

MOOG

771, 772, 773 Series Servovalves



771/2/3 SERIES TWO STAGE SERVOVALVES

771/2/3 SERIES SERVOVALVES

The 771/2/3 Series flow control servovalves are throttle valves for 3- and preferably 4-way applications. They are a high performance, two-stage design that covers the range of rated flows from 1 to 15 gpm at 1000 psi valve drop. 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.

Principle of operation

An electrical command signal (flow rate set point) is applied to the torque motor coils, and creates a magnetic force which acts on the ends of the pilot stage armature. This causes a

deflection of the armature/flapper assembly within the flexure tube. Deflection of the flapper restricts fluid flow through one nozzle which is carried through to one spool end, displacing the spool.

Movement of the spool opens the supply pressure port (P) to one control port, while simultaneously opening the tank port (T) to the other control port. The spool motion also applies a force to the cantilever spring, creating a restoring torque on the armature/flapper assembly.

Once the restoring torque becomes equal to the torque from the magnetic forces, the armature/flapper assembly moves back to the neutral position and the spool is held open in a state of equilibrium until the command signal changes to a new level.

In summary, the spool position is proportional to the input current and with constant pressure drop across the valve, flow to the load is proportional to the spool position.

VALVE FEATURES

- > 2-stage design with dry torque motor
- > Low friction double nozzle pilot stage
- > High spool control forces
- > High dynamics
- > Rugged, long-life design
- > High resolution, low hysteresis
- > Completely set-up at the factory
- > Small body size

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 [gpm] = calculated flow

Q_N [gpm] = rated flow

Δp [psi] = actual valve pressure drop

Δp_N [psi] = rated valve pressure drop



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

system are given, the user has to check the suitability of the products described here. In case of doubt, please contact Moog Inc.



Intrinsically safe valve versions are available for use in hazardous locations. Specific models are certified to FM, ATEX, CSA, and TIS standards. Contact the factory for details.

771/2/3 SERIES
GENERAL TECHNICAL DATA

Operating Pressure
 ports P,T,A and B up to 3,000 psi

Temperature Range
 Fluid -40° to 275°F
 Ambient -40° to 275°F

Seal Material
 Viton others on request

Operating Fluid
 Compatible with common hydraulic fluids, other fluids on request.

Recommended viscosity 60-450 SUS @ 100°F

System Filtration: High pressure filter (without bypass, but with dirt alarm) mounted in the main flow and if possible, directly upstream of the valve.

Class of Cleanliness: The cleanliness of the hydraulic fluid greatly effects the performance (spool positioning, high resolution) and wear (metering edges, pressure gain, leakage) of the servovalve.

Recommended Cleanliness Class

For normal operation ISO 4406 < 14/11
 For longer life ISO 4406 < 13/10

Filter Rating recommended

For normal operation $\beta_{10} \geq 75$ (10 μm absolute)
 For longer life $\beta_5 \geq 75$ (5 μm absolute)

Installation Operations

Any position, fixed or moveable.

Vibration

30 g, 3 axes

Weight

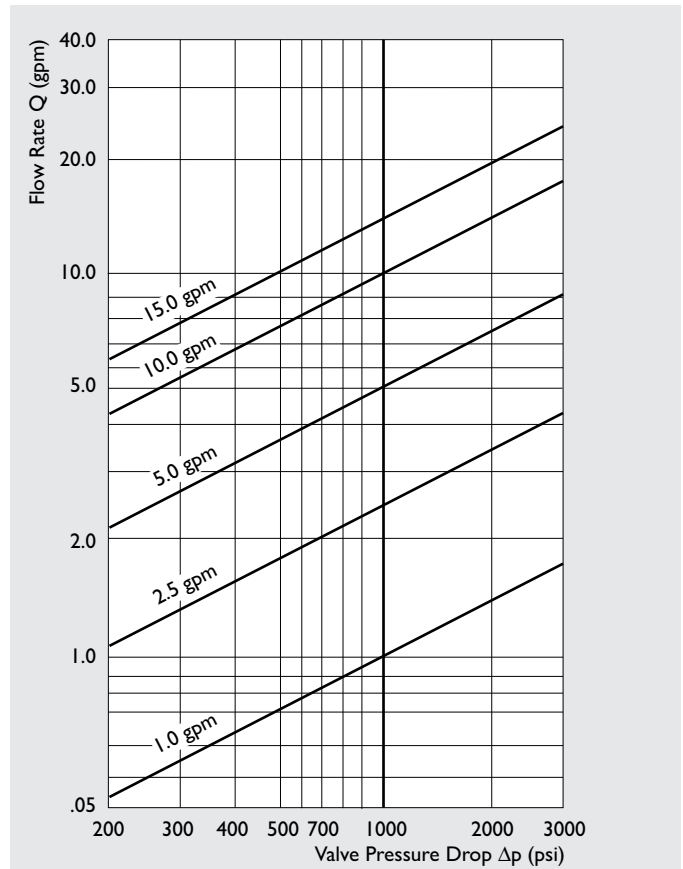
2.0 lb [.09 kg]

