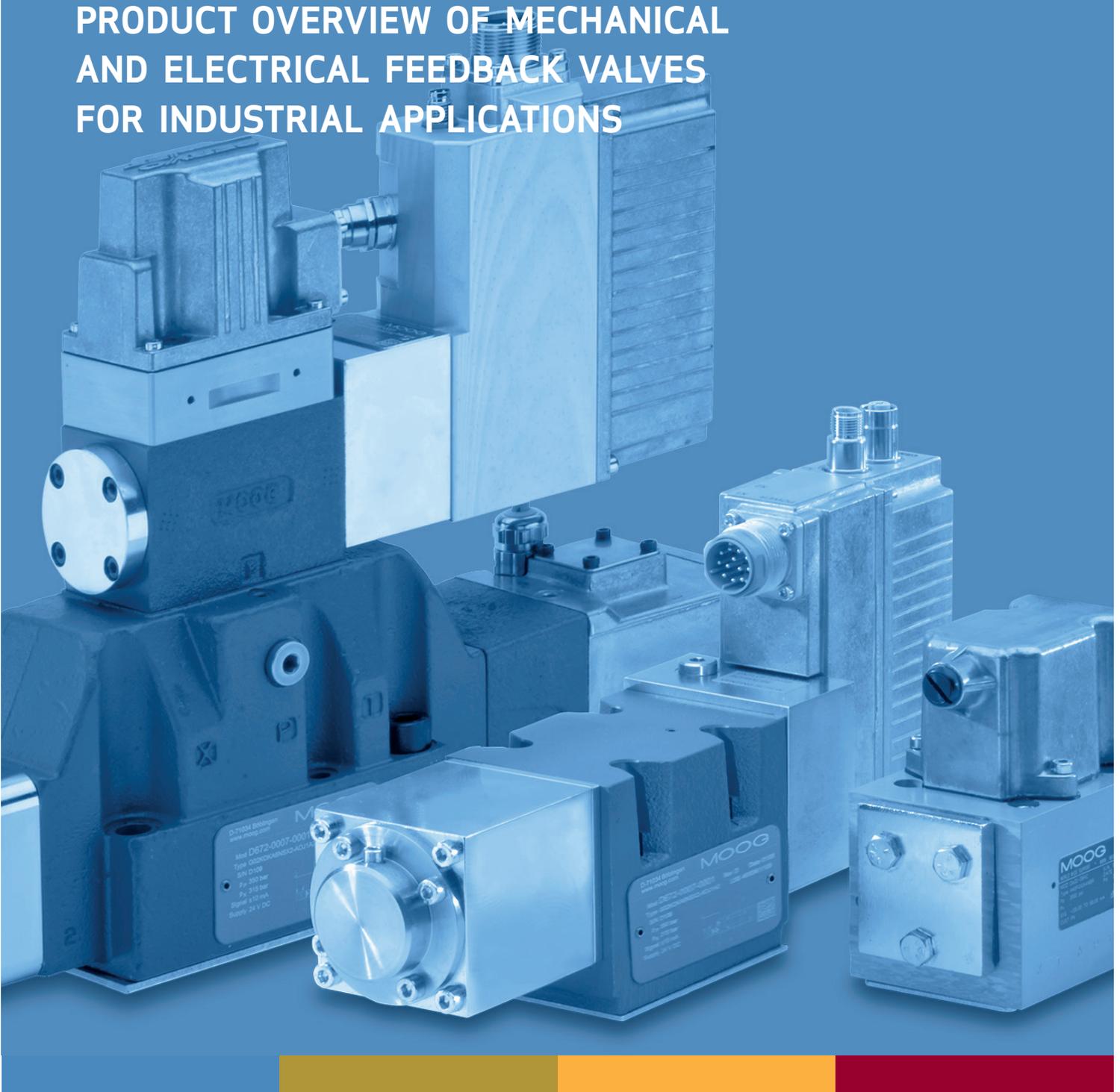


SERVO VALVES AND PROPORTIONAL VALVES

PRODUCT OVERVIEW OF MECHANICAL AND ELECTRICAL FEEDBACK VALVES FOR INDUSTRIAL APPLICATIONS



Rev. A, April 2025

MOOG | Shaping the way our world moves™

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
MFB.....	4
Mechanical Feedback Valves without Integrated Electronics	4
EFB	8
Servo and Proportional Valves with Electronics.	8
Direct Driven Servo Valves (DDV)	9
Direct Operated Valves (DOV).....	10
Pilot Operated Proportional Valves	11
Pilot Operated Servo Valves.....	12
NOTES	13

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.

