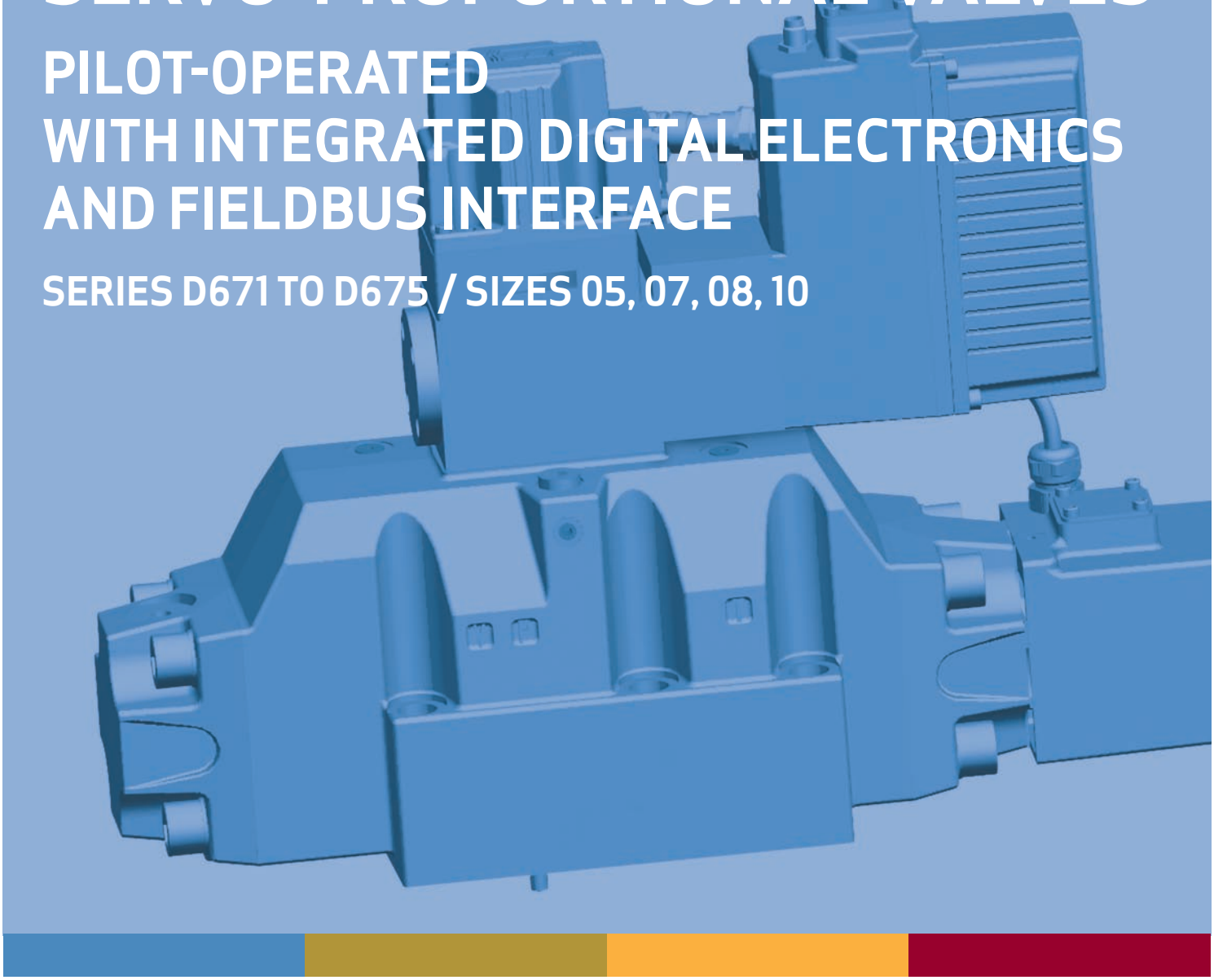
SERVO-PROPORTIONAL VALVES

PILOT-OPERATED WITH INTEGRATED DIGITAL ELECTRONICS AND FIELDBUS INTERFACE

SERIES D671 TO D675 / SIZES 05, 07, 08, 10



Rev. 1, March 2010

FOR DEMANDING APPLICATIONS REQUIRING HIGH PRECISION AND DYNAMIC RESPONSE

WHAT MOVES YOUR WORLD

MOOG

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 product's performance. And help take your thinking further than you ever thought possible.

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GENERAL OVERVIEW

EXCELLENCE IN MOTION CONTROL TECHNOLOGY

Moog's Industrial Group designs and manufacturers high performance motion control solutions combining electric, hydraulic, and hybrid technologies with expert consultative support in a range of applications including plastics, metal forming, power generation, test and simulation. We help performance-driven companies design and develop their next-generation machines. With 33 operations worldwide and sales of USD 455 million (2009) Moog Industrial is part of Moog Inc. (NYSE: MOG.A and MOG.B), which achieved in 2009 net sales of USD 1.849 billion.

MOOG SERVO- AND SERVO-PROPORTIONAL VALVES

Moog has been producing Servovalves and Servo-Proportional Valves with integrated electronics for over 50 years. During this period, more than 400,000 valves have been delivered. Our Valves are successfully used in all kinds of industrial applications.

SERVO-PROPORTIONAL VALVES, D671 to D675

The Servo-Proportional Valves of the D671 to D675 series are control valves for 2-, 3-, 4- or even 5-way applications. These valves are suited for electro-hydraulic control of position, speed, pressure or force, and applications involving high dynamic requirements. The integrated valve electronics are a new design, featuring a pulse width modulation driver and a 24 V DC power supply.

SERVOJET® PILOT VALVE

Key characteristics of the ServoJet® Pilot Stage, which uses the jet pipe design, are its robust and enhanced design. In past years, it has been particularly successful in Moog Servo-Proportional Valves used applications with moderate dynamic requirements.

TWO-STAGE SERVOJET® PILOT VALVE D670

The new two-stage pilot Servo-Proportional Valve D670 has been designed for applications involving the highest dynamic requirements. It merges the robust design of a dynamically enhanced ServoJet® pilot stage with the large control flow of a two-stage pilot valve, thereby achieving superior dynamic characteristics.

DIRECT OPERATED PILOT VALVE D633

The Direct Operated Valve D633, when used as the pilot valve, is characterized by its high dynamics and very low leakage. It is suited for very high dynamic requirements, while offering an outstanding efficiency. The very high pressure efficiency makes it the first choice for applications involving low pilot pressures.

NOTICE

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.

For the most current information, visit www.moog.com/industrial or contact your local Moog office.

CHARACTERISTICS AND BENEFITS

FLOW CONTROL (Q-CONTROL)

In this operating mode of the Servo-Proportional Valve, the spool position is controlled. The applied command signal is proportional to a particular spool position. The command signal (spool position command) is fed to the valve electronics. A position transducer (LVDT) measures the spool's actual position and transfers this information to the valve electronics. The electronics compare the actual spool position and command signal, and control the linear force motor or the ServoJet® Pilot Valve to position the spool as required.

The position command can be controlled through parameters in the valve software (i.e., linearization, ramping, deadband or sectionally defined amplification).

DIGITAL ELECTRONICS

The digital control electronics are integrated into the valve. The valve electronics contain a microprocessor system performing all important functions via the valve software.

FIELDBUS INTERFACE

The valves are parameterized, activated, and monitored via the built-in fieldbus interface (e.g. CANopen, Profibus-DP or EtherCAT). To reduce wiring, the fieldbus interface is provided with two plugs. Thus, valves may be integrated into the bus without any external T-joints. In addition, up to two analog input commands and up to two analog actual value outputs are available.

Optionally, the valve is available without a fieldbus interface. In this case, the valve parameters are set using the integrated service connector.

APPLICATION

In addition to flow control, the valves are capable of controlling external axis signals such as position, speed, force and similar parameters.

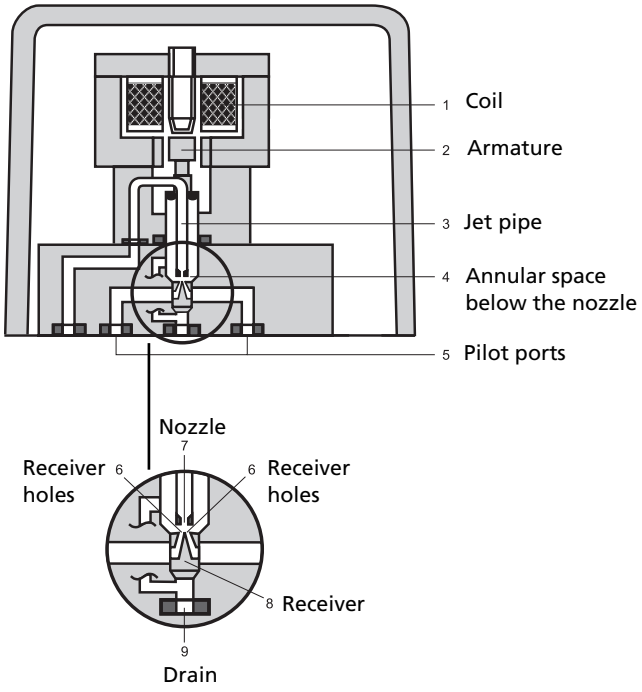
BENEFITS OF THE D671 TO D675 DIGITAL SERVO-PROPORTIONAL VALVES

- Fieldbus data connection: Electrically separated fieldbus interface.
- Diagnostic options: Integrated monitoring of the most important environmental and internal parameters. Valve parameters may be changed on site or remotely.
- Flexibility: Since parameters may be downloaded using the fieldbus, the valve may be tuned during a machine cycle and operating machine.
- Safety: Fail-safe options include a defined safe spool position using a spring or using an external supply cut off ensure operator safety.

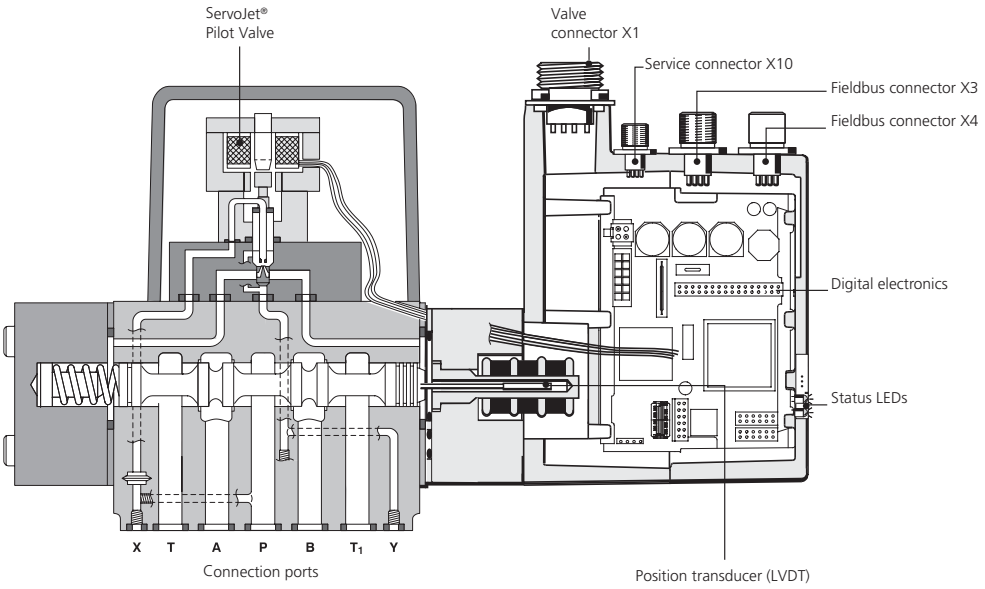
FUNCTIONAL DESCRIPTION OF THE SERVOJET® PILOT VALVE

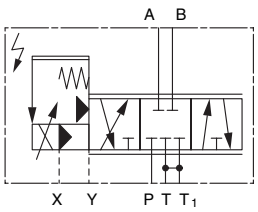
The ServoJet® Pilot Valve is based on the jet pipe design and consists mainly of a torque motor, jet pipe and receiver.

