

# SERVO VALVES

## PILOT OPERATED FLOW CONTROL VALVE WITH ANALOG INTERFACE

G631/631 SERIES

ISO 4401-05-05-0-94



Rev. L, January 2014

HIGH PERFORMANCE, TWO-STAGE DESIGN  
PROVIDING FLOW CONTROL IN A SIMPLE,  
RUGGED, DEPENDABLE, LONG LIFE 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.

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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](http://www.moog.com/industrial) or contact your local Moog office.

## PRODUCT OVERVIEW

The G631/631 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 5 to 75 l/min (1.3 to 20 gpm) at 35 bar (500 psi) valve 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.

|   |  |                    |                  |                   |                   |                   |
|---|--|--------------------|------------------|-------------------|-------------------|-------------------|
| Valve design  | 2-stage, with spool and bushing and dry torque motor |                    |                  |                   |                   |                   |
| Mounting pattern  | ISO 4401-05-05-0-94                                  |                    |                  |                   |                   |                   |
| Maximum operating pressure to ports P, T, A, B                        | 315 bar (4,500 psi)                                  |                    |                  |                   |                   |                   |
| Pilot stage   | Nozzle Flapper                                       |                    |                  |                   |                   |                   |
| Rated flow at $\Delta p_N$ 35 bar/spool land (500 psi/spool land)     | 5 l/min (1.3 gpm)                                    | 10 l/min (2.5 gpm) | 20 l/min (5 gpm) | 40 l/min (10 gpm) | 60 l/min (15 gpm) | 75 l/min (20 gpm) |
| Step response time for 0 to 100% stroke with spool and bushing design | 18 ms  | 18 ms              | 18 ms            | 18 ms             | 18 ms             | 18 ms             |



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

## FEATURES AND BENEFITS

The G631/631 Series is proven technology that performs reliably in machines where high performance, stability and accuracy are required. Moog's Mechanical Feedback Valves are designed to provide high reliability and long service life.

| <b>Features</b>  | <b>Benefits</b>  |
|--|--|
| 100% factory tested to ensure critical specification performance | Ensures smooth and easy startup, reduces downtime and insures long life in critical industrial applications  |
| 2-stage design   | Enables high machine performance, faster cycle times and greater accuracy - all resulting in higher productivity   |
| Dual Coil torque motor   | Redundancy for high reliability  |
| Dual Precision Nozzles in Torque Motor                           | Precision flow control and predictability  |
| Dry torque motor design  | Eliminates potential contamination issues in the air gaps of the torque motor that could cause machine downtime  |
| Hardened 440C Bushing and Spool                                  | Provides for high life, wear resistance when used in the harsh environments; provides for low sliding friction during use  |
| Emergency failsafe positioning                                   | Most valves are set up to return to a failsafe position when the command signal is interrupted or eliminated   |
| Field replaceable pilot stage filter                             | Enables preventive maintenance in the field, saving precious machine downtime and service costs  |
| External null bias adjustment                                    | Enables technicians to manually adjust the null bias of the valve to adapt to the conditions of the machine (see section on null flow adjustment – Page 11). This feature provides a simple adjustment to machine performance without the need to adjust a controller. |

## DESCRIPTION OF OPERATION

The G631/631 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 member. 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.