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.

PRODUCT OVERVIEW

Servo and proportional valves are used in industrial applications to control the position, force or speed of an actuator. To fulfill these control tasks with the highest degree of precision and dynamics, the Moog product portfolio offers servo and proportional valves with integrated closed loop position control for the spool. The spool position feedback and thus the closed loop control is implemented either mechanically and without the involvement of integrated valve electronics or electrically with integrated valve electronics.

Moog is a leader in the development and manufacture of high-performance hydraulic valves. Benefit from over 70 years of experience in the manufacture of servo and proportional valves for the industrial market and experience our products known for their reliability and accuracy.

Servo Valves without Electronics



Moog servo valves without electronics are high performance flow control devices using mechanical feedback (MFB) for the ultimate in precision and reliability. Often used as critical components in hydraulic positioning, velocity, or pressure control applications.

<https://www.moog.com/products/servovalves-servo-proportional-valves/industrial/servo-valves-without-integrated-electronics.html>

Servo and Proportional Valves with Electronics



Moog servo and proportional valves with integrated electronics and electronic feedback (EFB) enable precise control of position, velocity, pressure or flow at the

highest level. They are offered in a variety of standard and customized configurations and are suitable for all types of applications with analog signal or fieldbus.

<https://www.moog.com/products/servovalves-servo-proportional-valves/industrial/servo-and-proportional-valves-with-electronics.html>

Servo and Proportional Valves with Special Features

For customers with machines used in demanding environments, Moog offers servo valves and proportional valves with advanced safety features such as fail-safe options, certifications for use in hazardous environments and special performance modifications.

Moog has a long history of providing valves with advanced features needed for applications that are in demanding or even hazardous environments. For example fail-safe versions of some of our most popular valve models are critical to machines in a variety of applications where workers need maximum protection. Our explosion-proof, flameproof and intrinsically-safe line of products offer special designs and modifications needed for the respective certifications.

Special versions:

- Fail-safe versions
- Explosion-proof offering includes intrinsically-safe, flameproof and "increased safety" designs with ATEX and other related approvals
- Spool null cuts
- Light-weight construction and special cabling
- Spool-in-body/bushing and spool assembly construction
- Valve function (Q, p, p/Q)

MECHANICAL FEEDBACK VALVES WITHOUT INTEGRATED ELECTRONICS

Overview Features by Series

														
		30	31	32	631	72	728	730	743, 744	761	77x	78	79-100	79-200
Operation	Pilot operated	●	●	●	●	●	●	●	●	●	●	●	●	●
Valve type	Servo valve	●	●	●	●	●	●	●	●	●	●	●	●	●
Pilot	Nozzle-flapper	●	●	●	●	●	●	●	●	●	●	●	●	●
Electrical interface	Analog	●	●	●	●	●	●	●	●	●	●	●	●	●
Control	Flow	●	●	●	●	●	●	●	●	●	●	●	●	●
Rated flow at Δp 70 bar (1,000 psi)	< 10 l/min	●			●			●		●	●			
	10 to 20 l/min	●	●		●			●		●	●			
	21 to 50 l/min			●	●			●		●	●			
	51 to 150 l/min				●	●		●		●	●	●	●	
	151 to 300 l/min					●	●		●				●	●
	> 300 l/min								●					●
Maximum operating pressure	200 to 250 bar						●		●			●		
	251 to 300 bar		●	●										
	301 to 350 bar	●			●					●	●		●	●
	> 351 bar					●		●						
Frequency response	7 to 45 Hz						●		●			●		
	55 to 110 Hz				●	●						●	●	●
	115 to 185 Hz			●				●		●	●			
	200 to 300 Hz	●	●							●	●			
Mounting pattern	Size 01 (ISO 10372-01-01-0-92)	●												
	Size 02 (ISO 10372-02-02-0-92)		●								●			
	Size 03 (ISO 10372-03-03-0-92)			●							●			
	Size 04 (ISO 10372-04-04-0-92)							●		●				
	Size 05 (ISO 4401-05-05-0-94)				●									
	Size 06 (ISO 10372-06-05-0-92)					●								●
	Moog standard						●		●			●	●	