An electric current through the coil (pos. 1) of the ServoJet® pilot stage causes the armature (pos. 2) with the jet pipe (pos. 3) to move. The deflected fluid jet, which is focused by a specially shaped nozzle, hits one of the two receiver openings (pos. 8) more than the other. This causes a pressure difference in the pilot ports (pos. 5) of the ServoJet® Pilot Valve. The resulting flow moves the spool of the main stage in the corresponding working direction. The return flow is via the annular space (pos. 4) below the nozzle to the tank port (pos. 9).



TWO-STAGE DIGITAL SERVO-PROPORTIONAL VALVE SERIES D671 WITH SERVOJET® PILOT VALVE





Hydraulic symbol:
Shown with control pressure applied and electronics connected, enable and command signal = Zero

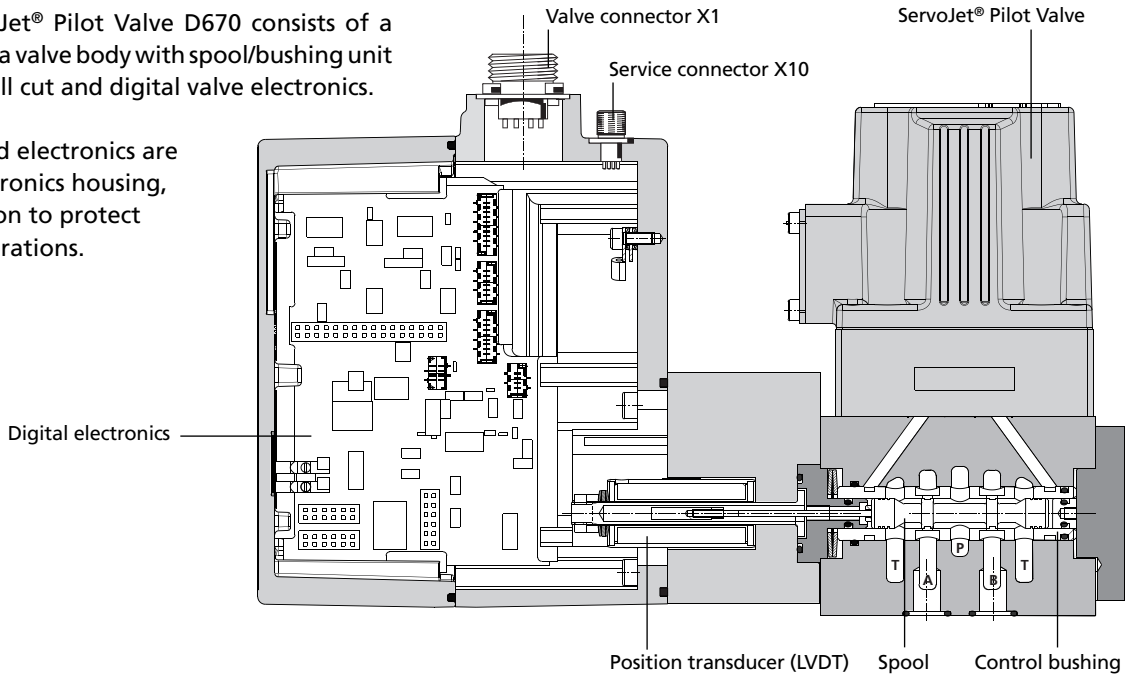
Functional description of the ServoJet® Pilot Valve

- Robust and reliable: The ServoJet® pilot stage employs the jet pipe principle, and is higly resistant to contamination. This results in high reliability and ensures safe operation, even in demanding environments.
- Good dynamics: The ServoJet® Pilot Valve features a high natural frequency and thus a good dynamic behaviour. The two different control flows (Standard and High Flow) provide a selection of valve dynamics suitable for your application.

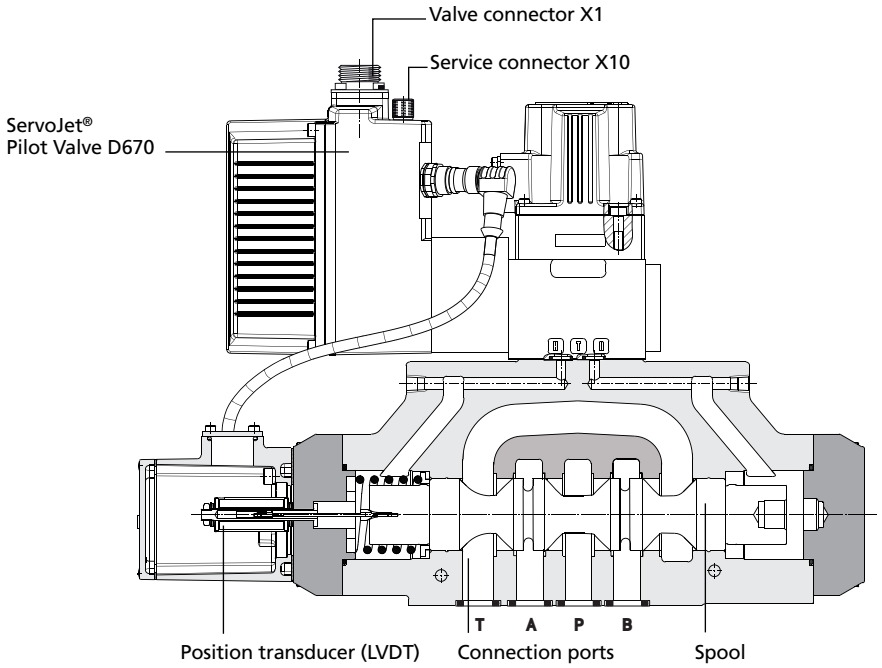
FUNCTIONAL DESCRIPTION OF THE TWO-STAGE SERVOJET® PILOT VALVE D670

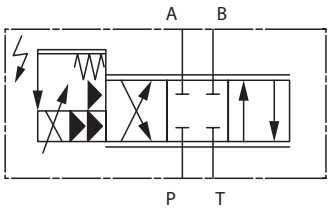
The two-stage ServoJet® Pilot Valve D670 consists of a ServoJet® pilot stage, a valve body with spool/bushing unit with a precise axis null cut and digital valve electronics.

The digital integrated electronics are mounted in the electronics housing, isolated from vibration to protect it from shock and vibrations.



THREE-STAGE DIGITAL SERVO-PROPORTIONAL VALVE SERIES D673 WITH SERVOJET® PILOT VALVE D670





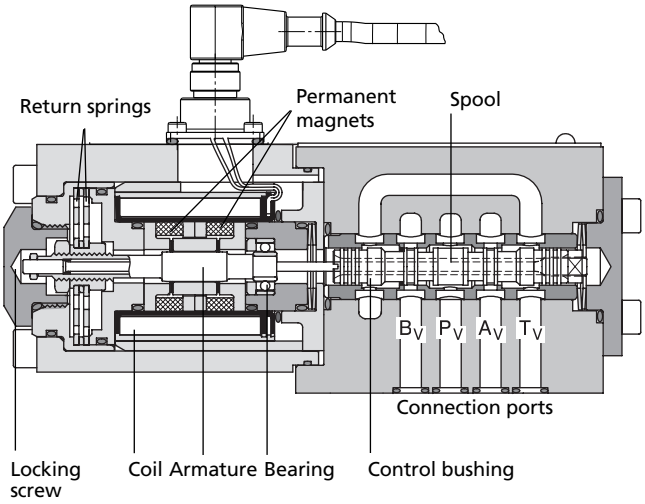
Hydraulics symbol:
Presented with control pressure being applied and electronics connected, enable and command signal = Zero

Benefits of the two-stage ServoJet® Pilot Valve D670:

- Very high dynamics: The two-stage ServoJet® Pilot Valve D670 features a dynamically enhanced ServoJet® pilot stage; its natural frequency has been doubled compared to the standard version. This characteristic combined with the high flow rate of a two-stage pilot valve provides a superior dynamic performance. Due to sophisticated digital control algorithms, this valve has high stability.
- Robust and reliable: Due to the proven jet pipe principle, the valve is as robust and reliable as the single-stage ServoJet® Pilot Valve.

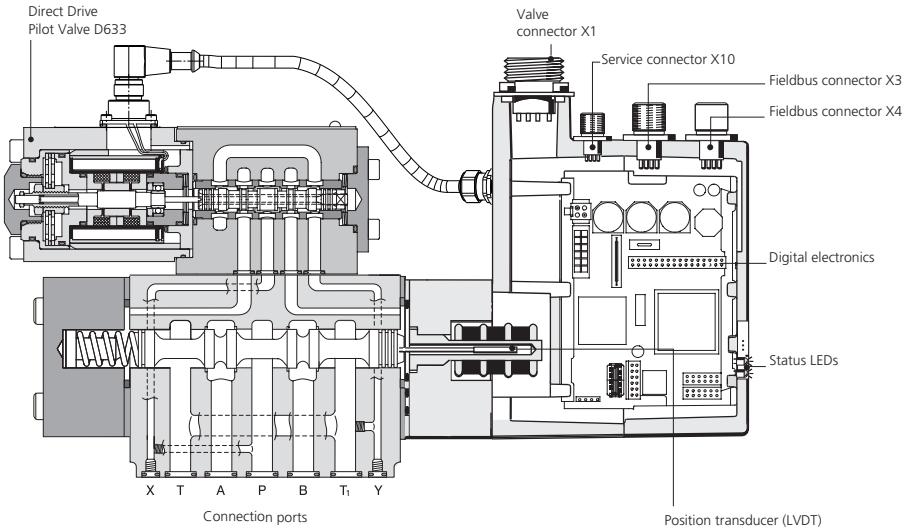
FUNCTIONAL DESCRIPTION OF THE DIRECT DRIVE PILOT VALVE D633

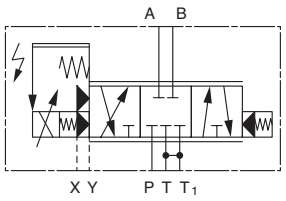
The pilot valve consists of a linear force motor driven by a permanent magnet, a driving rod connecting the armature with the spool and a spool in a bushing. The linear force motor consists of a coil, permanent magnets, pole parts, an armature and a centering spring. The 4-way spool controls the flow from the pressure port to one of the two control ports, simultaneously the flow from the other control port to the tank port is controlled. The displacement of the centering spring by moving the spool results in a return force opposing the armature movement. An electric current in the coil of the linear force motor gives rise to electromagnetic flux, depending on the current direction, which superimposes the permanent flux in the gaps between armature and pole parts. Thereby a force is exerted on the armature which results in a direction-dependent displacement, opposing the centering spring. The spool is connected to the armature by a driving rod and thus follows the displacements. Flow forces experienced when fluid is flowing through the valve as well as friction forces due to contamination between spool and bushing need to be compensated by the linear force motor. The stroke of the spool is approximately proportional to the coil current.



When returning to the center position, the spring force and the drive force act in the same direction. In the center position defined by the centering spring the linear force motor does not consume any current.