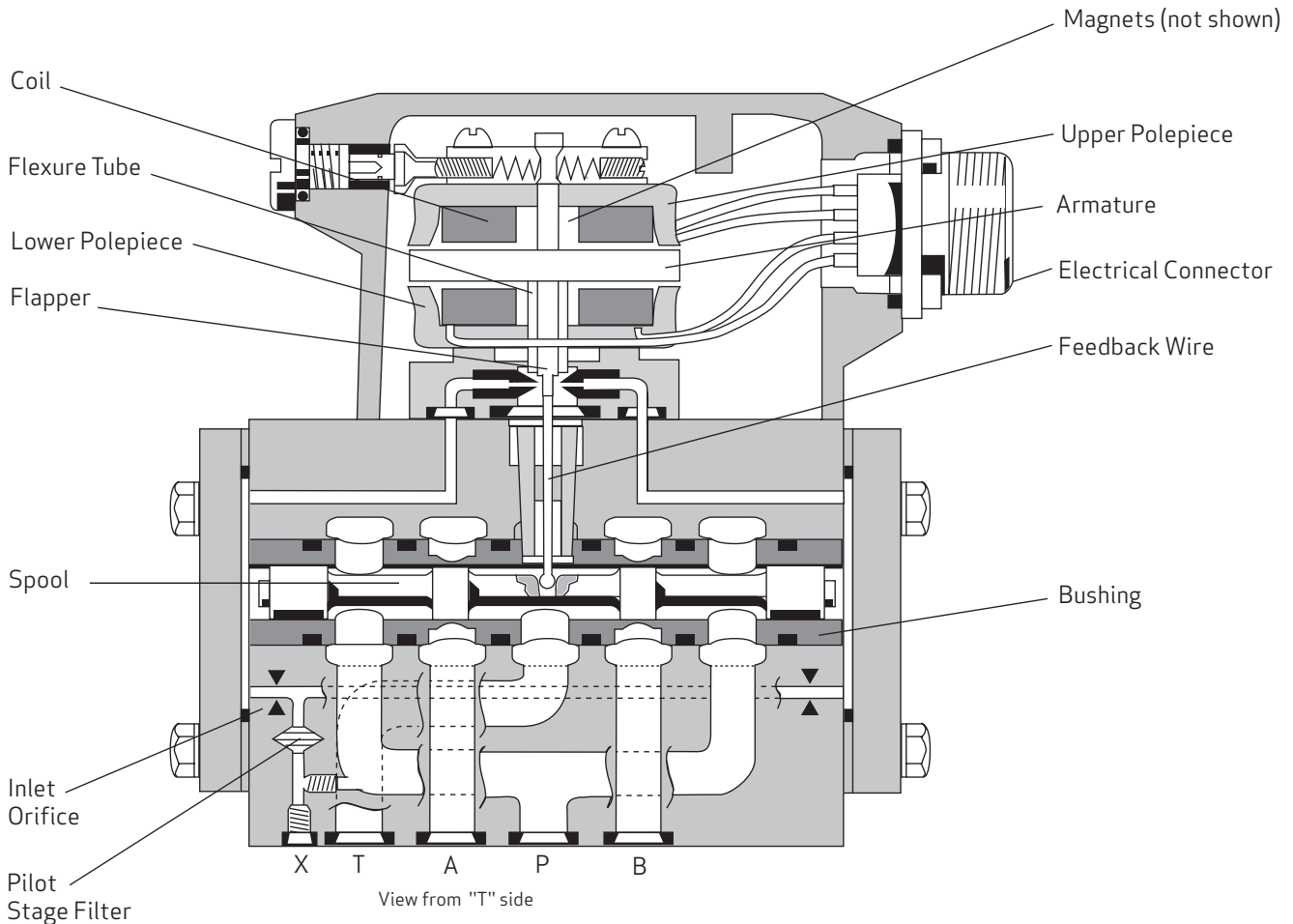
The flapper of the first stage hydraulic amplifier is rigidly attached to the armature. The flapper extends through the flexure tube and passes between 2 nozzles, creating two variable orifices between the nozzle tips and the flapper. The pressure controlled by the flapper and nozzle variable orifice 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 spring which creates a force on the armature/flapper assembly.

Input signals induce a magnetic charge in the armature and causes 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.

### Electro-hydraulic Servo Valve Cut-away



## G631/631 SERIES - SERVO VALVES

### General Technical Data

|                                  |  |
|----------------------------------|--|
| <b>Valve design</b>              | 2-stage, with spool and busing and dry torque motor  |
| <b>Pilot stage</b>               | Nozzle Flapper                                       |
| <b>Mounting pattern</b>          | ISO 4401-05-05-0-94                                  |
| <b>Installation position</b>     | Any orientation, fixed or movable                    |
| <b>Weight</b>                    | 2.2 kg (4.9 lb)                                      |
| <b>Storage temperature range</b> | -40 to +60 °C (-40 to +140 °F)                       |
| <b>Ambient temperature range</b> | -40 to +135 °C (-40 to +275 °F)                      |
| <b>Vibration resistance</b>      | 30 g, 3 axis, 10 Hz to 2 kHz                         |
| <b>Shock resistance</b>          | 30 g, 3 axis   |
| <b>Seal material</b>             | Fluorocarbon (FKM) 85 Shore A<br>Others upon request |

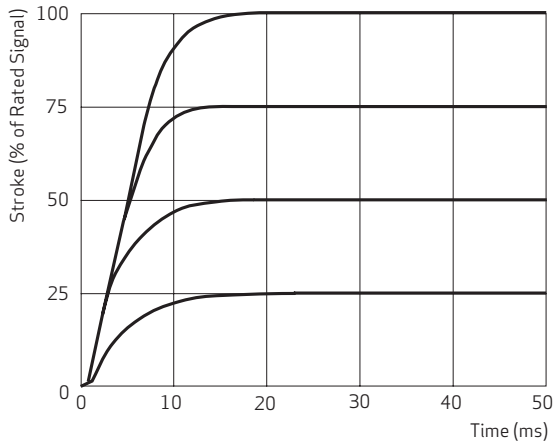
### Hydraulic Data

|  |   |
|--|---|
| <b>Maximum operating pressure to ports P, A, B, X</b>                        | 315 bar (4,500 psi)   |
| <b>Maximum operating pressure to port T</b>                                  | 20% of pilot pressure, max 100 bar (1,450 psi)  |
| <b>Rated flow at <math>p_N</math> 35 bar/spool land (500 psi/spool land)</b> | 5, 10, 20, 40, 60, 75   |
| <b>Null adjust authority</b>   | Greater than 10% of rated flow  |
| <b>Hydraulic fluid</b>   | Hydraulic oil as per DIN 51524 parts 1 to 3 and ISO 11158<br>Other fluids on request. |
| Temperature range  | -40 to +60 °C (-40 to +140 °F)  |
| Recommended viscosity range  | 10 to 85 mm <sup>2</sup> /s (cSt)   |
| Maximum permissible viscosity range  | 5 to 1,250 mm <sup>2</sup> /s (cSt)   |
| <b>Recommended cleanliness class as per ISO 4406</b>                         |   |
| For functional safety  | 19/16/13  |
| For longer life  | 17/14/11  |
| <b>Recommended filter rating</b>   |   |
| For functional safety  | $\beta_{10} \leq 75$ (10 $\mu$ m absolute)  |
| For longer life  | $\beta_5 \leq 75$ (5 $\mu$ m absolute)  |

