

# FLOW CONTROL SERVOVALVES

## J869 SERIES



TWO STAGE SERVOVALVES FOR INDUSTRIAL APPLICATIONS

J869 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 3.2 to 64 L/min at 7.0 MPa 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 the 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 Industrial Robots, Manipulators, Machine Tools, Press Machines, Test Machines, and other applications with high stability and high repeatability.

**TABLE OF CONTENTS**

Principle of operation..... 3

General technical data..... 4

Technical data..... 5

Installation drawing..... 6

Electrical connections

Ordering information

Spare parts and accessories..... 7

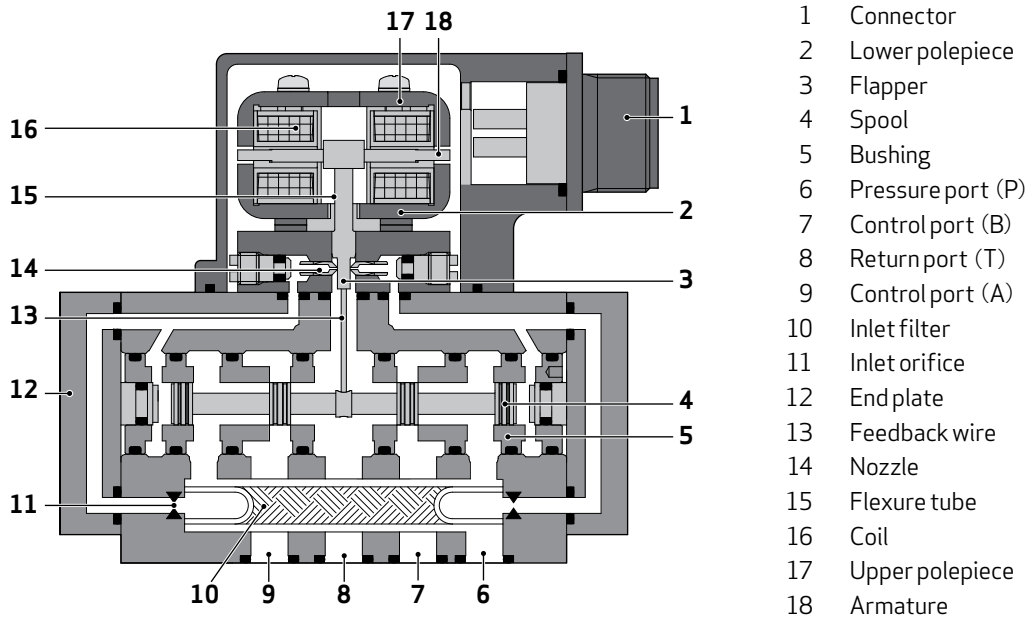


Note: The information or details stated in this document is subject to change without notice. Please contact us for the latest information.

## Principle of operation

- An electrical command signal 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 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. 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
- High resolution, low hysteresis
- Low friction double nozzle pilot stage
- High stability
- High spool control forces
- Rugged, long-life design

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 L/min = calculated flow

Q<sub>N</sub> L/min = rated flow

ΔP MPa = actual valve pressure drop

ΔP<sub>N</sub> MPa = rated valve pressure drop

## General Technical Data

### Proof Pressure

P, A and B port 31.5 MPa (Static pressure)  
 T port 21.0 MPa (Static pressure)

### Temperature Range

Fluid -10 ~ 80 °C  
 Ambient -10 ~ 80 °C

### Seal Material

NBR  
 Other seal material upon request

### Operating Fluid

Compatible with common hydraulic fluids,  
 other fluids on request.

### Recommended Viscosity

10 ~ 400 mm<sup>2</sup>/s

### System Filtration

High pressure filter (without bypass, but with dirt alarm)  
 mounted in the main flow and if possible, directly upstream  
 of the valve. Refer to Moog filtration catalog for recom-  
 mended filtration scheme.

### 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 < 16/13  
 For longer life ISO 4406 < 14/11

### Filter Rating

Recommended  
 For normal operation  $\beta_{10} \geq 75$  (10  $\mu\text{m}$  absolute)  
 For longer life  $\beta_5 \geq 75$  (5  $\mu\text{m}$  absolute)