For comprehensive information on Mechanical Feedback Valves without Integrated Electronics, please refer to pages 5 to 7. You can also explore our product pages on the Moog website at the following link:

<https://www.moog.com/products/servo-valves-servo-proportional-valves/industrial/servo-valves-without-integrated-electronics.html>

MECHANICAL FEEDBACK VALVES WITHOUT INTEGRATED ELECTRONICS

Specifications and Features



Series	30	31	32	631
Operation	Pilot operated			
Valve type	Servo valve			
Pilot	Nozzle-flapper			
Electrical interface	Analog			
Control	Flow			
Rated flow at Δp 70 bar (1,000 psi)	0.95 to 6.9 l/min (0.25 to 1.8 gpm)	3.8 to 15 l/min (1 to 4 gpm)	15 to 30 l/min (4 to 8 l/min)	3.8 to 78 l/min (1 to 20.7 gpm)
Maximum operating pressure	310 bar (4,500 psi)	275 bar (4,000 psi)		210 to 350 bar (3,000 to 5,000 psi)
100% step response at 210 bar (3,000 psi)	2.5 ms		4.5 ms	18 ms
Mounting pattern	Size 01 (ISO 10372-01-01-0-92)	Size 2 (ISO 10372-02-02-0-92)	Size 3 (ISO 10372-02-02-0-92)	Size 05 (ISO 4401-05-05-0-94)
Features and benefits	<ul style="list-style-type: none"> • Low friction double nozzle pilot stage for high resolution and low hysteresis • Rugged construction designed for extreme conditions (high shock, vibration or pressure) • Ultra-Compact, light weight package • High response for improved control capability • Stainless steel body and integrated torque motor in an environmentally sealed compartment 	<ul style="list-style-type: none"> • Low friction double nozzle pilot stage for high resolution and low hysteresis • Rugged construction designed for extreme conditions (high shock, vibration or pressure) • Ultra-Compact, light weight package • High response for improved control capability • Stainless steel body and integrated torque motor in an environmentally sealed compartment 	<ul style="list-style-type: none"> • Low friction double nozzle pilot stage for high resolution and low hysteresis • Rugged construction designed for extreme conditions (High shock, vibration or pressure) • Ultra-Compact, light weight package • High response for improved control capability • Stainless steel body and integrated torque motor in an environmentally sealed compartment 	<ul style="list-style-type: none"> • Low friction double nozzle pilot stage for high resolution and low hysteresis • Rugged, long-life design suitable for a wide range of machines • Small body size • Integrated fail-safe options enables machine builders to reduce componentry • Field-configurable 5th port for separate pilot supply offers greater flexibility • Field-replaceable first stage disc filter for ease of maintenance

MECHANICAL FEEDBACK VALVES WITHOUT INTEGRATED ELECTRONICS

Specifications and Features



Series	72	728	730	743/744
Operation	Pilot operated			
Valve type	Servo valve			
Pilot	Nozzle-flapper			
Electrical interface	Analog			
Control	Flow			
Rated flow at Δp 70 bar (1,000 psi)	95 to 225 l/min (25 to 60 gpm)	225 to 300 l/min (60 to 78 gpm)	4 to 66 l/min (1 to 17.4 gpm)	75 to 400 l/min (20 to 100 gpm)
Maximum operating pressure	210 to 490 bar (3,000 to 7,000 psi)	210 bar (3,000 psi)	210 to 550 bar (3,000 to 8,000 psi)	210 bar (3,000 psi)
100% step response at 210 bar (3,000 psi)	11 to 33 ms	60 ms	7 to 16 ms	25 to 170 ms
Mounting pattern	Size 6 (ISO 10372-06-05-0-92)	Moog standard	Size 4 (ISO 10372-04-04-0-92)	Moog standard
Features	<ul style="list-style-type: none"> • Low friction double nozzle pilot stage for high dynamics, high resolution and low hysteresis • High spool driving forces, rugged design ensures long-life operation • Dry torque motor • Optional 5th port for separate pilot supply • Filtered and filterless models available • Field-replaceable first stage filter for easier maintenance 	<ul style="list-style-type: none"> • Nozzle flapper pilot stage for high dynamics, high resolution and low hysteresis • "Simulator" spool cut minimizes pressure change and "bump" through the zero flow null position • High spool driving forces, rugged design ensures long-life operation • Optional integrated abort manifold/end cap to control motion of actuator to home position in the event of an abort signal • Optional asymmetric flow ratios matched to actuator cylinder requirements 	<ul style="list-style-type: none"> • Nozzle flapper pilot stage for high dynamics, high resolution and low hysteresis • High spool driving forces, rugged design ensures long-life operation • High Pressure version available for continuous operation at system pressures up to 8,000 psi • Intrinsically-safe version available for applications requiring products certified for potentially hazardous environments • Optional external pilot supply (X-Port) and return (Y-Port) connections 	<ul style="list-style-type: none"> • High resolution and low hysteresis • High spool driving forces, rugged design ensures long-life operation • Intrinsically-safe version available for applications requiring products certified for potentially hazardous environments • Optional three coil pilot configuration for added protection against coil failure • Field replaceable pilot stage filter • Optional fail-safe methods ensure reliable and predictable actuator motion in the event of signal loss • Designed to meet all requirements of General Electric Specification 351A7620