TWO-STAGE DIGITAL SERVO-PROPORTIONAL VALVES SERIES D671 WITH DIRECT DRIVE SERVOJET® PILOT VALVE D633





Hydraulics symbol:
Presented with control pressure being applied and electronics connected, enable and command signal = Zero

Benefits of the Direct Drive Pilot Valve D633

- Low leakage losses: The Direct Drive Pilot Valve D633 does not require a pilot flow when in the centered position. This results in a significant reduction in energy consumption, which is particularly important for machines with multiple valves.
- High dynamics: The valve is highly dynamic due to the high natural frequency of the Direct Drive Valve and pilot flows close to those of two-stage pilot valves.
- High pressure efficiency: The very high pressure efficiency even for small spool strokes makes the Direct Drive Pilot Valve D633 a first choice for applications involving low control pressures as it offers high control forces even for this type of application: Secure position of the main spool is always ensured.
- Reliability: The Direct Drive Pilot Valve D633 offers a high degree of reliability due to the high actuation forces of the linear force motor as compared to proportional magnets.

DESIGN SPECIFICATIONS

PILOT PRESSURE

To achieve reliable functioning of the valves we recommend the following pilot pressures p_x:

- For valves with stub shaft spools $p_x >= p_P$
- For valves with standard spools $p_x >= 0.3 \times p_P$

p_P = Pressure at the P-port of the valve (supply pressure)

Note: The pilot pressure range (see technical data) must be observed.

VALVE FLOW CALCULATIONS

The actual valve flow is dependent on the spool and the pressure drop Δp across the lands. At 100 % command signal the valve flow at rated pressure drop Δp_N = 5 bar (75 psi) per land is the rated flow Q_N. For other than rated pressure drop, the valve flow changes at a constant command signal according to the following formula.

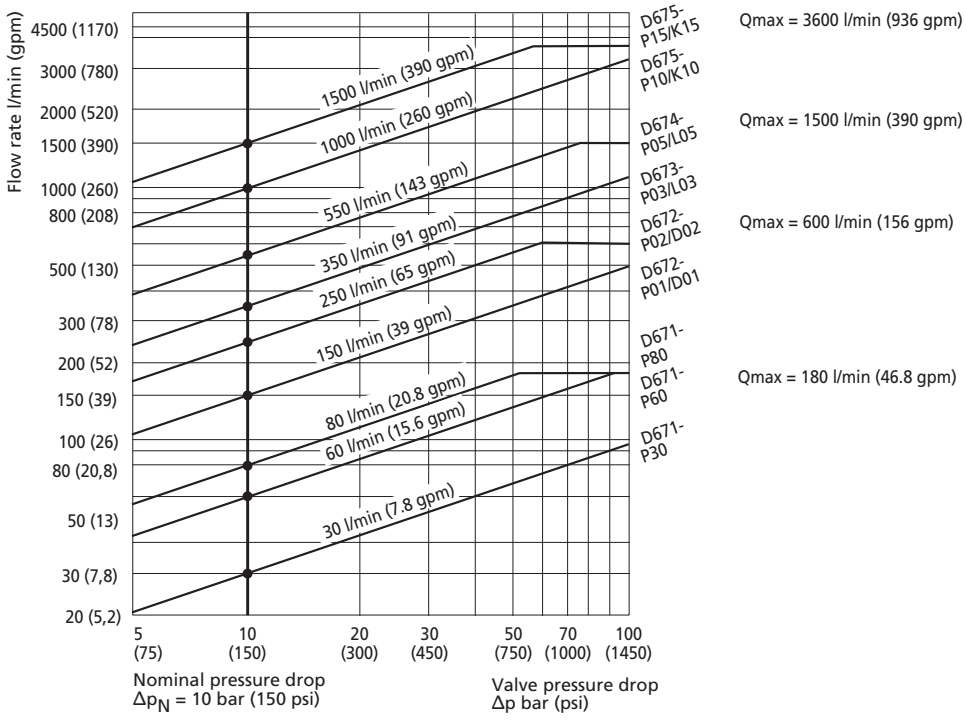
The actual valve flow Q must not exceed a mean velocity of 30 m/s in the ports P, A, B and T.

The maximum flow rates given in the flow diagrams should not be exceeded to prevent the risk of cavitation.

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

Q	l/min (gpm)	= Actual flow
Q_N	l/min (gpm)	= Nominal flow
Δp	bar (psi)	= Actual pressure drop per land
Δp_N	bar (psi)	= Nominal pressure drop per land

FLOW CHART (4-WAY FUNCTION)



VALVES FOR APPLICATIONS WITH SAFETY REQUIREMENTS

GENERAL

For applications with servo-proportional valves where certain safety regulations are enforced to prevent dangers to operator and the machine, a "safe spool position" is needed in order to avoid potential damage. Therefore, a fail-safe version is offered as an option for the multi-stage servo-proportional valves. After switching off the 24 V supply of the safety solenoid valve, this fail-safe function causes a defined spool position: Overlapped center position or open position A ➡ T or B ➡ T.

For fail-safe valves in series D671 to D675, movement to the safe central position is ensured by hydraulically connecting the two control volumes of the main stage using a 2/2- or a 4/2-way valve, respectively. The return force of the centering springs moves the spool into the fail-safe position.

With fail-safe valves, it is possible to check whether the main spool is in a safe position. If the spool is within the defined safe range, pin 11 shows a signal with a voltage exceeding 8.5 V. If the voltage is lower than 6.5 V, the spool is not in a safe position.

To reduce the fail-safe switching time, it is advised to both switch off the supply of the 2/2- or 4/2-way valve and the enable signal at the same time.

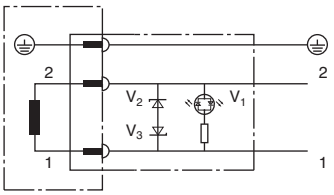
NOTE:
According to ISO 13849 a higher safety category can be achievedby using a fail-safe valve with spool position monitoring. For this, attention should be paid to appropriate machine safety standards.

ELECTRICAL CHARACTERISTICS

Detailed information on pin assignments of the 11-pole + PE connector X1 for applications involving safety requirements is provided in sectioin "Electronics" (extended information AM426D).

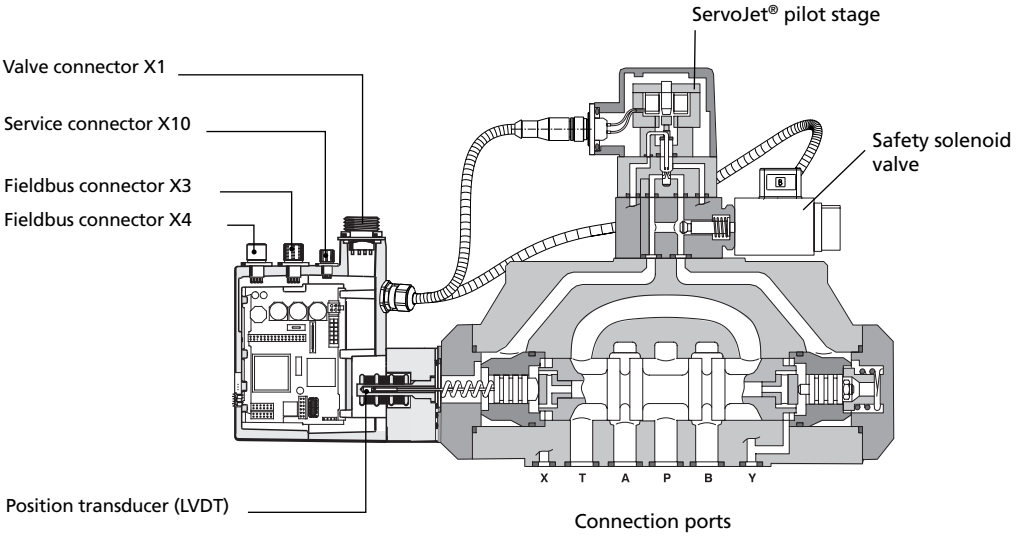
Connector wiring

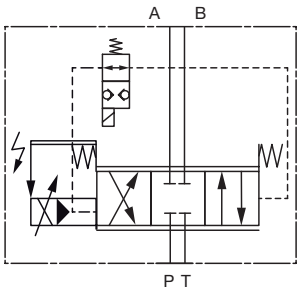
EN 175301 part 803
with free wheel and
light diode



Valve design	2/2-way valve or 4/2-way valve
Function	solenoid operated
Nominal voltage U_N	24 V DC (minimum 22.8 V DC, maximum 26.4 V DC)
Nominal power P_N	
2/2-way valve	26 W
4/2-way valve	36 W

TWO-STAGE PROPORTIONAL VALVE SIZE 08 WITH SERVOJET® PILOT VALVE FOR APPLICATIONS WITH SAFETY REQUIREMENTS





Hydraulics symbol:
Presented with control pressure applied and electronics connected, supply of 2/2-way valve switched off.

TIPS ON SELECTING THE FAIL-SAFE FUNCTION FOR APPLICATIONS WITH SAFETY REQUIREMENTS

The valve series D671 to D675 is offered with various fail-safe functions. The behavior of the valve in a fail-safe situation depends on the fail-safe function selected, the pilot valve and the actual pilot pressure, electrical supply of the valve electronics and 2/2- or 4/2-way valve.

The following tables should provide assistance with selecting the suitable fail-safe function. The spool positions of the main stage in the event of a failure of valve electronics, control pressure or power supply are described below.

VALVES WITH SERVOJET® PILOT STAGE

Fail-safe function	Spool position of the main stage	Pilot pressure (or system pressure for internal pilot) [1]	Valve electronics	2/2-way valve
F	End position P ➡ B and A ➡ T	on	off	–
	End position P ➡ B and A ➡ T	off	on	–
	End position P ➡ B and A ➡ T	off	off	–
D	End position P ➡ A and B ➡ T (D671: 20 % P ➡ A and B ➡ T)	on	off	–
	End position P ➡ A and B ➡ T (D671: 20 % P ➡ A and B ➡ T)	off	on	–
	End position P ➡ A and B ➡ T (D671: 20 % P ➡ A and B ➡ T)	off	off	–
M[2]	Undefined	on	off	–
	Defined center position	off	on	–
	Defined center position	off	off	–
W	Undefined	on	off	on
	Defined center position	off	on	on
	Defined center position	off	off	on
	Defined center position	on	off	off
	Defined center position	off	on	off
	Defined center position	off	off	off
U	End position P ➡ B and A ➡ T	on	off	on
	Defined center position or defined P ➡ B and A ➡ T	off	on	on
	Defined center position or defined P ➡ B and A ➡ T	off	off	on
	Defined center position or defined P ➡ B and A ➡ T	on	off	off
	Defined center position or defined P ➡ B and A ➡ T	off	on	off
	Defined center position or defined P ➡ B and A ➡ T	off	off	off
P [2]	End position P ➡ B and A ➡ T	on	off	on
	Defined P ➡ B, A ➡ T	off	on	on
	Defined P ➡ B, A ➡ T	off	off	on
	Defined P ➡ B, A ➡ T	on	off	off
	Defined P ➡ B, A ➡ T	off	on	off
	Defined P ➡ B, A ➡ T	off	off	off

[1] Pressure "off" means without pressure (<<1 bar). For higher pressures the spool position of the main stage is undefined.
Pressure "on" means a pilot pressure of at least the value calculated according to the procedure given on page 9. For lower pressures the spool position of the main stage is undefined.

[2] Only with ServoJet® Pilot Valve.