Degree of Protection

EN50529P: class IP65, with mating connector mounted.

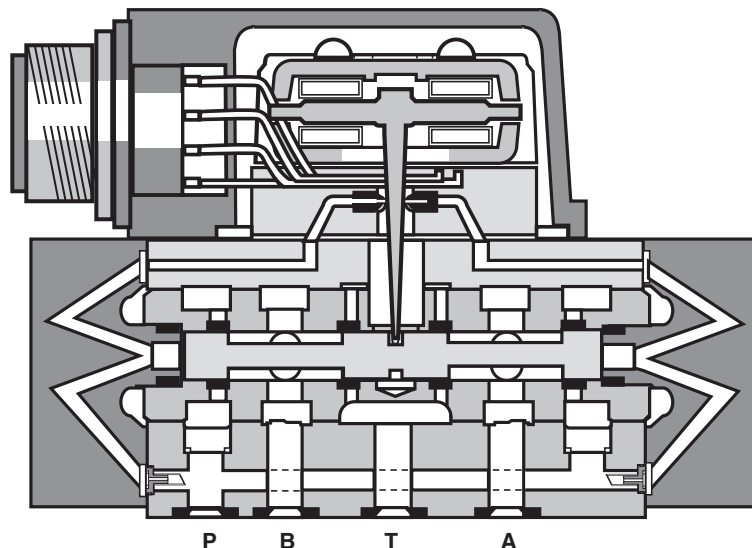
Shipping Plate

Delivered with an oil sealed shipping plate.



Valve Flow Diagram

Valve flow for maximum valve opening (100% command signal) as a function of the valve pressure drop.



View from Pressure Side

771/2/3 SERIES
TECHNICAL DATA

Model...Type
Mounting Pattern
Valve Body Version

771 771 773

ISO 10372 - 02 - 02 - 0 - 92

4-way

2-stage with spool-bushing assembly

Nozzle/Flapper, Highflow

Internal only

Pilot Stage

Pilot Connection

Optional, Internal or External

Rated Flow

(±10%) at $\Delta p_N = 1,000$ psi

Standard	[gpm]	1.0	2.5	5.0	10.0	15.0
----------	-------	-----	-----	-----	------	------

Response Time*

Standard	[ms]	6	6	6	10	16
----------	------	---	---	---	----	----

Threshold*

[%] < 0.5

Hysteresis*

[%] < 3.0

Null Shift

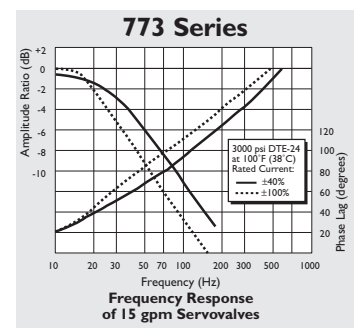
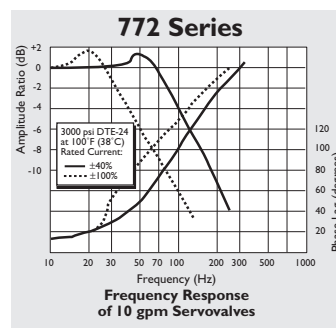
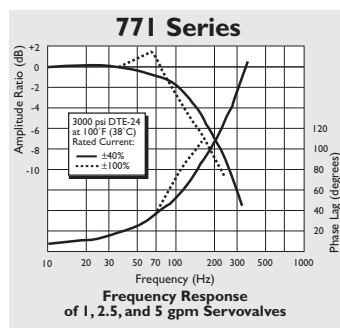
at $\Delta T = 100^\circ F$ [%] < 2.0