### Installation Operations

Any position, fixed or movable

### Vibration

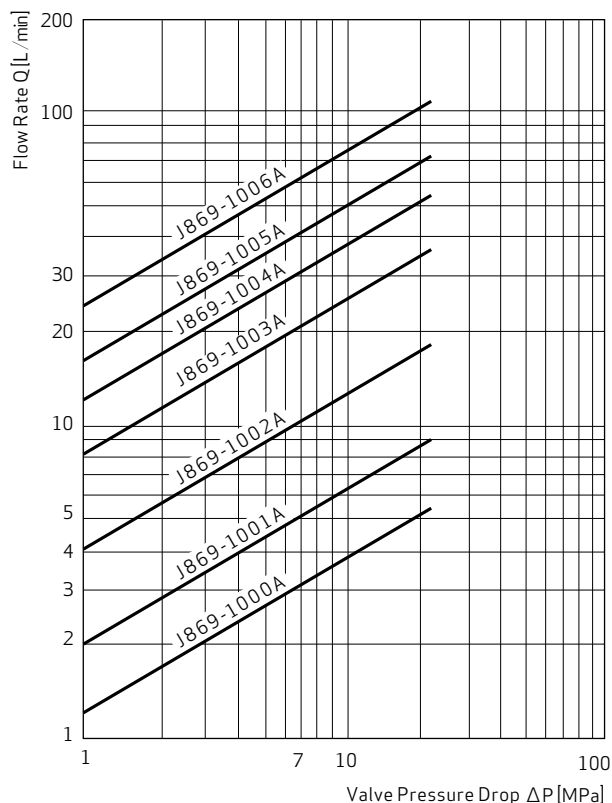
10 g, 3 axes

### Weight

1.1 kg

### Shipping Plate

Delivered with an oil sealed shipping plate.



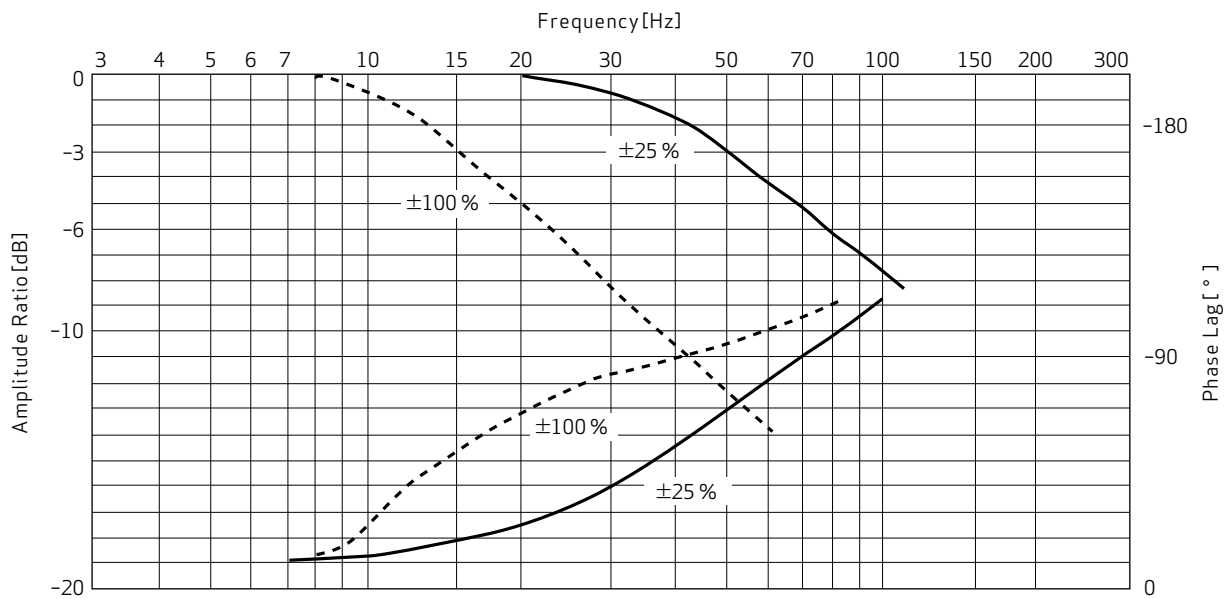
### Valve Flow Diagram

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

## Technical Data

		Specification	Condition
Rated Supply Pressure		21.0 MPa	
Operating Pressure Range		1 ~ 21.0 MPa	
Proof Pressure (Supply)		31.5 MPa	
Proof Pressure (Return)		21.0 MPa	
Rated Current (Series connection)		15 mA	
Nominal Coil Resistance		200 Ω / coil	Between A-B, C-D
Null Bias		< ±2%	Test Pressure 21 MPa
Null Shift		< 1.0%	Temperature (ΔT = 30°C : 30 ~ 60°C)
		< 0.5%	Acceleration (1 G)
		< 0.5%	Supply Pressure (30% of Rated Pressure)
		< 2.0%	Back Pressure (0 ~ 20% of Rated Pressure)
Hysteresis		< 2.5%	Test Pressure 21 MPa
Threshold		< 0.1%	Test Pressure 21 MPa
Frequency Response	Amplitude Ratio - 3dB	> 40 Hz	Supply Pressure 21 MPa ±25% input
	90° phase lag	> 50 Hz	
Temperature Range		-10 ~ 80°C	
Operating Fluid		10 ~ 400 mm <sup>2</sup> /s	Petroleum base hydraulic fluid
Required Filtration		$\beta_{10} \geq 75$	
Weight		1.1 kg	