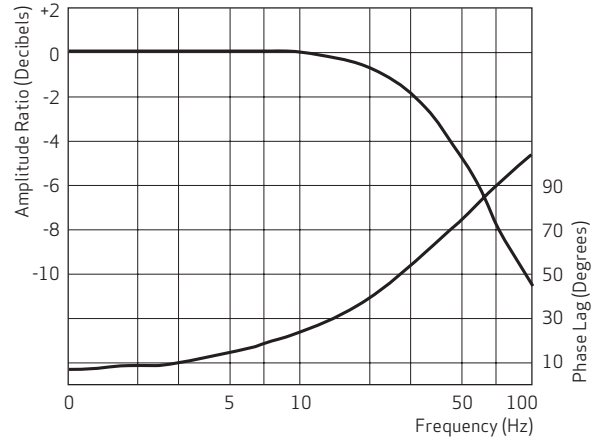
### Static and Dynamic Data

|   |                          |
|---|--------------------------|
| <b>Deviation of rated flow</b>                              | $\pm 10\%$ of rated flow |
| <b>Step response time for 0 to 100% stroke</b>              | 18 ms                    |
| <b>Threshold</b>  | 1.0% of rated signal     |
| <b>Hysteresis</b>   | < 3% of rated signal     |
| <b>Null shift at <math>\Delta T = 38</math> °C (100 °F)</b> | < 4% of rated signal     |

# G631/631 SERIES SERVO VALVES



Step Response



Standard Frequency Response  
 3,000PSI DTE -24 at 38° C (100° F)  
 ±25% Input Amplitude

# ELECTRICAL DATA

## Rated current and coil resistance

A variety of coils are available for G631/631 Series Servo Valves, which offer a wide choice of rated currents.

## Coil impedance

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  $\pm 12\%$ . 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 servoamplifier having high output impedance.

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.

| Ordering code | Coil inductance [H]<br>Command signal |             |               | Coil resistance [Ohms/coil at 25°C (77°F)] | Power consumption [W] |             |               |
|---------------|---------------------------------------|-------------|---------------|--|-----------------------|-------------|---------------|
|               | Single coil                           | Series coil | Parallel coil |  | Single coil           | Series coil | Parallel coil |
| Q             | $\pm 30$                              | $\pm 15$    | $\pm 30$      | 300  | 0.27                  | 0.14        | 0.14          |
| R             | $\pm 100$                             | $\pm 50$    | $\pm 100$     | 28   | 0.28                  | 0.14        | 0.14          |

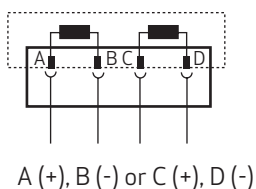
| Ordering code | Coil inductance [H]<br>Measured at 50 Hz |             |               |
|---------------|--|-------------|---------------|
|               | Single coil                              | Series coil | Parallel coil |
| Q             | 2.0                                      | 7.0         | 2.0           |
| R             | 0.2                                      | 0.8         | 0.2           |

## Coil connections

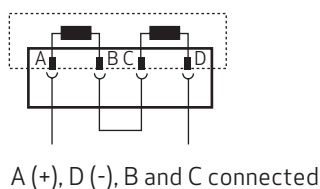
A 4-pin electrical connector that mates with an MS3106F14S-2S is standard. All 4 torque motor leads are available at the connector so that external connections can be made for series, parallel, or differential operation. G631/631 Series Servo Valves can be supplied on special order with other connectors or pigtail.

