (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
</tbody>
</table>

**4 Bushing/spool design (see Null Cut Options page 14 for designation)**

<table>
<thead>
<tr>
<th>Model number (assigned at factory)</th>
<th>Type designation</th>
<th>Rated flow in l/min (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
</tbody>
</table>

**5 Pilot stage design**
- A Port A open to return
- B Port B open to return

**6 Spool position without electrical signal**
- M Center position

**7 Pilot connections and pressure**

<table>
<thead>
<tr>
<th>Model number (assigned at factory)</th>
<th>Type designation</th>
<th>Rated flow in l/min (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>25</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>-072</td>
<td>S</td>
<td>60</td>
</tr>
</tbody>
</table>

**8 Seal material**
- V FKM 90 Shore
- N NBR 90 Shore (BUNA)
- F FKM High pressure seals
- E EPR (ethylene-propylene copolymer)

**9 Valve connector**
- A Connector over C1 (A) - side (RH)
- B Connector over C2 (B) - side (LH)

**10 Optional Mechanical Null Adjust**
- N Magnetic Null Adjust
- R Reverse Polarity

**Preferred Models**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Type Designation</th>
<th>Rated Flow (±,1,000 psi) gpm</th>
<th>Rated Current (single coil) mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>-072-1101</td>
<td>S09FOFM4VBLHN</td>
<td>25</td>
<td>±15</td>
</tr>
<tr>
<td>-072-1102</td>
<td>S15FOFM4VBLHN</td>
<td>40</td>
<td>±15</td>
</tr>
<tr>
<td>-072-1203</td>
<td>S22FOFM4VBLHN</td>
<td>60</td>
<td>±40</td>
</tr>
<tr>
<td>-072-1201-6</td>
<td>S09KOFM4VBLN</td>
<td>25</td>
<td>±40</td>
</tr>
<tr>
<td>-072-1202-6</td>
<td>S15KOFM4VBLN</td>
<td>40</td>
<td>±40</td>
</tr>
<tr>
<td>-072-1203-6</td>
<td>S22KDFM4VBLN</td>
<td>60</td>
<td>±40</td>
</tr>
</tbody>
</table>

1) Values with (490 bar/7,000 psi) maximum operating pressure uses a filterless body. Refer to installation specifics in this catalog.
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.

Australia
+61 3 9561 6044
Service + 61 3 8545 2140
info.australia@moog.com
service.australia@moog.com

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

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

China
+86 21 2893 1600
Service +86 21 2893 1626
info.china@moog.com
service.china@moog.com

France
+33 1 4560 7000
Service +33 1 4560 7015
info.france@moog.com
service.france@moog.com

Germany
+49 7031 622 0
Service +49 7031 622 197
info.germany@moog.com
service.germany@moog.com

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

India
+91 80 4057 6666
Service +91 80 4057 6604
info.india@moog.com
service.india@moog.com

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

Italy
+39 0332 421 111
Service 800 815 692
info.italy@moog.com
service.italy@moog.com

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

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

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

The Netherlands
+31 252 462 000
info.thenetherlands@moog.com
service.netherlands@moog.com

Singapore
+65 677 36238
Service +65 651 37889
info.singapore@moog.com
service.singapore@moog.com

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

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

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

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

United Kingdom
+44 (0) 1684 858000
Service +44 (0) 1684 278369
info.uk@moog.com
service.uk@moog.com

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

For more information, visit 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.
©2022 Moog Inc. All rights reserved. All changes are reserved.