TIPS ON SELECTING THE FAIL-SAFE FUNCTION FOR APPLICATIONS WITH SAFETY REQUIREMENTS

VALVES WITH TWO-STAGE SERVOJET® PILOT VALVE D670/D671

Fail-safe Function	Spool position of the main stage	Pilot pressure (or system pressure for internal pilot) [1]	Valve electronics	4/2-way valve
F	End position P ➡ B and A ➡ T	on	off	–
	Undefined	off	on	–
	Undefined	off	off	–
D	End position P ➡ A and B ➡ T	on	off	–
	Undefined	off	on	–
	Undefined	off	off	–
W	Undefined	on	off	on
	Undefined	off	on	on
	Undefined	off	off	on
	Defined center position	on	off	off
	Defined center position	off	on	off
	Defined center position	off	off	off
U	End position P ➡ B and A ➡ T	on	off	on
	Undefined	off	on	on
	Undefined	off	off	on
	Defined center position or definiert P ➡ B and A ➡ T	on	off	off
	Defined center position or definiert P ➡ B and A ➡ T	off	on	off
	Defined center position or definiert P ➡ B and A ➡ T	off	off	off

VALVES WITH DIRECT DRIVE PILOT VALVE D633

Fail-safe Function	Spool position of the main stage	Pilot pressure (or system pressure for internal pilot) [1]	Valve electronics	4/2-way valve
F	End position P ➡ B and A ➡ T	on	off	–
	Undefined	off	on	–
	End position P ➡ B and A ➡ T	off	off	–
D	End position P ➡ A and B ➡ T (D671: 20 % P ➡ A and B ➡ T)	on	off	–
	Undefined	off	on	–
	End position P ➡ A and B ➡ T (D671: 20 % P ➡ A and B ➡ T)	off	off	–
W	Undefined	on	off	on
	Undefined	off	on	on
	Undefined	off	off	on
	Defined center position	on	off	off
	Defined center position	off	on	off
	Defined center position	off	off	off
U	End position P ➡ B and A ➡ T	on	off	on
	Undefined	off	on	on
	Defined center position or definiert P ➡ B and A ➡ T	off	off	on
	Defined center position or definiert P ➡ B and A ➡ T	on	off	off
	Defined center position or definiert P ➡ B and A ➡ T	off	on	off
	Defined center position or definiert P ➡ B and A ➡ T	off	off	off

[1] Pressure "off" means without pressure (<<1 bar). For higher pressures the spool position of the main stage is undefined.
Pressure "on" means a pilot pressure of at least the value calculated according to the procedure given on page 9. For lower pressures the spool position of the main stage is undefined.

GENERAL REQUIREMENTS FOR VALVE ELECTRONICS

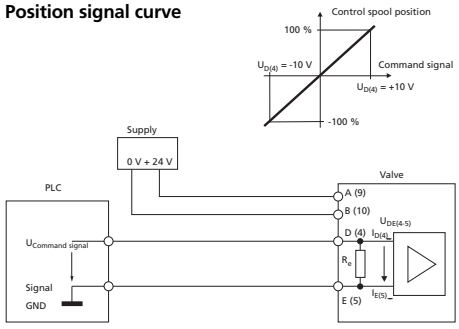
- All signal lines, including those of external transducers, should be shielded.
- Shielding should be connected radially to ⊥ (0 V), power supply side, and connected to the mating connector housing (EMC).
- Minimum cross sectional area of all lines ≥ 0.25 mm^2 (0.01 in^2)
- Consider voltage losses between cabinet and valve. See also Moog technical note TN 494 (see section "Accessories and Documents for all Sizes").
- Note: When making electrical connections to the valve (shield(⏚)) appropriate measures must be taken to ensure that locally different ground electical potentials do not result in excessive ground currents. See Moog technical note TN 353 (see section "Accessories and Documents for all Sizes").
- All connected circuits have to be separated from the network using a "safe disconnect" device according to EN 61558-1 and EN 61558-2-6. All voltages have to be low voltage type according to EN 60204-1. We recommend the use of SELV/PELV power supplies.

SIGNAL AND PIN ASSIGNMENT FOR VALVES WITH ANALOG INPUT (6-POLE + PE, 11-POLE + PE)

Command signal ±10 V, floating

The spool stroke is proportional to $U_D – U_E$ for 6-pole + PE connectors and $U_4 – U_5$ for 11-pole + PE connectors.
For a command signal $U_D – U_E = +10$ V or $U_4 – U_5 = +10$ V input the spool moves 100 % P ➡ A and B ➡ T.
For a command signal $U_D – U_E = 0$ V or $U_4 – U_5 = 0$ V input the spool is in the defined center position.

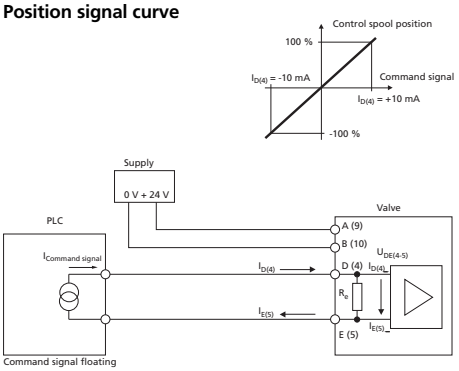
Position signal curve



Command signal ±10 mA, floating

The spool stroke is proportional $I_D = –I_E$ for 6 + PE connector and $I_4 = –I_5$ for 11-pole + PE connector.
For a command signal $I_D = +10$ mA or $I_4 = +10$ mA input the spool moves 100 % P ➡ A and B ➡ T.
For a command signal $I_D = 0$ mA or $I_4 = 0$ mA input the spool is in the defined center position.

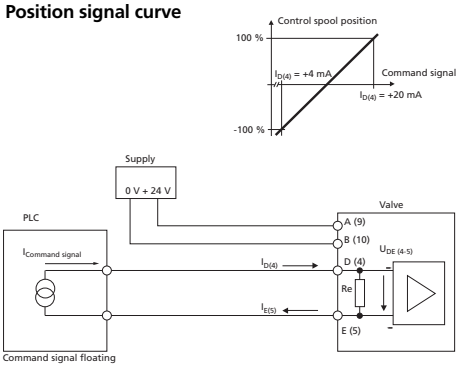
Position signal curve



Command signal 4 to 20 mA, floating

The spool stroke of the valve is proportional $I_D = –I_E$ for 6-pole + PE connector and $I_4 = –I_5$ for 11-pole + PE connector.
For a command signal $I_D = 20$ mA or $I_4 = 20$ mA input the spool moves 100 % P ➡ A and B ➡ T.
For a command signal $I_D = 12$ mA or $I_4 = 12$ mA input the spool is in the defined center position.

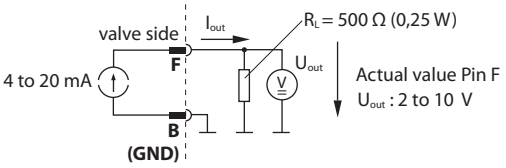
Position signal curve



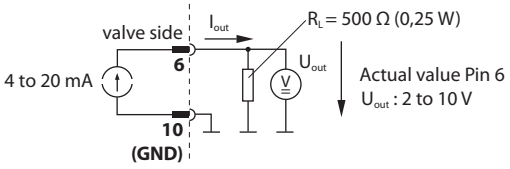
Actual value 4 to 20 mA

The actual value, that is the position of the spool when using the flow function, is taken at pin F (6-pole + PE connector) or pin 6 (11-pole + PE connector), respectively (wiring diagram below). These signals can be used for monitoring and fault detection purposes. The full spool stroke corresponds to 4 to 20 mA. At 12 mA command the spool is in center position.
20 mA corresponds to 100 % valve opening P ➡ A and B ➡ T.
Using the actual value signal 4 to 20 mA a cable fault is detected by $I_{out} = 0$ mA.

Conversion of the actual value output I_{outF} (Position of the spool) for valves with 6-pole + PE connector



Conversion of the actual value signal I_{out6} (Position of the spool) for valves with 11-pole + PE connector



(For signal type "D", R_L is in the valve electronics)

PIN ASSIGNMENT WITH 6-POLE + PE CONNECTOR (X1)

To EN 175201-804 with mating connector (type R and S, metal shell) with preleading protective earth contact (⏚).

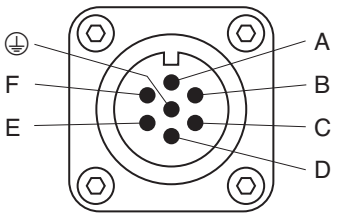
Pin	Signal / Pin assignment	Voltage differential ±10 V	Current differential ±10 mA, 4 to 20 mA
A	Power supply	24 V DC (18 to 32 V DC) above GND (reverse polarity protected against GND)	
B	Power ground/ Signal ground	GND	
C	Enable input	> 8.5 to 32 V DC above GND: valve enabled < 6.5 V DC above GND: valve disabled it has been set to valve status "HOLD" or "DISABLED" Input resistance 10 kΩ	
D E	Command input [1]	$U_{in} = U_{DE}$ R_{in} = 20 kΩ differential	$I_{in} = I_D = -I_E$ [2] R_{in} = 200 Ω
F	Actual value output	I_{out}= 4 mA to 20 mA above GND. R_L = 500 Ω I_{out} is proportional to the control spool position; the output is short circuit protected	
⏚	Protective earth connection		

[1] The potential difference (measured against GND) must be between –15 and +32 V.

[2] The input current I_{in} of this command value input must be between –25 and +25 mA.

Command signals I_{in} < 3 mA (e.g., due to cable break) mean a defect in 4 to 20 mA signals.

The valve reaction to this defect may be customized and activated by the customer.



PIN ASSIGNMENT WITH 11-POLE + PE CONNECTOR (X1)

To EN 175201-804 with mating connector (type E, metal shell) with preleading protective earth contact (⏚).

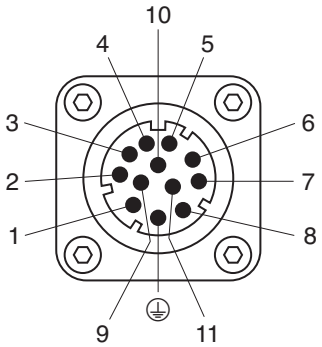
Pin	Signal / Pin assignment	Voltage differential ±10 V	Current differential ±10 mA, 4 mA to 20 mA
1	Not used		
2	Not used		
3	Enable input	> 8.5 to 32 V DC above GND: valve enabled < 6.5 V DC above GND: valve disabled it has been set to valve status "HOLD" or "DISABLED" Input resistance 10 kΩ	
4 5	Command input [1]	$U_{in} = U_{4-5}$ R_{in} = 20 kΩ differential	$I_{in} = I_4 = -I_5$ [2] R_{in} = 200 Ω
6	Actual value output	I_{out} = 4 mA to 20 mA above GND. R_L = 500 Ω I_{out} is proportional to the control spool position; the output is short circuit protected	
7	Not used		
8	Digital output valve status	U_{8-10} > 8.5 V DC: Enable and supply ok, valve ready Nominal load voltage: 24 V DC, load types: ohmic, inductive, lamp Output current maximum 1.5 V (short-circuit-proof) [3]	
9	Power supply	24 V DC (18 V to 32 V DC) above GND (reverse polarity protected against GND)	
10	Power ground / Signal ground	GND	
11	Digital output valve error	Error monitoring [4]	
⏚	Protective earth connection		

[1] The potential difference (measured against GND) each must be between –15 and +32 V.

[2] Command signals I_{in} < 3 mA (e.g., due to cable break) mean a defect in 4 to 20 mA signals. The valve reaction to this defect may becustomized and activated by the customer.

[3] The sum of extracted currents has to be added to the valve supply current. The valve fuse has to be laid out for the total current.

[4] Output may be factory programmed, "low" means error (e.g. difference between command value and actual value).