### Configuration for valve opening P → B, A → T

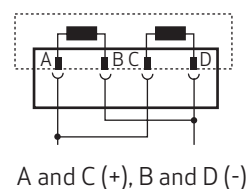
#### Single



#### Series

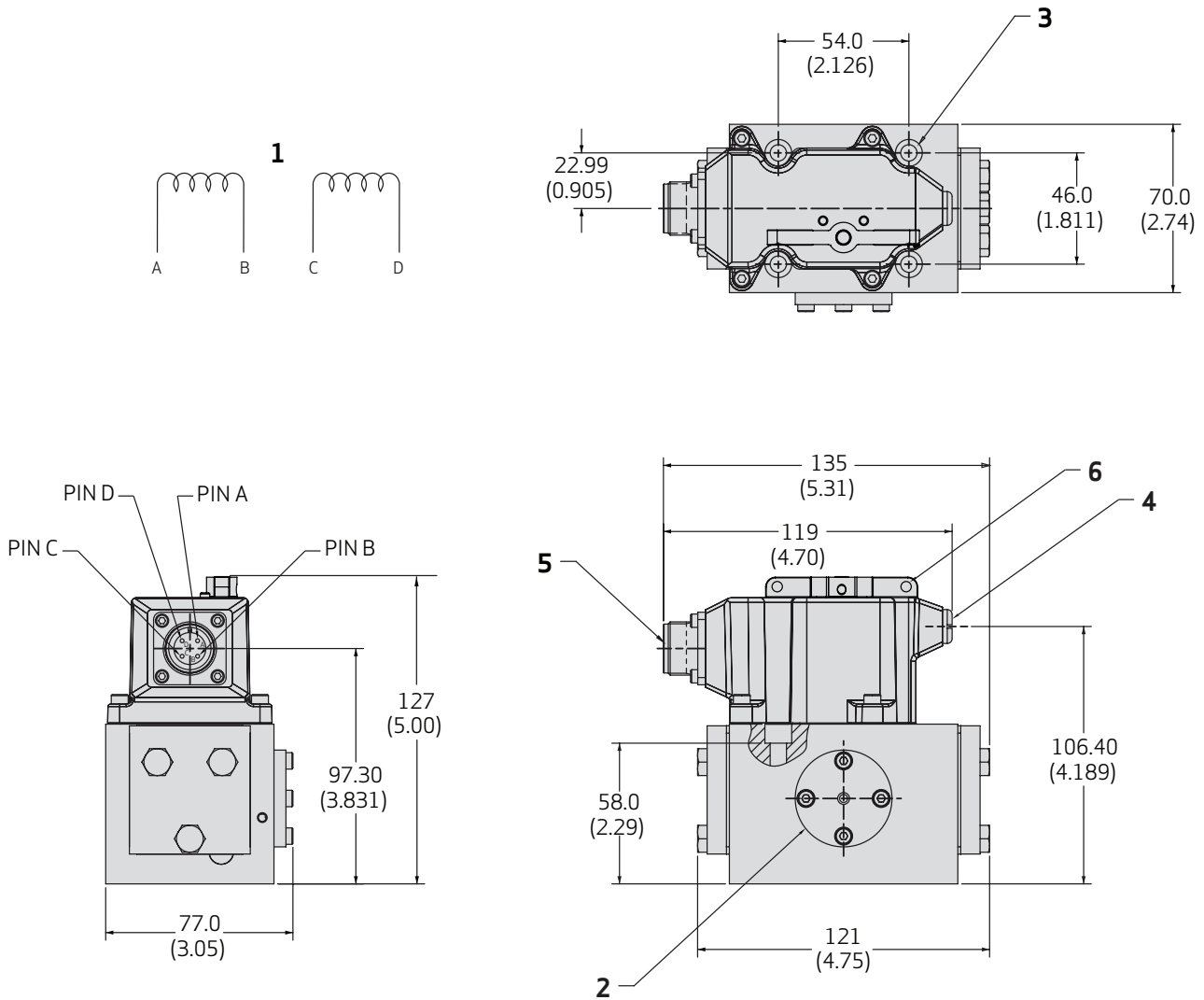


#### Parallel





# INSTALLATION DRAWINGS AND NULL ADJUST INSTRUCTIONS



- 1 Typical wiring schematic
- 2 Filter location
- 3 4X Ø 6.76 (0.266) thru Ø 11.10 (0.437) to depth shown Mounting Holes
- 4 Null adjust cover. Remove for screw access (requires 1/8" hex key)
- 5 Connector mates with MS3106F14S-2S (Moog P/N: -49054F014S002S)
- 6 Optional Manual Override

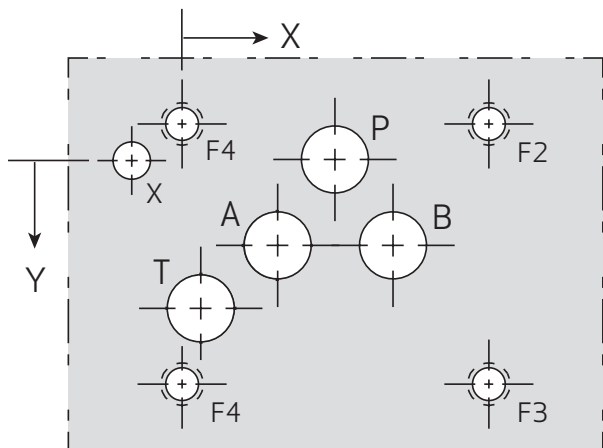
**Fluid:**  
 Industrial hydraulic fluid per DIN 51524 parts 1 to 3 and ISO 11158, maintained to ISO 4406 Code 19/16/13 recommended. Viscosity 10 to 85 mm<sup>2</sup>/s (cSt) at 38 °C (60 to 300 SUS at 100 °F)