Null Leakage Flow*

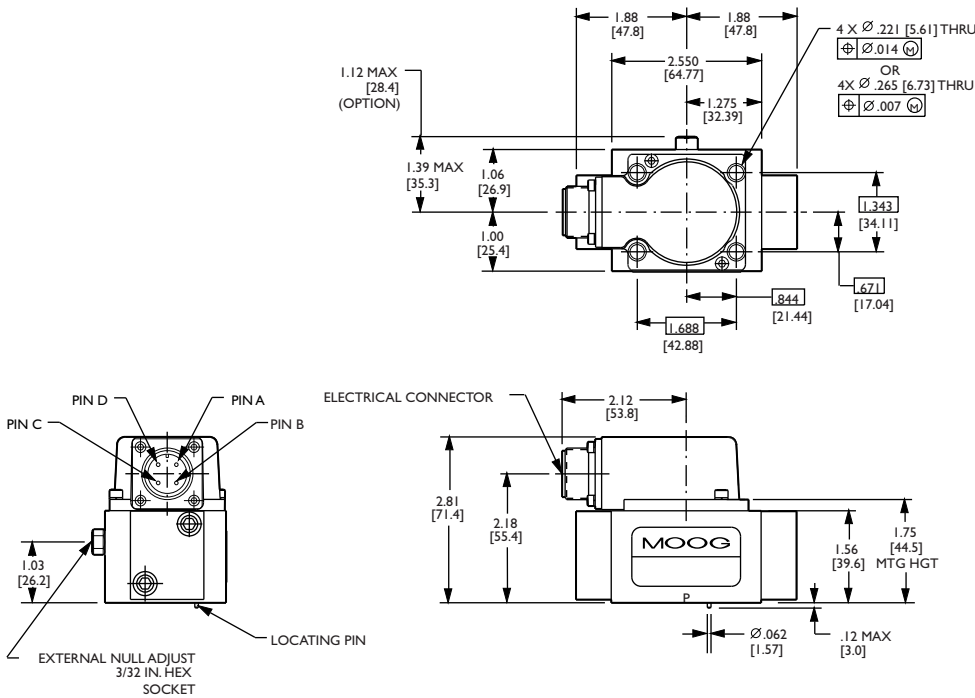
max. [gpm] 0.35

* Measured at 1,000 psi pilot or operating pressure

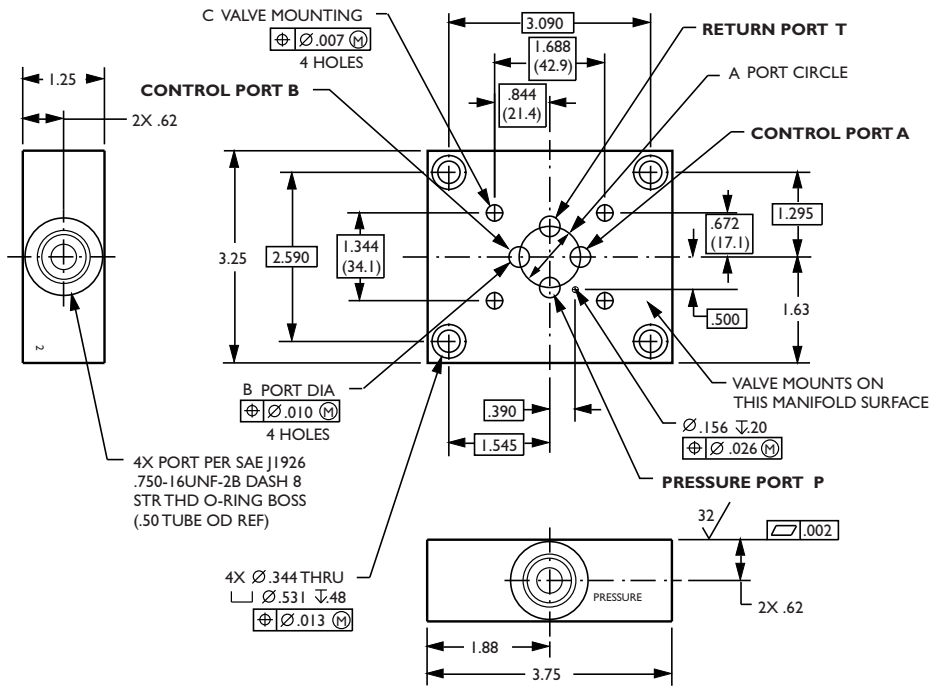
Typical characteristic curves with ±40% and ±100% input signal, measured at 3,000 psi operating pressure.