PIN ASSIGNMENT WITH 11-POLE + PE CONNECTOR (X1) FOR APPLICATIONS WITH SAFETY REQUIREMENTS

To EN 175201-804 with mating connector (type E, metal shell) with preleading protective earth contact (⏚).

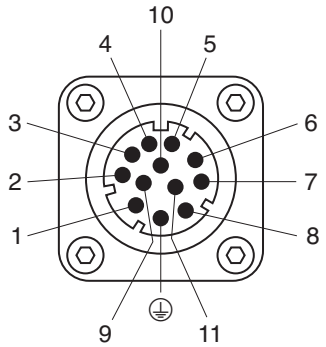
Pin	Signal / Pin assignment	Voltage differential ±10 V	Current differential ±10 mA, 4 mA to 20 mA
1	Fail-safe valve	24 V DC (minimum 22.8 V DC, maximum 26.4 V DC, maximum 1.50 A)	
2	Fail-safe valve	⊥ (0 V)	
3	Enable input	> 8.5 V to 32 V DC above GND: valve enabled < 6.5 V DC above GND: valve disabled it has been set to valve status "HOLD" or "DISABLED". Input resistance 10 kΩ	
4	Command input [1]	$U_{in} = U_{4-5}$ R_{in} = 20 kΩ	$I_{in} = I_4 = -I_5$ [2] R_{in} = 200 Ω
5		differential	
6	Actual value outout	I_{out} = 4 mA to 20 mA above GND. R_L = 500 Ω I_{out} is proportional to the control spool position; the output is short circuit protected	
7	Not used		
8	Digital output valve status	U_{8-10} > 8.5 V DC: Enable and supply ok, valve status "ACTIVE" Nominal load voltage: 24 V DC,load types: ohmic, inductive, lamp Output current maximum 1.5 V (short-circuit-proof) [3]	
9	Power supply	24 V DC (18 V to 32 V DC) above GND	
10	Power ground/ Signal ground	GND	
11	Digital output valve error	Monitoring of the fail-safe position [4]	
⏚	Protective earth connection		

1) The potential difference (measured against GND) each must be between -15 and +32 V.

2) Command signals I_{in} < 3 mA (e.g., due to cable break) mean a defect in 4 to 20 mA signals. The valve reaction to this defect may be customized and activated by the customer.

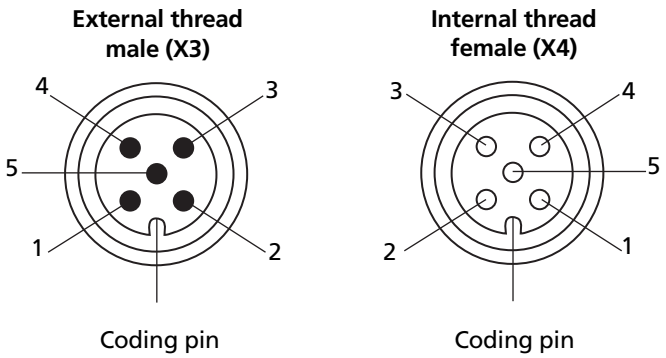
3) The sum of extracted currents has to be added to the valve supply current. The valve fuse has to be laid out for the total current.

4) Output may be factory programmed, "low" means error.
U_{11-2} > 8.5 V DC: safe spool position
U_{11-2} < 6.5 V DC: no safe spool position



CANopen CONNECTOR (X3, X4 / CODING A / 2 x M12x1 / 5-POLE)

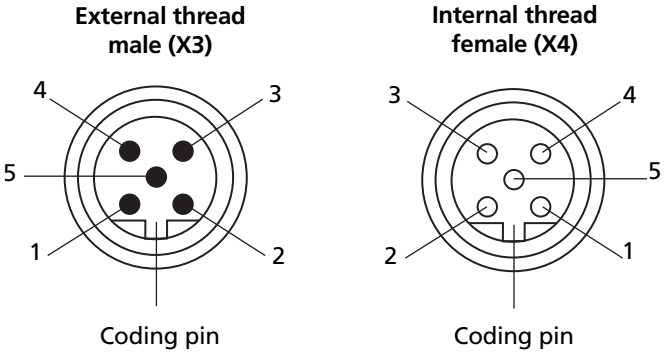
Pin	Signal X3, X4	
1	CAN_SHLD	Shield
2	CAN_V+	Not connected in the valve
3	CAN_GND	Ground
4	CAN_H	Transceiver H
5	CAN_L	Transceiver L



View on connection side of CANopen receptacle

PROFIBUS-DP CONNECTOR (X3, X4 / CODING B / 2 x M12x1 / 5-POLE)

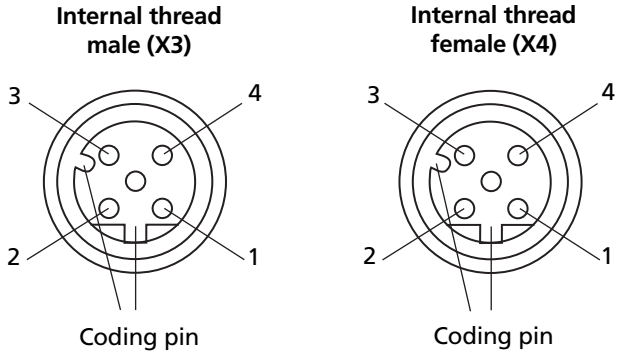
Pin	Signal X3, X4	
1	Profi V+	Power supply 5 V of terminating resistors
2	Profi A	Receiving/sending data -
3	Profi GND	Ground
4	Profi B	Receiving/sending data +
5	Shield	Shield



View on connection side of PROFIBUS-DP receptacle

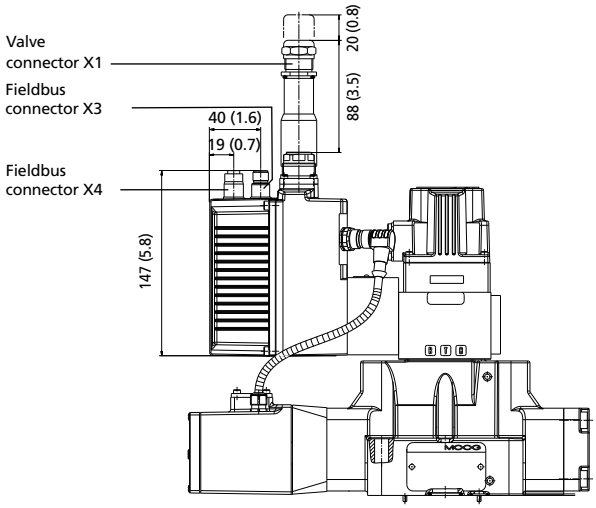
ETHERCAT CONNECTOR (X3, X4 / CODING D / 2 x M12x1 / 4-POLE)

Pin	Signal X4 IN	Signal X3 OUT
1	TX + IN	TX + OUT
2	RX + IN	RX + OUT
3	TX – IN	TX – OUT
4	RX – IN	RX – OUT

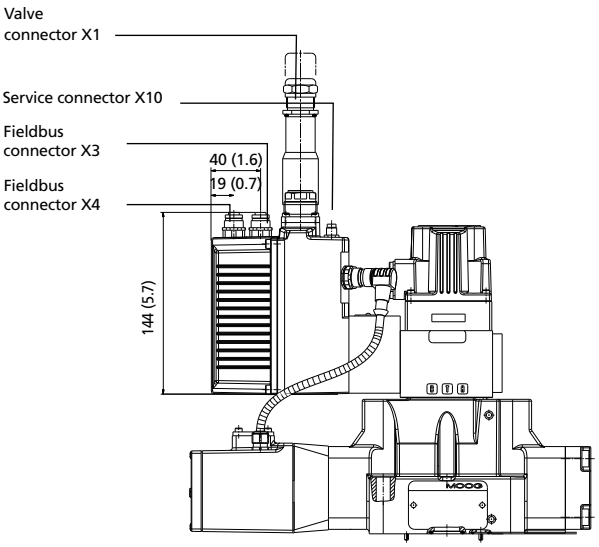


View on connection side of ETHERCAT receptacle

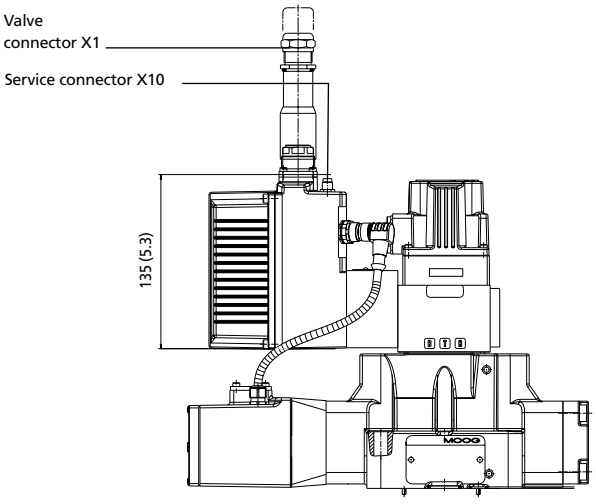
INSTALLATION DRAWING FOR VALVES WITH CANopen FIELDBUS CONNECTOR [1)]



INSTALLATION DRAWING FOR VALVES WITH PROFIBUS-DP OR ETHERCAT FIELDBUS CONNECTOR [1)]



INSTALLATION DRAWING FOR VALVES WITH ANALOG CONTROL [1)]



[1)] Electronics housing as an example for all sizes

HYDRAULICS WITH FIELDBUS

GENERAL

Modern automation technology is characterized by an increasing decentralization of processing functions using serial data communication systems. The use of serial bus systems instead of conventional communication technology ensures the increased flexibility of systems in terms of modifications and expansions.

It also has a significant potential for savings in project and installation costs in many areas of industrial automation. Amongst the benefits that have become viable through the use of fieldbuses are additional options for parameterization, enhanced diagnosis options and the reduction of variants.

VDMA PROFILE

In one working group within the German Machinery and industrial equipment Manufacturers Association (VDMA), a profile was created in collaboration with numerous well-known hydraulic system manufacturers:

This profile describes communication between hydraulic components via a fieldbus. It defines uniform functions and parameters in a standardized exchange format.

CANopen

According to EN 50325-4
CAN bus was originally developed for use in automobiles, but has been used in mechanical engineering in a variety of applications for many years.

The CAN bus is primarily designed for transmission security and speed.

CAN bus features:
- Multi-master system: Each participant can transmit and receive
- Topology: Linear structure with short stub line
- Network extension and bandwidths:
  - Up to 25 m (80.4 ft) at 1 Mbit/s
  - Up to 5000 m (16090 ft) at 25 kbit/s
- Addressing type: Message-oriented via identifier; priority assignment of the message via identifier
- Safety: Hamming distance = 6, i.e. up to 6 individual errors/message are recognized
- Bus physics: ISO 11898
- Maximum number of participants: 110 (64 without a repeater)

PROFIBUS-DP

According to EN 61158
Profibus-DP has been developed for the process and production industries and therefore is being supported by many control system manufacturers.

Profibus-DP features:
- Multi-master system: Several masters share access time and initiate communication
  Slaves only react to requests
- Topology: Linear structure with short stub line
- Network extension and bandwidths:
  - Up to 100 m (321.8 ft) at 12 Mbit/s
  - Up to 1200 m (3861.6 ft) at 9.6 kbit/s per segment
  Repeaters may be used
- Addressing type: Address oriented
- Priority/cycle time assignment of messages by master configuration
- Bus physics: RS-485 according to EIA-485
- Maximum number of participants: 126 (32 without a repeater)

ETHERCAT

According to IEC/PAS 62407
EtherCAT has been developed as an industry bus based on Ethernet to meet increasing demands regarding cycle time. EtherCAT bus is designed for high data transmission rates and fast cycle times.