**Operating Temperature Range:**  
 Fluid: -40 to +60 °C (-40 to +140 °F)  
 Ambient: -40 to +135 °C (-40 to +275 °F)

**Valve Phasing:**  
 Flow out port B results when:  
 Series coils: B & C connected, A+, D-  
 Parallel coils: A & C connected, B & D connected, A+/B- or C+/D-  
 Single coils: A & C+, B & D-

**Null Adjust:**  
 Flow out port A results with the clockwise rotation of the null adjust screw.

## G631/631 SERIES HOLE PATTERN FOR MOUNTING SURFACE



| Designation       | P     | A     | B     | T     | X      | F1     | F2     | F3     | F4     |
|-------------------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| <b>Size Ø</b>     | 11.13 | 11.13 | 11.13 | 11.13 | 3.18   | M6     | M6     | M6     | M6     |
| <b>mm</b>         | 0.438 | 0.438 | 0.438 | 0.438 | 0.125  | 1/4-20 | 1/4-20 | 1/4-20 | 1/4-20 |
| <b>in</b>         |       |       |       |       |        |        |        |        |        |
| <b>Position X</b> | 27.0  | 16.69 | 37.31 | 3.20  | -10.59 | 0      | 54.0   | 54.0   | 0      |
| <b>mm</b>         | 1.063 | 0.657 | 1.469 | 0.126 | -0.417 | 0      | 2.126  | 2.126  | 0      |
| <b>in</b>         |       |       |       |       |        |        |        |        |        |
| <b>Position Y</b> | 6.32  | 21.41 | 21.41 | 32.51 | 7.39   | 0      | 0      | 46.02  | 46.02  |
| <b>mm</b>         | 0.249 | 0.843 | 0.843 | 1.280 | 0.291  | 0      | 0      | 1.812  | 1.812  |
| <b>in</b>         |       |       |       |       |        |        |        |        |        |

### Notes

- Surface to which the valve is mounted requires flatness of 0.03 mm (0.001 in) over 100 mm (3.94 in) and an average finish  $R_a$  better than 0.8  $\mu\text{m}$  (0.000032 in).
- Ports:  
 P and T: 10 mm (0.390 in) diameter, counter-bored 15.75 mm (0.620 in) by 1.5 mm (0.061 in) deep  
 A and B: 9 mm (0.344 in) diameter, counter-bored 15.75 mm (0.620 in) by 1.5 mm (0.061 in) deep  
 X: 7.5 mm (0.295 in) diameter, counter-bored 11.75 mm (0.463 in) by 1.5 mm (0.061 in) deep
- Recommended Seals:  
 90 durometer that is compatible with the hydraulic fluid.  
 P, A, B and T: 12 mm inside diameter by 2 mm cross-section  
 X: 8 mm inside diameter by 2 mm cross-section
- Location of X port in valve body does not correspond to ISO standards.

### Conversion Instruction

For operation with internal or external pilot connection.  
 Pilot flow supply Screw and seal washer location (M4 X 6 DIN EN ISO 4762)

|            |        |        |
|------------|--------|--------|
|            | X      | P      |
| Internal P | closed | open   |
| External X | open   | closed |

## NULL FLOW ADJUSTMENT

It is often desirable to adjust the null flow of a servo valve independently of other system parameters. The mechanical null adjustment permits convenient control function set-ups. Valves with mechanical null adjustment allow for at least  $\pm 10\%$  adjustment of null flow. Mechanical feedback elements position the spool relative to the valve body for a given input signal.

### Mechanical Adjustment Procedure

The mechanical null adjuster is a hex socket adaptor located behind the pan head screw in the motor cap (see illustration below) which, when adjusted, provides control of the spool position to obtain the desired flow null.

Normal adjustment should require less than  $\pm$  one turn. Limit null screw adjustment to less than  $\pm$  two turns.

#### Adjustment Procedure

- Using a blade screwdriver, remove the null access screw to permit adjustment of the hex socket setscrew.
- Using a 1/8 inch Allen Wrench, adjust the setscrew to obtain the desired flow null.

*Note: Clockwise rotation of the null adjuster produces flow out port A.*

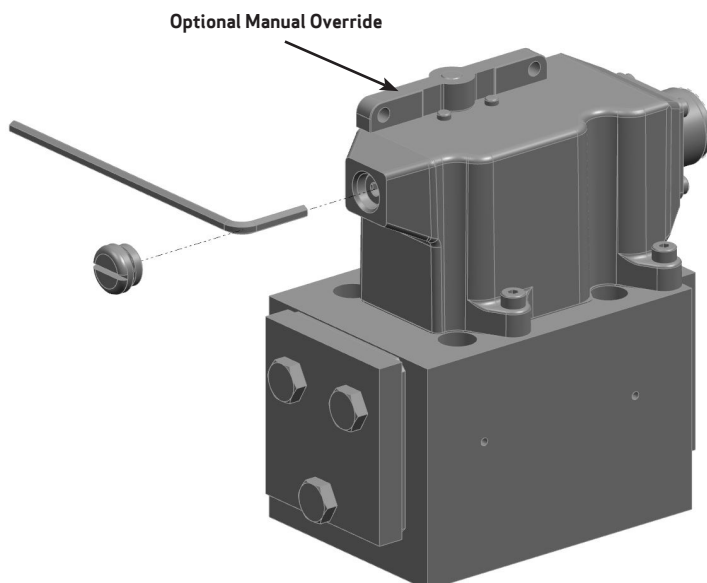
- After the desired flow null has been obtained, replace the null access screw.