MECHANICAL FEEDBACK VALVES WITHOUT INTEGRATED ELECTRONICS

Specifications and Features



Series	761	771, 772, 773	78	79-100	79-200
Operation	Pilot operated				
Valve type	Servo valve				
Pilot	Nozzle-flapper				
Electrical interface	Analog				
Control	Flow				
Rated flow at Δp 70 bar (1,000 psi)	0.5 to 75 l/min (0.125 to 20 gpm)	1.9 to 57 l/min (0.5 to 15 gpm)	75 to 150 l/min (20 to 40 gpm)	115 to 225 l/min (30 to 60 gpm)	400 to 1,000 l/min (100 to 260 gpm)
Maximum operating pressure	Aluminium body: 315 bar (4,500 psi); steel body: 350 bar (5,000 psi)	210 or 350 bar (3,000 or 5,000 psi)	210 bar (3,000 psi)	210, 310 or 350 bar (3,000, 4,500 or 5,000 psi)	
100% step response at 210 bar (3,000 psi)	<4 to <16 ms	4 to 17 ms	15 to 40 ms	14 ms	6 to 15 ms
Mounting pattern	Size 04 (ISO 10372-04-04-0-92)	(G)771: Size 02 (ISO 10372-02-02-0-92); (G)772: Size 03 (ISO 10372-03-03-0-92); (G)773: Moog Standard	Moog standard	Size 6 (ISO 10372-06-05-0-92)	Moog standard
Features	<ul style="list-style-type: none"> • High dynamics, high resolution and low hysteresis • High spool driving forces and rugged design ensures long-life operation • Intrinsically-safe versions (761K) available for applications requiring products certified for use in potentially hazardous environments 	<ul style="list-style-type: none"> • High dynamics, high resolution and low hysteresis • High spool driving forces • Rugged design ensure long-life operation • Intrinsically-safe version available for applications requiring products certified for potentially hazardous environments 	<ul style="list-style-type: none"> • High dynamics, high resolution and low hysteresis • Rugged, long-life design • Intrinsically-safe (78K) or flameproof versions (78 N) available for applications requiring products certified for potentially hazardous environments • Field-replaceable pilot-stage filter for ease of maintenance 	<ul style="list-style-type: none"> • 3-stage Servo Valves for applications that require high flow rates and high performance • High spool driving forces, rugged design ensures long-life operation • Electrical feedback on the main spool for low hysteresis and excellent linearity • Optional external pilot supply and return connections 	<ul style="list-style-type: none"> • 3-stage Servo Valves for applications that require high flow rates and high performance • High spool driving forces, rugged design ensures long-life operation • Electrical feedback on the main spool for low hysteresis and excellent linearity • Optional external pilot supply and return connections

DIRECT DRIVEN SERVO VALVES (DDV)