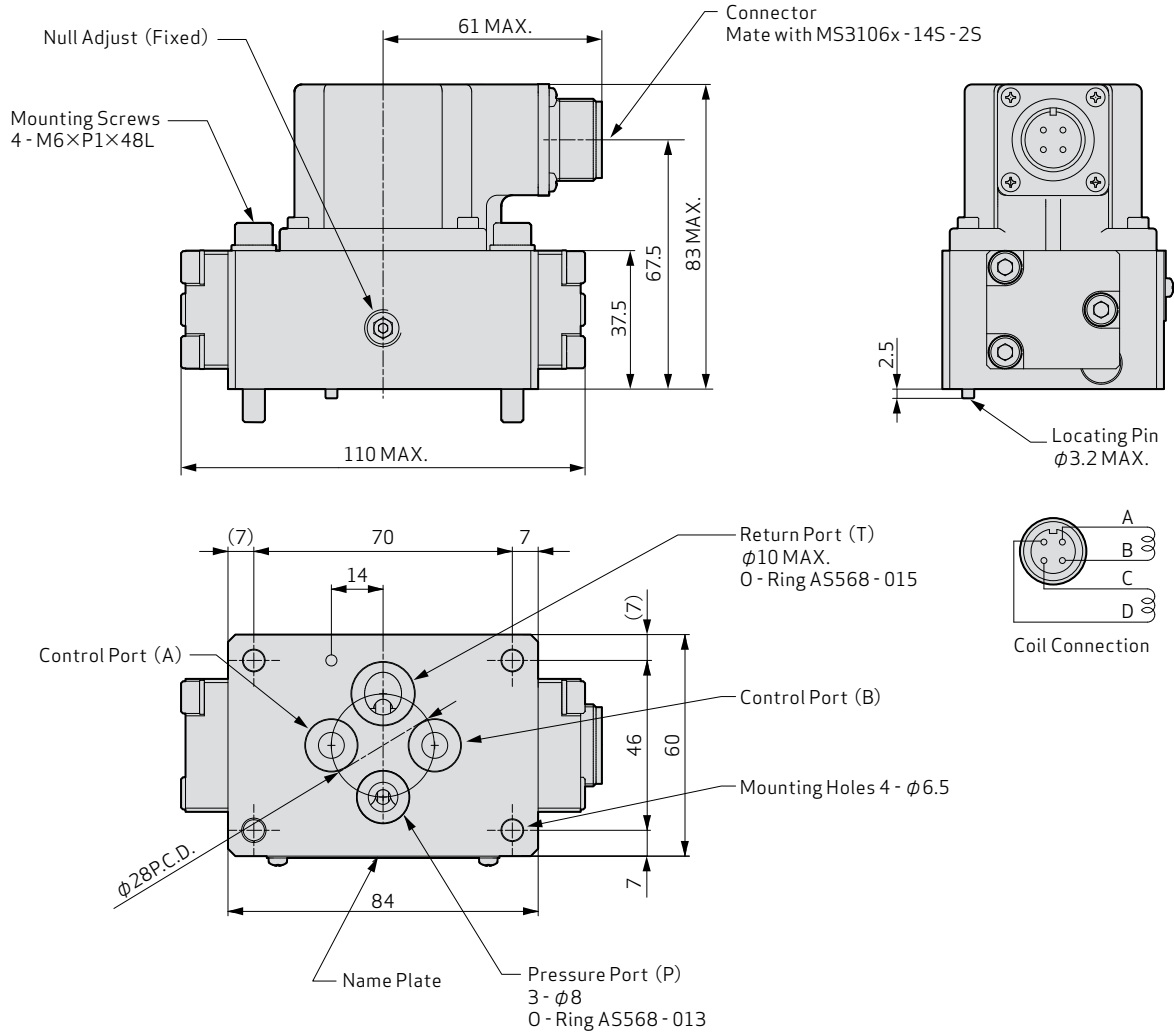
## Frequency Response



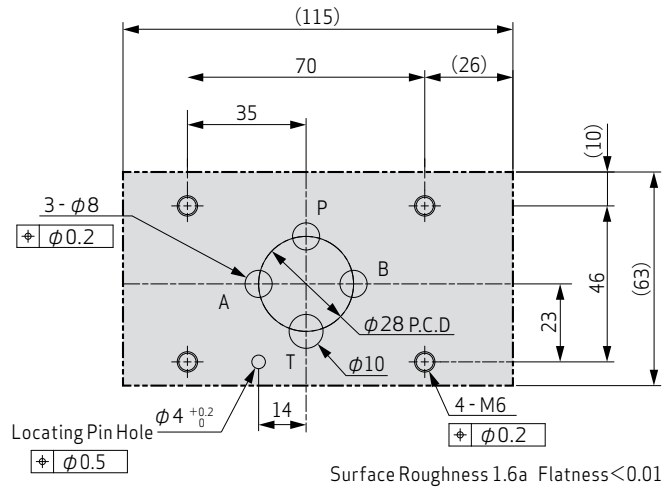
**Test Condition**

Input Current    ±25%, ±100%  
 Temperature    40°C  
 Supply Pressure 21.0 MPa

### Installation Drawing



### Mounting Manifold



## Electrical Connections

### Rated current and coil resistance

A variety of coils are available for J869 Series Servovalves.

### Coil connections

A four-pin electrical box connector (that mates with an MS31 06A - 14S - 2S cable connector) is standard. All four torque motor leads are available at the connector so external connection can be made for series, parallel or single coil operation.

### Servoamplifier

The servoamplifier responds to input current, so 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 J869 Series coil)

	Parallel	Series	Single
<b>Coil Resistance</b>	100 Ω	400 Ω	200 Ω
<b>Rated Current</b>	±30 mA	±15 mA	±30 mA
<b>Coil Inductance</b>	0.7H	2.1 H	0.7H
<b>Electrical Power</b>	0.09 W	0.09 W	0.18 W
<b>Polarity for valve opening</b>	P → A, B → T A and C (+), B and D (-)	P → A, B → T A (+), D (-)	P → A, B → T A (+), B (-) or C (+), D (-)

## Ordering Information

### Standard Models

Model	Rated Flow Valve Drop 7.0MPa	Internal Leakage System Pressure 21.0MPa	Rated Current (Series Connection)	Nominal Coil Resistance
J869 - 1000A	3.2 L/min	1.1 L/min	15 mA	200 Ω
J869 - 1001A	5.3 L/min	1.2 L/min	15 mA	200 Ω
J869 - 1002A	10.6 L/min	1.4 L/min	15 mA	200 Ω
J869 - 1003A	21.0 L/min	1.8 L/min	15 mA	200 Ω
J869 - 1004A	32.0 L/min	2.1 L/min	15 mA	200 Ω
J869 - 1005A	42.0 L/min	2.5 L/min	15 mA	200 Ω
J869 - 1006A	64.0 L/min	3.2 L/min	15 mA	200 Ω

### Spare parts and Accessories

Part	Size	Part Number
O - Rings (included in delivery)	P, A, B	A5568 - 013
	T	A5568 - 015
Mounting Bolts (included in delivery)	M6 × 48 mm (4 pieces)	A04001 - 006 - 048
Mating Connector		MS3106A14S2S (MS3106A - 14S - 2S)
Clamp for Mating Connector		MS3057 - 6A
Flushing Block		C63761 - 001 (P - T ONLY)
		C63904 - 001 (P → B, A → T)