EtherCAT bus features:
- Single master system: The master triggers communication
  Slaves only react to requests
- Topology: Line, star, tree and ring structure following the daisy chain principle
- Network extension and bandwidths: 100 m (321.8 ft) between participants, 100 MBit/s
- Addressing type: Address oriented, one datagram for all participants
- Bus physics: Fast Ethernet 100 Base Tx
- Maximum number of participants: 65535

CONFIGURATION SOFTWARE

GENERAL

The Windows®-based "Moog Valve Configuration Software" enables fast and convenient commissioning, diagnostics and configuration of the valve. Data may be uploaded from the PC to the valve and current settings may be downloaded from the valve to the PC and displayed.

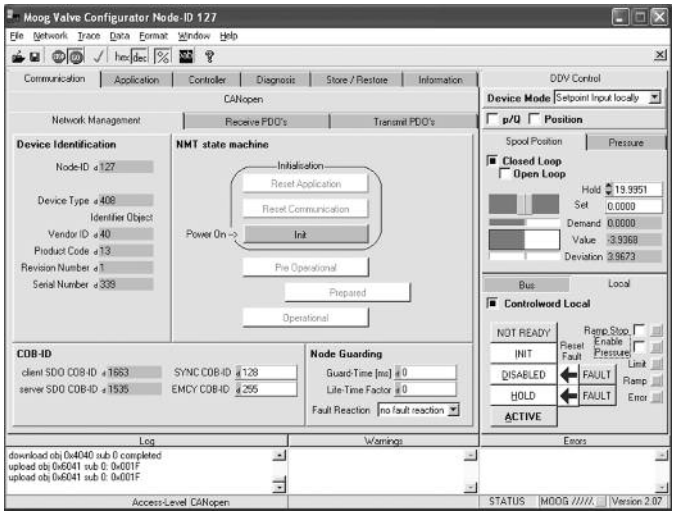
The valve can be controlled via graphic control elements. Status information (e.g. set values and actual values) as well as characteristic lines are displayed graphically. System parameters can be recorded and visualized via an integrated oscilloscope/data logger.

CONFIGURATION SOFTWARE

System requirements:

The configuration software can be configured on a PC with the following minimal requirements:

- IBM-PC compatible with 133 MHz
- Windows® 95/98/ME, Windows® NT/2000/XP/Vista
- 64 MB RAM
- 40 MB free hard disc capacity
- Monitor 640x480 Pixel resolution
- Keyboard, mouse



Recommended specification:

- IBM-PC compatible with ≥ 500 MHz
- Windows® NT/2000/XP/Vista

To use the software, the following options are additionally required: (see section "Accessories")

- USB port
- USB commissioning module
- Configuration/commissioning cable
- Adapter M8x1 service connector
  (not required for fieldbus CANopen)
- Valve electrically connected and power supply switched on

Note:
Configuration/commissioning using the "Moog Valve Configuration Software" is performed using the fieldbus connector (fieldbus CANopen), otherwise (fieldbus Profibus-DP, EtherCAT or analog control) using the integrated M8x1 service connector.

The software is provided by Moog upon request at no charge.

MODEL		D671	
Valve design		Two-stage, with standard spool	
Pilot valve		ServoJet®	
		Standard	High Flow
Mounting surface		ISO 4401-05-05-0-05, with T_1	
Installation position		Any position	
Weight	kg (lb)	6.3 (13.9)	
Weight including fail-safe valve	kg (lb)	8.8 (19.4)	
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)	
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)	
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz	
Shock protection		50 g, 6 directions	
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))			
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 210 (3000)	
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 210 (3000) 250 (3625)	
Maximum flow	l/min (gpm)	180 (47.6)	
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	30 (7.9) / 60 (15.9) / 80 (21.1) / 2 x 80 (21.1)	
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	1.8 (0.48)	
Pilot flow static	l/min (gpm)	1.7 (0.45)	2.6 (0.69)
Pilot flow at a 100 % step	l/min (gpm)	1.7 (0.45)	2.6 (0.69)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.	
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)	
Recommended viscosity range	mm²/s (cSt)	15 to 45	
Viscosity range	mm²/s (cSt)	5 to 400	
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11	
TYPICAL STATIC AND DYNAMIC DATA			
Step response time for 0 to 100 % stroke	ms	28	18
Threshold	%	< 0.05	
Hysteresis	%	< 0.2	
Null shift at ΔT = 55 K	%	< 1	
Sample deviation	%	±10	
ELECTRICAL DATA			
Relative duty cycle	%	100	
Degree of protection according to EN 60529		IP 65 (with mating connectors)	
Power supply	V DC	18 to 32	
Maximum current consumption (static)	A	0.25	
Maximum current consumption (dynamic)	A	0.5	
External protection per valve	A	1 A (slow)	
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005	
Connector type		See section "Electronics"	
Control electronics		Integrated in the valve, see section "Electronics"	

[1] With integrated orifice 350 bar (5000 psi), upon request.

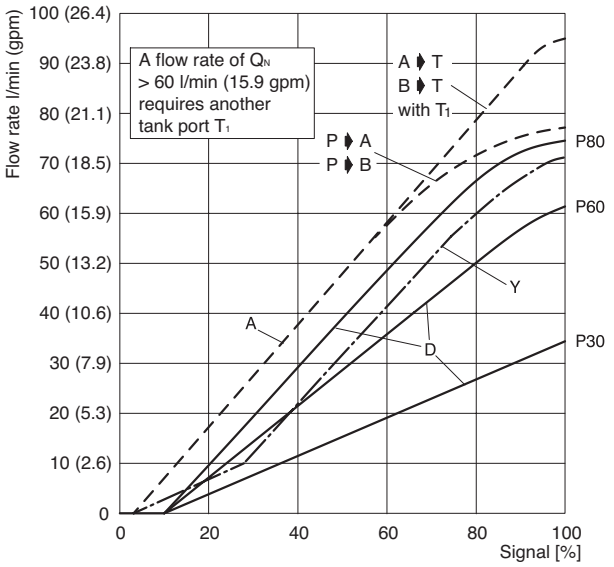
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

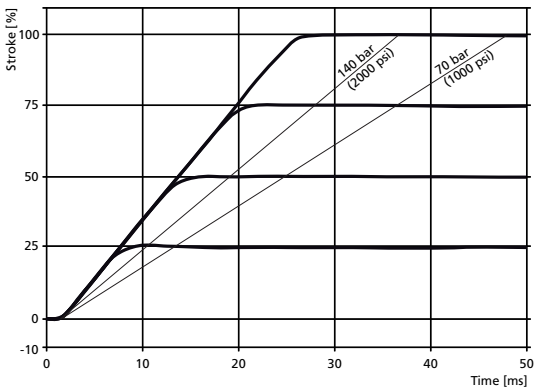
at Δp_N = 5 bar (75 psi) per land



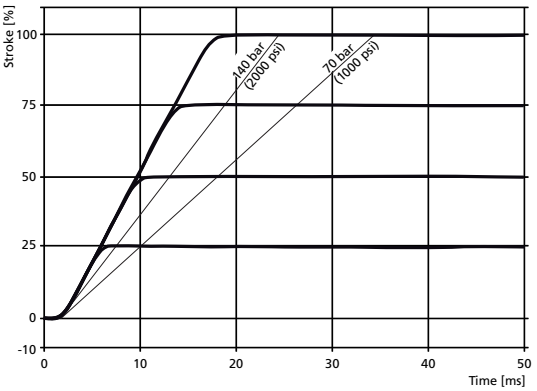
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

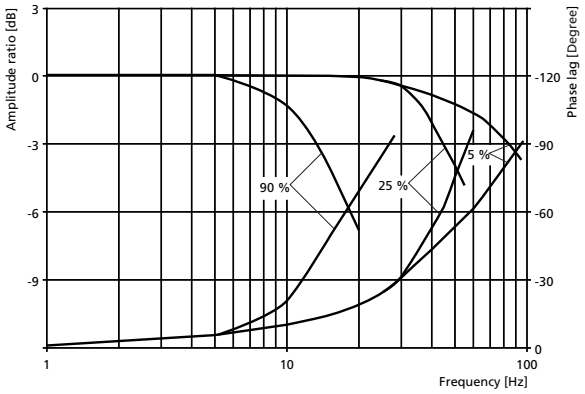
Step response
D671 with ServoJet® Pilot Valve, Standard



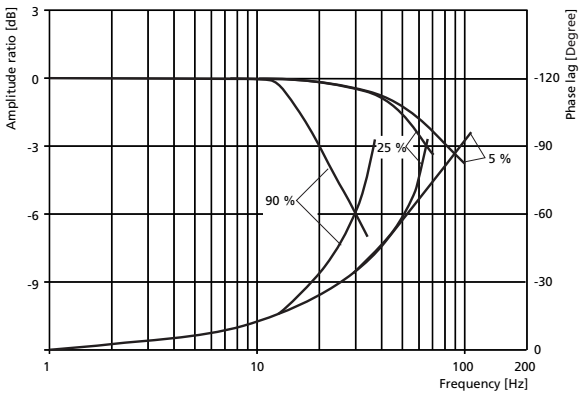
Step response
D671 with ServoJet® Pilot Valve, High Flow



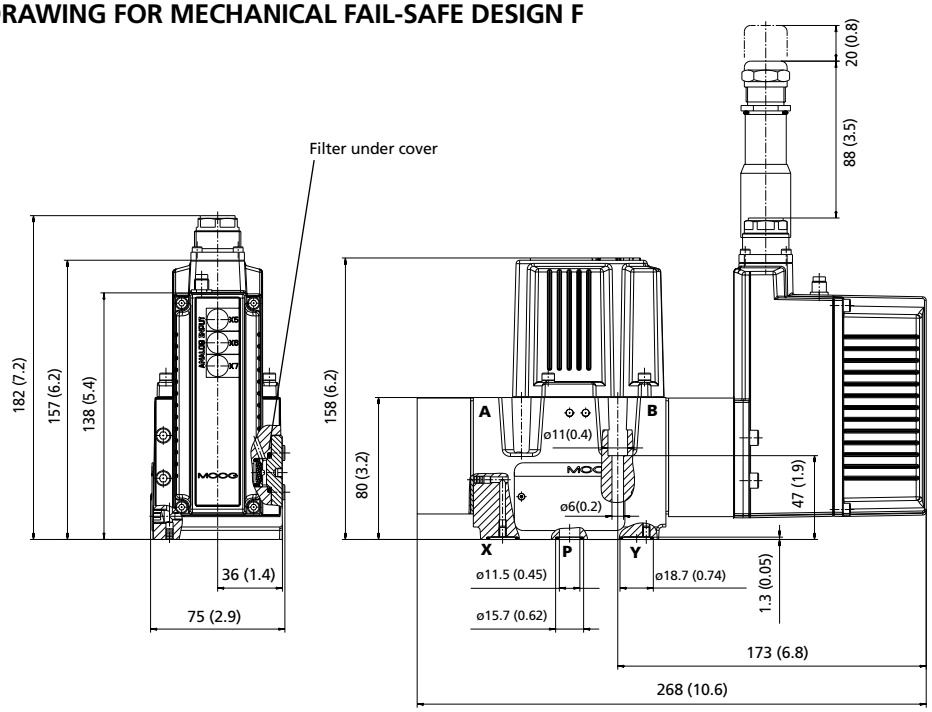
Frequency response
D671 with ServoJet® Pilot Valve, Standard