Specifications and Features



Series	D633, D634		D636, D637	D638, D639
Valve type	Servo valves			
Operation	Directly driven by linear force motor			
Pilot	-			
Control	Flow	Flow, pressure, flow&pressure (p/Q), pressure compensated flow, axis (position, velocity, force)		
Mounting pattern	ISO 4401 Size 03 to 05			
Rated flow at Δp 35 bar (500 psi) per land	40 to 100 l/min			
Rated flow at Δp 5 bar (75 psi) per land	-			
Maximum operating pressure	Port P, A, B	350 bar (5,000 psi)		
	Port T without Y	50 bar (725 psi)		
	Port T with Y	D633: 350 bar (5,000 psi); D634: 210 bar (3,000 psi)	D636: 350 bar (5,000 psi); D637: 210 bar (3,000 psi)	D638: 350 bar (5,000 psi); D639: 210 bar (3,000 psi)
100% step response at 210 bar (3,000 psi)	12 to 20 ms		8 to 14 ms	
Electrical interface	Analog		<ul style="list-style-type: none"> Analog Fieldbus 	
Features	<ul style="list-style-type: none"> Directly driven design: Pressure-independent dynamic performance Low current consumption at and near hydraulic null Spool is in spring-centered position at loss of power supply: Actuator stops 		<ul style="list-style-type: none"> Directly driven design: Pressure-independent dynamic performance Low current consumption at and near hydraulic null Spool is in spring-centered position at loss of power supply: Actuator stops Integrated digital electronics with integrated pressure transducer allows a high grade of flexibility 	
			<ul style="list-style-type: none"> Directly driven design: Pressure-independent dynamic performance Low current consumption at and near hydraulic null Spool is in spring-centered position at loss of power supply: Actuator stops Integrated digital electronics with integrated pressure transducer allows a high grade of flexibility 	

DIRECT OPERATED VALVES (DOV)

Specifications and Features



Series	D92x		D93x
Valve type	Proportional valves		Servo-proportional valves
Operation	Direct operated by two proportional solenoids		Direct operated by a proportional solenoid
Pilot	-		
Control	Flow		
Mounting pattern	ISO 4401 Size 03 to 05		
Rated flow at Δp 35 bar (500 psi) per land	-		4 to 100 l/min
Rated flow at Δp 5 bar (75 psi) per land	4 to 75 l/min (1.06 to 19.8 gpm)		-
Maximum operating pressure	Port P, A, B	350 bar (5,000 psi)	
	Port T without Y	280 bar (4,000 psi) ¹⁾	
	Port T with Y	D926: 350 bar (5,000 psi); D927: 250 bar (3,600 psi)	D936: 350 bar (5,000 psi); D937: 250 bar (3,600 psi)
100% step response at 210 bar (3,000 psi)	18 to 28 ms		11 to 18 ms
Electrical interface	Analog		
Features	<ul style="list-style-type: none"> • 4/3-way design including fail-safe position reduces need for additional safety components • Spool-in-body design built for high rated flow • Electronics mechanically uncoupled from housing allows for high vibration resistance for longer service life and less machine downtime • Next-generation electronics with digital core and energy efficient components lead to low thermal stress and long electronics lifecycle • Large variety of spool overlap, flow characteristics, and signal options to fit numerous applications • Electronics placed on the solenoid delivers compact design for minimum installation space 		<ul style="list-style-type: none"> • 4/4-way design including fail-safe position reduces need for additional safety components • Fully hardened spool and bushing provides high accuracy and wear resistance • Electronics mechanically uncoupled from housing allows for high vibration resistance for longer service life and less machine downtime • Next-generation electronics with digital core and energy efficient components lead to low thermal stress and long electronics lifecycle • Optimized overlaps and clearances between spool and bushing deliver low internal leakage and high contamination resistance • Electronics placed on the solenoid delivers compact design for minimum installation space

1) In order to avoid an emptying of the return line, a back pressure of 2 bar (30 psi) should be maintained on the T and Y ports