#### Tools and Equipment

- Blade screwdriver
- Allen wrench set (1/8 inch)

### Optional Manual Override Operation

At times it may be convenient to activate the servo valve manually rather than with an electrical control signal. This can be done on the G631/631 series with the optional manual override. With supply pressure applied, rotating the manual override handle on the motor cap fully counterclockwise will result in the right port pressure increasing. Rotating the manual override handle on the motor cap fully clockwise will result in the left port pressure increasing.



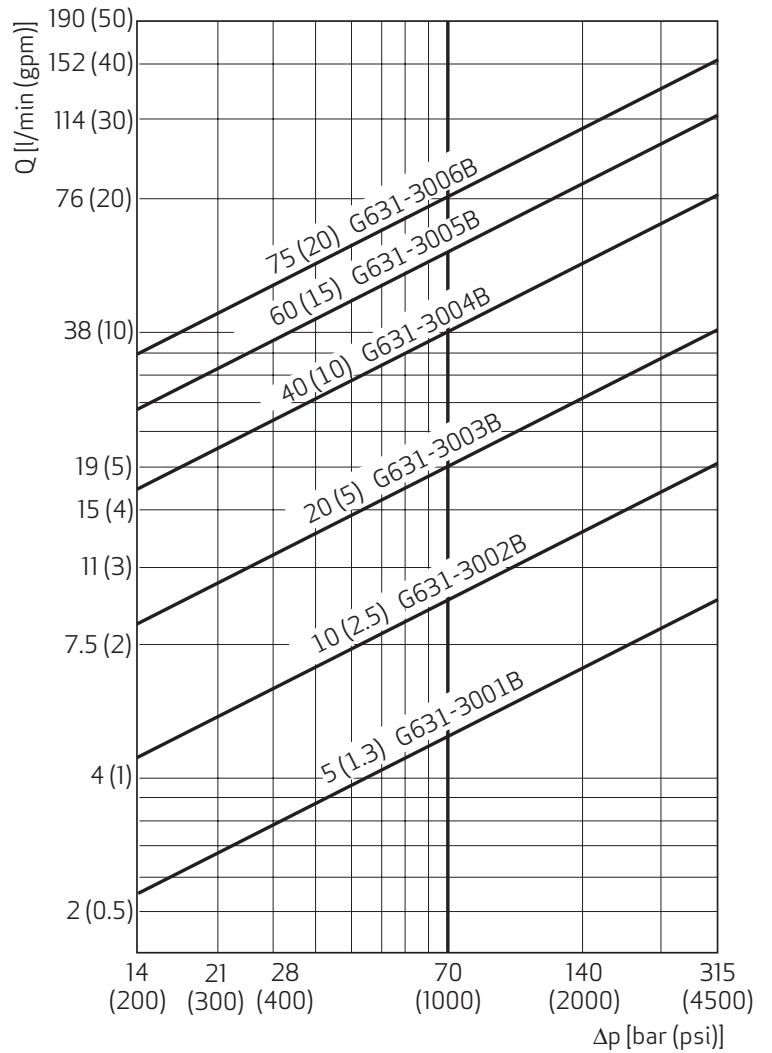
## FLOW CALCULATION

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.

$$Q = Q_N \sqrt{\frac{\Delta p}{\Delta p_N}}$$

**Q** actual flow  
**Q<sub>N</sub>** rated flow  
**Δp** actual pressure drop per spool land  
**Δp<sub>N</sub>** rated pressure drop per spool land

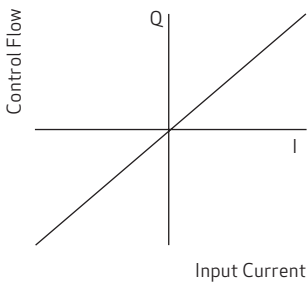
### Flow Diagram



## NULL CUT OPTIONS

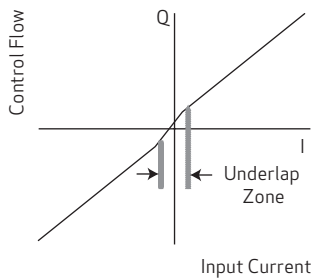
See Ordering Code for reference

### Standard Axis Cut



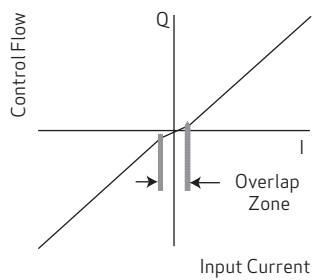
Default, without request for optional cuts

### Open Center Spool Valves



Normally used in hydraulic motor applications

### Closed Center Spool Valves

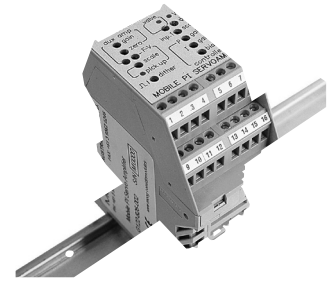


Normally used in failsafe applications

## 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 servoamplifiers, transducer conditioning electronics, command and auxiliary function modules, valve drive amplifiers, and power supplies. All of these modules are CE marked and require a 24V DC supply. The modules mount to standard 35mm DIN rail mount for easy installation and removal.