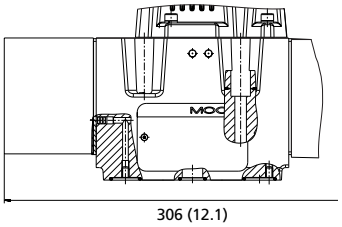
Step response
D671 with ServoJet® Pilot Valve, High Flow



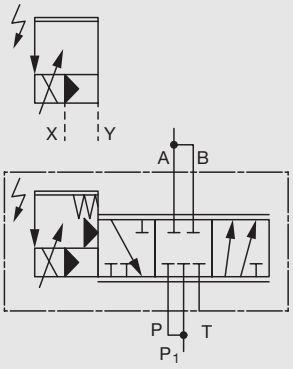
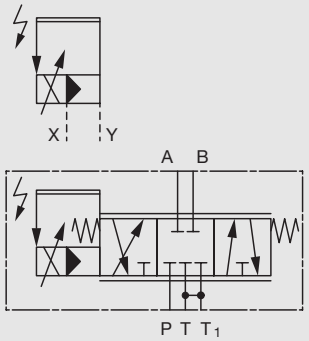
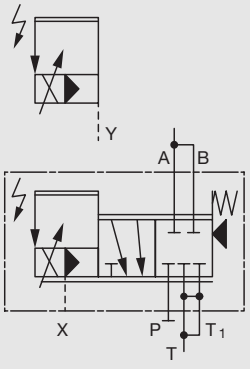
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F



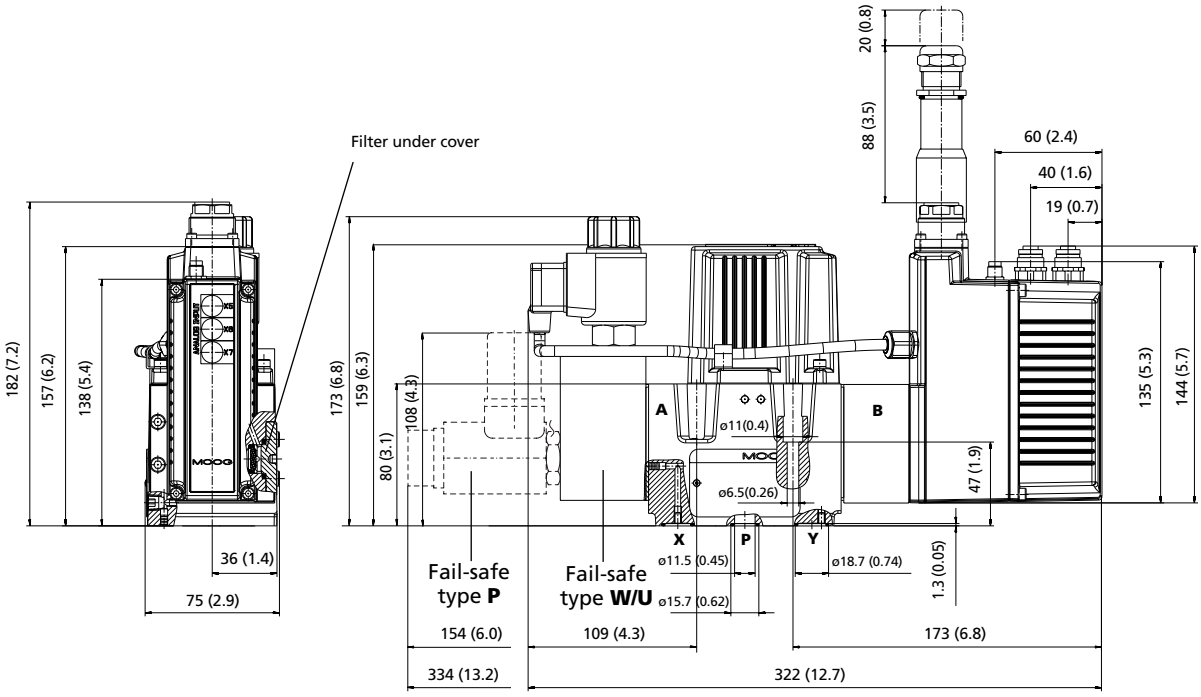
MECHANICAL FAIL-SAFE DESIGN M/D



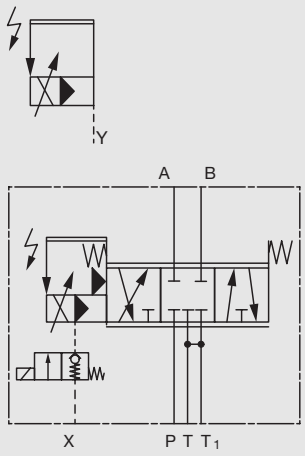
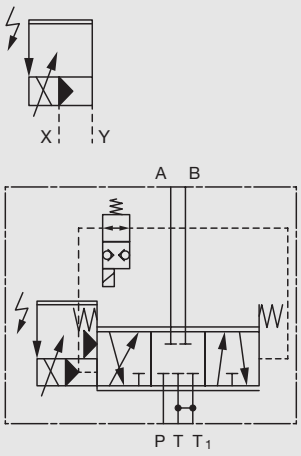
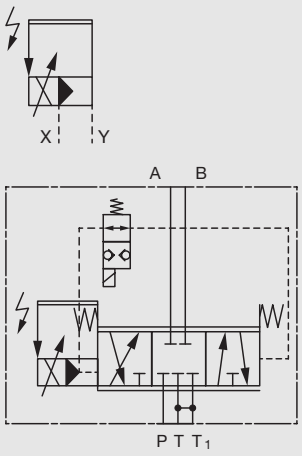
For space requirements of mating connector for various fieldbus systems see section "Electronics".
The mounting surface must conform to ISO 4401-05-05-0-05 (see subsequent section "Mounting Pattern").

Optional X and Y external "P_1" port equal to port "T_1" "P_1" does **not** conform to ISO 4401	Optional X and Y external	Optional Y external only X external
		
Fail-safe type F 5-way design port P_1 required	Fail-safe type M 4-way design a second tank port T_1 at Q_N > 60 l/min (15.9 gpm) required	Fail-safe type M 2/2-way design a second tank port T_1 required flow direction to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section "Electronics".
The mounting surface must conform to ISO 4401-05-05-0-05 (see subsequent section "Mounting Pattern").

Optional Y external only X external	Optional X and Y external	Optional X and Y external
		
Fail-safe type P 4-way design defined center position or defined A ➡T	Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position

MODEL		D671	
Valve design		Two-stage, with standard spool	
Pilot valve		Direct Drive Pilot Valve D633	
		Standard	Offset
Mounting surface		ISO 4401-05-05-0-05, with T_1	
Installation position		Any position	
Weight	kg (lb)	8.3 (18.3)	
Weight including fail-safe valve	kg (lb)	9.5 (20.9)	
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)	
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)	
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz	
Shock protection		50 g, 6 directions	
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))			
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 10 (145) above T or Y 10 (145) to 350 (5000) 70 (1000) [1]	
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 70 (1000) [1] 250 (3625)	
Maximum flow	l/min (gpm)	180 (47.6)	
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	30 (7.9) / 60 (15.9) / 80 (21.1) / 2 x 80 (21.1)	
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	1.8 (0.48)	
Pilot flow static	l/min (gpm)	0.4 (0.11)	
Pilot flow at a 100 % step	l/min (gpm)	6.0 (1.6)	6.5 (1.7)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.	
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)	
Recommended viscosity range	mm²/s (cSt)	15 to 45	
Viscosity range	mm²/s (cSt)	5 to 400	
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 18 / 15 / 12 17 / 14 / 11	
TYPICAL STATIC AND DYNAMIC DATA			
Step response time for 0 to 100 % stroke	ms	11	11
Threshold	%	< 0.05	
Hysteresis	%	< 0.2	
Null shift at ΔT = 55 K	%	< 1.5	
Sample deviation	%	±10	
ELECTRICAL DATA			
Relative duty cycle	%	100	
Degree of protection according to EN 60529		IP 65 (with mating connectors)	
Power supply	V DC	18 to 32	
Maximum current consumption (static)	A	0.3	
Maximum current consumption (dynamic)	A	1.2	
External protection per valve	A	1.6 A (slow)	
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005	
Connector type		See section "Electronics"	
Control electronics		Integrated in the valve, see section "Electronics"	

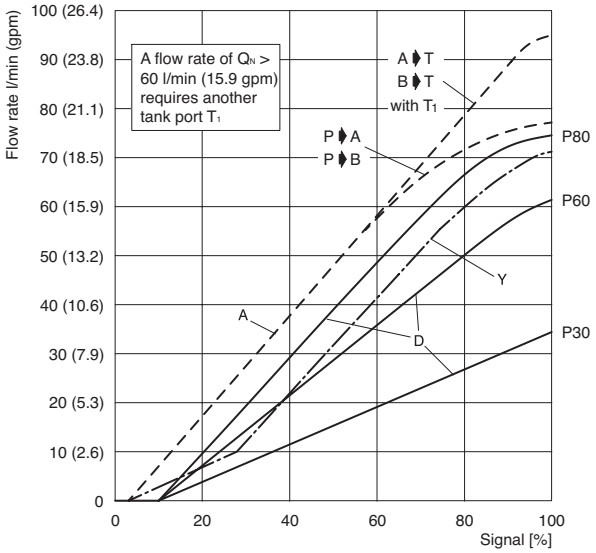
[1] Pressure peaks up to 210 bar (3000 psi) permissible.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

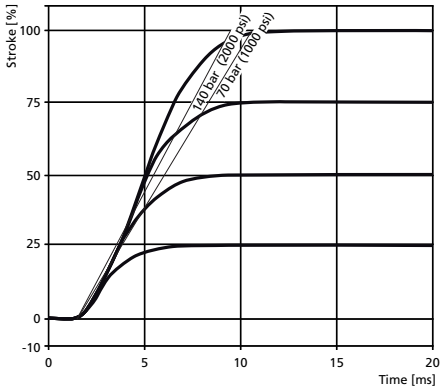
at Δp_N = 5 bar (75 psi) per land



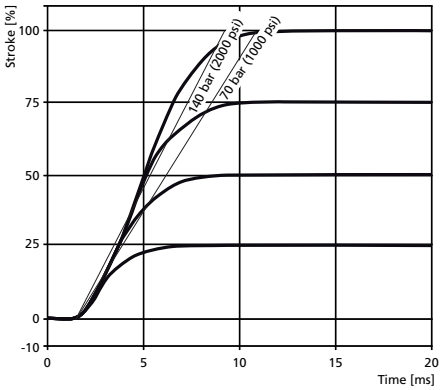
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

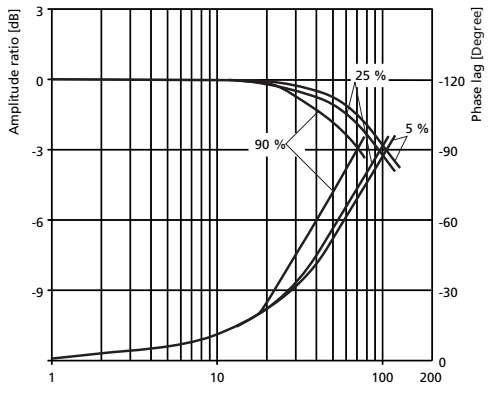
Step response
D671 with Direct Drive Pilot Valve D633, Standard