PILOT OPERATED PROPORTIONAL VALVES

Specifications and Features



Series	D66x	D67x	D68x	D94x
Valve type	Proportional valves			
Operation	Pilot operated			
Pilot	ServoJet® or nozzle-flapper	DDV or ServoJet®	D633	ServoJet®
Control	Flow	Flow, pressure, flow&pressure (p/Q), axis (position, velocity, force)	Flow	Flow, pressure, flow&pressure (p/Q), axis (position, velocity, force)
Mounting pattern	ISO 4401 Size 05 to 10 (NG10 to 32)			
Rated flow at Δp 35 bar (500 psi) per land	-			
Rated flow at Δp 5 bar (75 psi) per land	30 to 1,500 l/min (8 to 396 gpm)			
Maximum operating pressure	Port P, A, B	350 bar (5,000 psi)		
	Port T with Y internal	Depends on Pilot Valve		50 bar (725 psi) to 70 bar (1,000 psi)
	Port T with Y external	250 bar (3,600 psi) to 350 bar (5,000 psi)		
100% step response at 210 bar (3,000 psi)	9 to 48 ms	9 to 40 ms		10 to 41 ms
Electrical interface	Analog			
Features	<ul style="list-style-type: none"> Optimized design of valve bodies for high rated flow Available as 2- or 3-stage valves, dependent on required dynamics Optional ServoJet® or nozzle-flapper pilot valves Excellent dynamic response due to improved pilot stages Different fail-safe options available allowing the best fit to the application 	<ul style="list-style-type: none"> Optimized design of valve bodies for high rated flow Integrated digital electronics for high flexibility Optional pilot stages (DDV or ServoJet®) allow the best fit to the application Excellent dynamic response due to improved pilot stages Different fail-safe options available allow the best fit to the application 	<ul style="list-style-type: none"> Optimized design of valve bodies for high rated flow High energy efficiency due to D633 pilot valve with low internal leakage Low range of minimum pilot pressure required Integrated amplifier and control electronics for high functional flexibility Excellent dynamic response due to high natural frequency of pilot stage Different fail-safe options available allowing the best fit to application Optionally available: new pilot valve with integrated electronics and position control of the pilot valve 	<ul style="list-style-type: none"> Optimized design of valve bodies for high rated flow Integrated digital electronics with integrated pressure transducer allows a high grade of flexibility Robust ServoJet® pilot valves Excellent dynamic response due to improved pilot stages Different fail-safe options available allow the best fit to the application

PILOT OPERATED SERVO VALVES

Specifications and Features



Series	D661	D671/2	D791/2
Valve type	Servo valves		
Operation	Pilot operated		
Pilot	ServoJet®	Single or 2-stage ServoJet®	EFB or MFB
Control	Flow	Flow, pressure, flow&pressure (p/Q), axis (position, velocity, force)	Flow, pressure, flow&pressure (p/Q), axis (position, velocity, force)
Mounting pattern	ISO 4401 size 05 (NG10)	ISO 4401 size 05 to 07 (NG10 to 16)	<ul style="list-style-type: none"> • ISO 103742-06-05-0-92 • Special
Rated flow at Δp 35 bar (500 psi) per land	20 to 200 l/min (5.3 to 52.8 gpm)	20 to 240 l/min (5.3 to 63.4 gpm)	100 to 1000 l/min (26.4 to 264 gpm)
Rated flow at Δp 5 bar (75 psi) per land	-		
Maximum operating pressure	Port P, A, B	350 bar (5,000 psi)	
	Port T with Y Internal	210 bar (3,000 psi)	
	Port T with Y external	250 bar (3,600 psi)	250 bar (3,600 psi) or 350 bar (5,000 psi)
100% step response at 210 bar (3,000 psi)	6.5 to 18 ms	7 to 19 ms	3 to 12 ms
Electrical interface	Analog	<ul style="list-style-type: none"> • Analog or fieldbus interface • Additional analog transducer interfaces 	
Features	<ul style="list-style-type: none"> • Fully hardened spool and bushing provides high accuracy and wear resistance • Improved ServoJet® pilot valve design results in excellent dynamic response 	<ul style="list-style-type: none"> • Fully hardened spool and bushing provides high accuracy and wear resistance • Integrated digital electronics for high flexibility • Robust single or 2-stage ServoJet® pilot valves • Excellent dynamic response due to improved pilot stages 	<ul style="list-style-type: none"> • Fully hardened spool and bushing provides high accuracy and wear resistance • 3-stage valve design for high dynamics • Electrical position feedback (LVDT) - no wear • Integrated electronics with inverse polarity protection • Optional external pilot supply and return connections via additional x and y port in valve body • Low threshold and hysteresis, excellent stability at null

NOTES

NOTES

NOTES

MORE PRODUCTS. MORE SUPPORT.

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
+86 512 5350 3600
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

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

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
info.uk@moog.com

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

For product 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.
For the full disclaimer refer to www.moog.com/literature/disclaimers.

©2025 Moog Inc. All rights reserved. All changes are reserved.

Moog Servo Valves and Proportional Valves
KEM/Rev. A, April 2025, CDL68250-en