Din Rail Module

### 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.

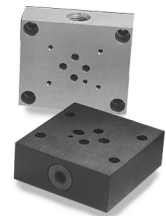


Valve Tester

### Mounting Manifolds - Easier Installation and Maintenance

Various mounting 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.



Mounting Manifolds

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

The most effective way to reduce life cycle costs of an oil hydraulic system, regardless of the types of valve used, is through close attention to contamination control. For industrial servo systems the ideal system filter arrangement is summarized as follows:

- Use a 10 micron (Beta 10  $\geq$  75) high pressure filter without by-pass just before the valve or critical parts of the valve (e.g. pilot)
- Use a 3 micron (Beta 3  $\geq$  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 the small particle contamination which is the prime contributor to component wear and silting.



Hydraulic Filters

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 16/13 (under ISO 4406:1987) or 19/16/13 (under ISO 4406:1999).

For long life, the maximum levels per ISO 4406: 1987 and 1999 are 14/11 and 17/14/11, 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, etc.

## ROUTINE MAINTENANCE GUIDELINES

Every six months or 4,000 operating hours, check for proper operation of the control valve assembly by performing the preventative maintenance steps outlined below. These checks do not require removal of the valve from the process line. If a problem is suspected, repair the valve assembly prior to returning the unit to service.

- Replace the hydraulic filter element
- Stroke the valve and check for smooth, full-stroke operation; unsteady motion could indicate a servo valve, actuator or process valve problem

### GENERAL INFORMATION

#### Effects when Storing Valves

The following effects may occur when storing valves for a long time:

- Sealing materials become brittle, possibly resulting in leaks
- Hydraulic fluid becomes gummy, possibly resulting in friction

#### Storage Time

The storage time starts at stock receipt and ends at mounting of the valve.

#### Preservatives

If preservation is carried out, use only preservatives which are compatible with the sealing materials and do not affect the valve, spare parts and accessories.

### BEFORE STORAGE

**Note:** If the valves are exposed to aggressive environmental influences during storage, vacuum packaging may be necessary. We recommend the following preparatory measures for storage:

#### Mount the shipping plate on the valve.

This is the only way of adequately protecting the valves against the ingress of dirt and moisture and protecting the seals against the effects of ozone and UV.

#### Put the valve, spare parts and accessories into the original packaging.

Package each valve separately.

#### Enclose anti-tarnish paper or package the valve, spare parts and accessories with corrosion inhibiting film.

(Only for storage time > 1 year.)

Multipacks of single valves in their individual packages are allowed.

#### Seal the original packaging properly.

This is the only way of adequately protecting the valves, spare parts and accessories against damage.

### STORAGE CONDITIONS

We recommend the following ambient conditions for storage:

- Dust-free, moderately ventilated
- As vibration-free and shock-free as possible

Shock resistance (as per EN 60068-2-27):  
50 g, 6 directions, half-sine 3 ms

Vibration resistance (as per EN 60068-2-6):  
30 g, 3 axes, frequency 10 to 2,000 Hz

#### Temperature

Recommended: +15 to +25 °C (+59 to +77 °F)

Permissible: -40 to +60 °C (-40 to +140 °F)

Temperature fluctuations >10 °C (50 °F) must be avoided.

Distance to shielded radiators: > 1 m (3 ft)

No direct exposure to sunlight

No sources of light with a high UV content

UV rays generate ozone, which damage sealing materials.

Relative air humidity: < 65 %, non condensing

### AFTER STORAGE

We recommend to check the original packaging, valve, spare parts and accessories for possible damage or alterations due to storage, that is, before use.

Damaged or not functional valves, spare parts and accessories must not be started up.

Sealing materials with the following characteristics must not be used:

- Contamination
- Cracking
- Hardening/softening
- Stickiness
- Discoloration

#### Storage Time > 5 Years

We recommend that the valve be checked by us or one of our authorized service centers after a storage time of more than 5 years.

#### Storage Time > 10 Years

After a storage time of more than 10 years the valves have to be checked by us or one of our authorized service centers.

## ABOUT MOOG

Moog Inc. is a worldwide designer, manufacturer and integrator of precision control components and systems. Moog's Industrial 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 maintains facilities in 26 countries around the globe. 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 ensures Moog motion control solutions are tailored to their environment—from meeting operating regulations and performance standards, to taking machine performance to a higher level.