771/2/3 SERIES INSTALLATION DRAWINGS



TYPICAL SUBPLATE MANIFOLD



TYPICAL SUBPLATE MANIFOLD

Model Number	A Port Circle Dia	B Port Dia	C Mtg Holes
771-XXX	.625	.191	.190-32 NF
772-XXX	.780	.261	.190-32 NF
773-XXX	.937	.312	.250-20 NC

The mounting manifold must conform to ISO 10372-03-03-0-92. Surface to which valve is mounted requires a $\sqrt{32}$ [$\Delta\Delta$] finish, flat within 0.002[0.05] TIR.

For External Null Adjust: Flow out of Port B will increase with clockwise rotation of null adjust screw ($3/32$ hex key).

For External Null Adjust: Flow bias is continually varied for a given port as the null adjust is rotated.

771/2/3 SERIES ELECTRICAL CONNECTIONS

Rated current and coil resistance

A variety of coils are available for 771/2/3 Series Servovalves, which offer a wide choice of rated current. See Table I.

Coil connections

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

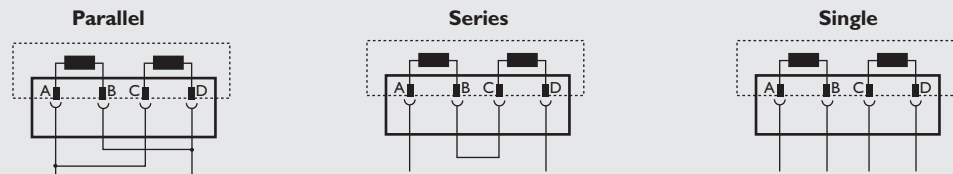
771/2/3 Series Servovalves can be supplied on special order with other connectors or a pigtail.

Servoamplifier

The servovalve responds to input current, therefore, a servoamplifier that has high internal impedance (as obtained with current feedback) should be used. This will reduce the effects of coil inductance and will minimize changes due to coil resistance variations.

ELECTRICAL CONNECTIONS

(Examples with typical 771/2/3 series coils)



	[Ω]	100	400	200
Coil Resistance	[mA]	±15	±7.5	±15
Rated Current	[W]	.023	.023	.045
Electrical Power		A and C (+)	A (+), D (-)	A (+), B (-)
Connections for Valve Opening		B and D (-)	B and C connected	or C (+), D (-)
P ▶ B, A ▶ T				

Note: Before applying electrical signals the pilot stage has to be pressurized.

TABLE I

Nominal Resistance Per Coil at 77°F (25°C) Ω	Recommended Rated Current—mA		Approximate Coil Inductance*—Henrys		
	Parallel, Differential or Single Coil Operation	Series Coils	Single Coils	Series Coils	Parallel Coils
80	±40	±20	0.22	0.66	0.18
200	±15	±7.5	0.72	2.20	0.59
1000	±8	±4	3.20	9.70	2.60

* Measured at 50 Hz



Australia	Mulgrave
Brazil	São Paulo
China	Hong Kong
	Shanghai
Denmark	Copenhagen
England	Tewkesbury
Finland	Espoo
France	Rungis



Germany	Böblingen
India	Bangalore
Ireland	Ringaskiddy
Italy	Brescia
	Malnate
Japan	Hiratsuka
Korea	Seoul
Luxembourg	Luxembourg City
Philippines	Baguio
Singapore	Singapore
Spain	Orio
Sweden	Askim
USA	East Aurora

MOOG

Industrial Controls Division

Moog Inc., East Aurora, NY 14052-0018
Telephone: +1-716-652-2000
Fax: +1-716-687-7910
Toll Free: +1-800-272-MOOG
www.moog.com/industrial
©2007 Moog Inc. All changes are reserved.