		C63904 - 002 (P → A, B → T)

### Model Number

J869 - 

--	--	--	--

--	--

  
 Type Designation

# FOR MORE SPECIFIC INFORMATION

For more specific information regarding Moog products, solutions or services, please Email us, or visit our website. You may also directly contact your local Moog office.

Argentina  
+54 11 4326 5916  
info.argentina@moog.com

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

Singapore  
+65 677 36238  
info.singapore@moog.com

Australia  
+61 3 9561 6044  
info.australia@moog.com

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

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

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

Italy  
+39 0332 421 111  
info.italy@moog.com

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

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

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

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

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

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

Switzerland  
+41 71 394 5010  
info.switzerland@moog.com

Finland  
+358 10 422 1840  
info.finland@moog.com

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

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

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

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

United Kingdom  
+44 168 429 6600  
info.uk@moog.com

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

Norway  
+47 6494 1948  
info.norway@moog.com

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

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

Russia  
+7 8 31 713 1811  
info.russia@moog.com

**[www.moog.co.jp/](http://www.moog.co.jp/)**

Moog is a registered trademark of Moog Inc. All trademarks as included herein are the property of Moog Inc. and its subsidiaries.  
©2012 Moog Inc. All rights reserved.

J869 Series-en  
YCO / YCO / PDF, Jan 2013