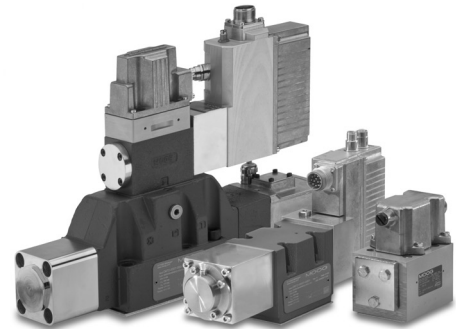
## Products

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.

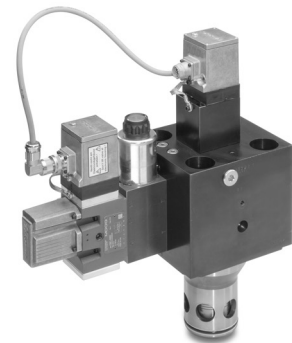
Some are developed specifically for unique operating environments. Others are standard equipment on machines across many industries. All are continuously improved to take advantage of the latest technology breakthroughs and advancements.

Moog products include:

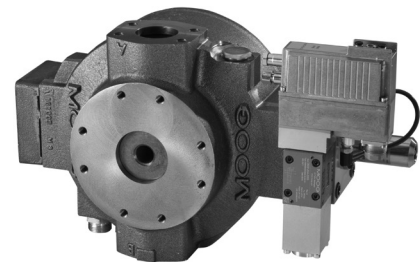
- Servo Valves and Proportional Valves
- Servo Motors and Servo Drives
- Servo Controllers and Software
- Radial Piston Pumps
- Actuators
- Integrated Hydraulic Manifold Systems and Cartridge Valves
- Slip Rings
- Motion Bases



Servo Valves



Active Cartridge Valves



Radial Piston Pumps



Servo Drives

## 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 requires 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.



Flight Simulation



Formula One Simulation Table

## 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/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](http://www.moog.com/industrial/service).





## ACCESSORIES AND SPARE PARTS

### Series Dependent Accessories and Spare Parts

#### Accessories G631/631 Series

| Part designation            | Description  | Part number                                     |
|-----------------------------|--|---|
| Attachment screws<br>Metric | 4 required M8x45 ISO 4762-10.9 (5/16-18NC by 1.75 long) tightening Torque 13 Nm (11.5 lbf-in)                    | B64929-007B070                                  |
| Attachment screws<br>Inch   | 4 required 5/16-18NC by 1.75 long tightening torque 13 Nm (11.5 lbf-in)  | C66391-144B                                     |
| Mating connector            | 4 pin electrical connector   | B46744-004<br>(-49054F014S002S) [MS3106F14S-2S] |
| Mounting manifold           | Base mounting manifold   | B52576AM001                                     |
| Flushing plate              | Manifold employed in place of valve when initially cleaning hydraulic fluids                                     | B67728-002                                      |
| AMO manifold                | Adjustable metering orifice manifold used to bleed fluid between A and B ports for better pressure control       | B64820AM003                                     |
| Safety manifold             | Sandwich manifold used to lock, extend and retract cylinder upon loss of electrical signal or hydraulic pressure | B64291AMNNXXXX                                  |

#### Spare Parts G631/631 Series

| Part designation                       | Description   | Material                  | Part number                       |
|--|---|---------------------------|-----------------------------------|
| Base O-ring for P, T, A<br>and B ports | 5 required for P, T, A, and B ports 12 mm (0.472 in) inside diameter x 2.0 mm (0.079 in) cross section.                                     | Fluorocarbon FKM 85 shore | A25163-012-020<br>(G2141-012-020) |
| X port O-ring                          | 1 required 8.0 mm (0.315 in) x 2.0 mm (0.079 in) cross section.   |                           | A25163-008-020<br>(G2141-008-020) |
| Replaceable filter,                    | 100 µm nominal  |                           | A67999-100                        |
| Filter replacement kit                 | Contains the following:<br>2 pieces O-ring 13 mm (0.512 in) inside diameter x 1.5 mm (0.059 in) cross section<br>1 piece filter disc 100 µm | Fluorocarbon FKM 85 shore | B52555RK200K001                   |

#### Documents (not included in scope of delivery)

| Part designation | Description                            | Remark  | Part number |
|------------------|--|---|-------------|
| Catalog          | G631/631 series general information    | Note: Visit <a href="http://www.moog.com/industrial/literature">www.moog.com/industrial/literature</a> to download document | CDL 6641    |
| Service manual   | G631/631 standard series               | Note: Visit <a href="http://www.moog.com/industrial/literature">www.moog.com/industrial/literature</a> to download document | CDS 6672    |
| Service manual   | G631/631 intrinsically safe (K) series | Note: Visit <a href="http://www.moog.com/industrial/literature">www.moog.com/industrial/literature</a> to download document | CDS 6750    |



# TAKE A CLOSER LOOK

Moog designs a range of motion control products that complement the performance of those featured in this catalog. Visit our website for more information and contact the moog facility nearest you.

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G631/631 Series Flow Control Servo Valves  
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