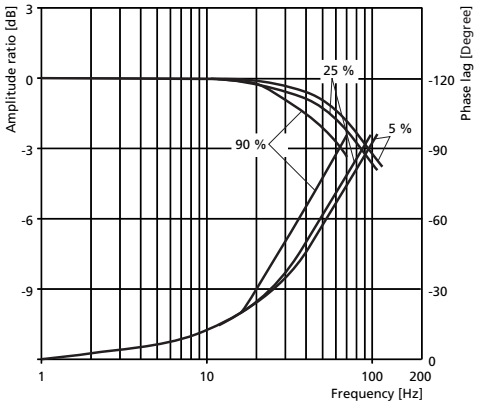
Step response
D671 with Direct Drive Pilot Valve D633, Offset



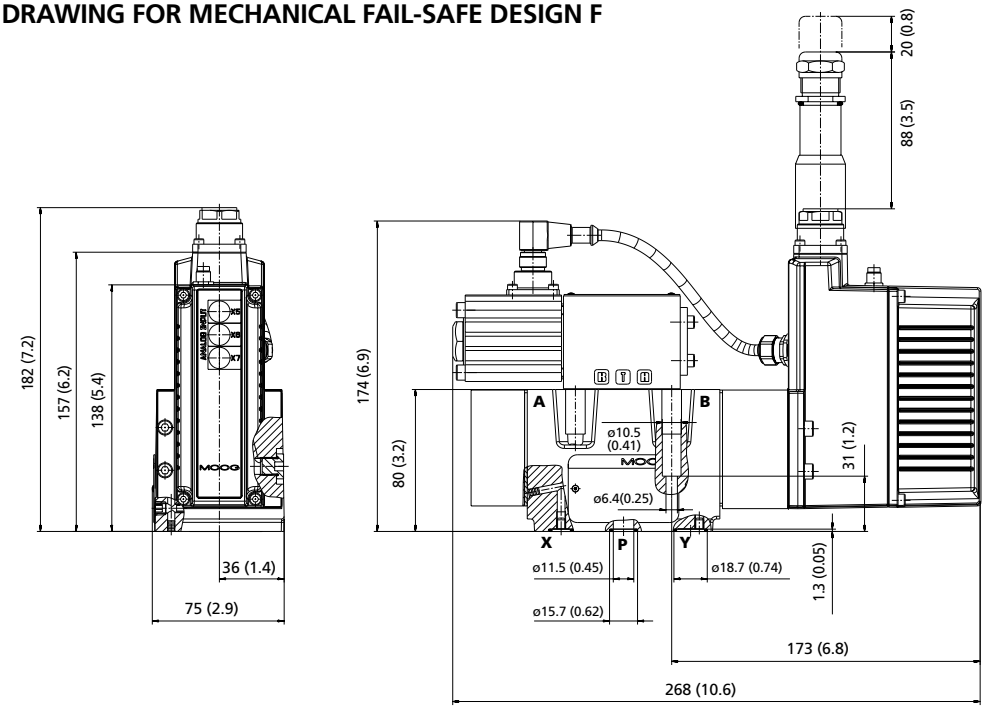
Frequency response
D671 with Direct Drive Pilot Valve D633, Standard



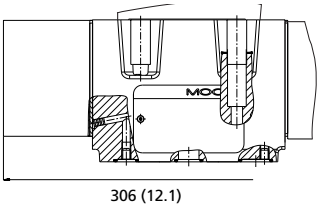
Frequency response
D671 with Direct Drive Pilot Valve D633, Offset



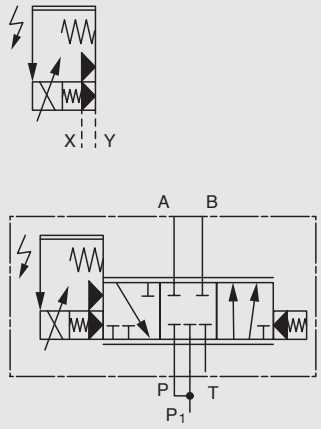
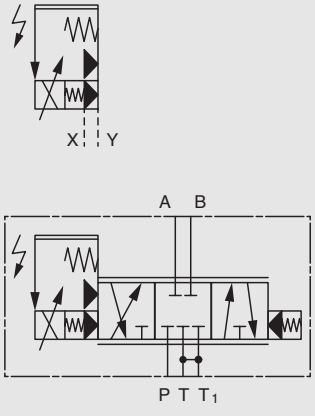
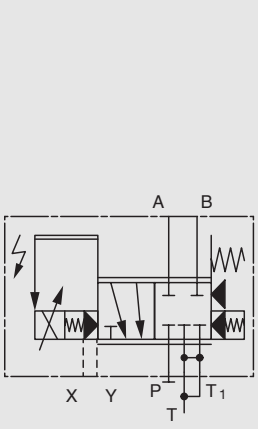
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F



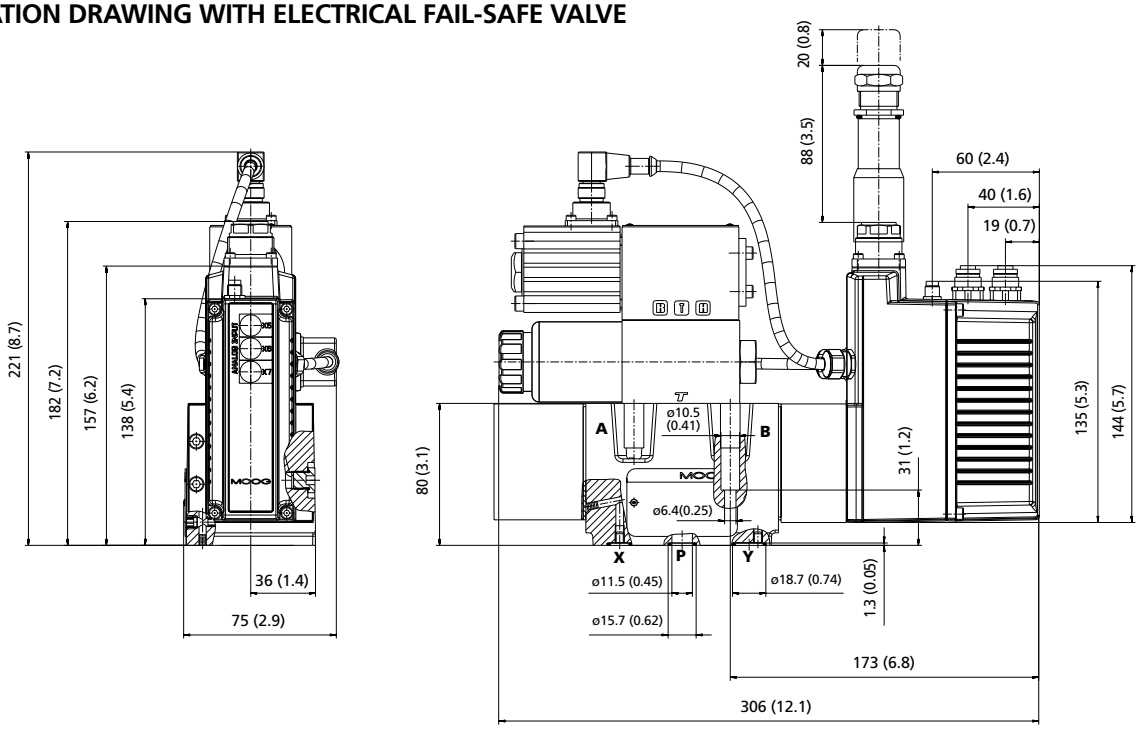
MECHANICAL FAIL-SAFE DESIGN D



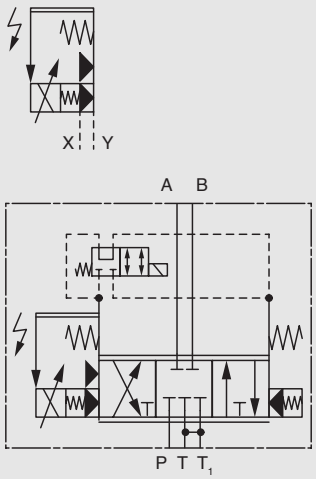
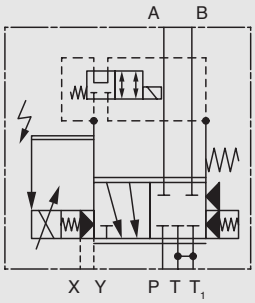
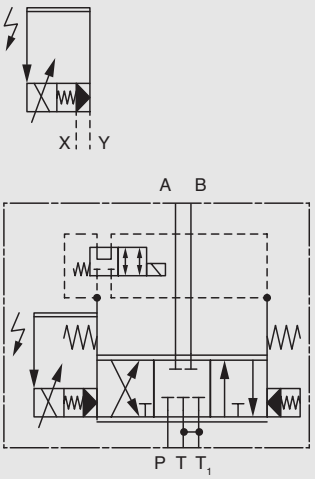
For space requirements of mating connector for various fieldbus systems see section "Electronics".
The mounting surface must conform to ISO 4401-05-05-0-05 (see subsequent section "Mounting Pattern").

Optional X and Y external "P_1" port equal to port "T_1" "P_1" does **not** conform to ISO 4401	Optional X and Y external	Only X and Y external
		
Fail-safe type F 5-way design port P_1 required	Fail-safe type F 4-way design a second tank port T_1 at Q_N= 60 l/min (15.9 gpm) required	Fail-safe type M 2/2-way design a second tank port T_1 required flow direction to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section "Electronics".
The mounting surface must conform to ISO 4401-05-05-0-05 (see subsequent section "Mounting Pattern").

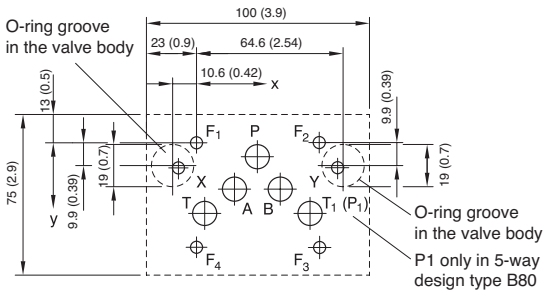
Optional X and Y external	Only X and Y external	Optional X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 2/2-way design Defined center position flow direction according to symbol	Fail-safe type W 4-way design Defined center position

Series	Part number for D671 with ServoJet® Pilot Valve		Part number for D671 with Direct Drive Pilot Valve D633	
O-ring material 85 shore	NBR	FKM	NBR	FKM
Sealing service kit for main stage with the following O-rings for P, T, T_1, A, B ID 12.4 x Ø 1.8 for X, Y ID 15.6 x Ø 1.8	B97215-N661F10 5 pieces -45122-004 2 pieces -45122-011	B97215-V661F10 5 pieces -42082-004 2 pieces -42082-011	B97215-N681-10 6 pieces -45122-004 1 piece -45122-011	B97215-V681-10 6 pieces -42082-004 1 piece -42082-011
O-ring for filter	-66117-012-020	A25163-012-020	–	–
O-ring for filter cover	B97009-080	-42082-080	–	–
Sealing service kit for pilot valve	–	–	B97215-N630F63	B97215-V630F63
Sealing service kit for fail-safe valve	–	–	B97215-N630F63	B97215-V630F63
Replaceable filter	A67999-200 (200 µm nominal)		–	
Fastening screws M6x60 ISO 4762-10.9 4 pieces M6x40 ISO 4762-10.9 4 pieces	A03665-060-060 Tightening torque 11 Nm (97 in-lbs)		A03665-060-040 Tightening torque 11 Nm (97 in-lbs)	
Flushing plates	P, A, B, T, T_1, X, Y B67728-001	P, T, T_1, X, Y B67728-002	P, T, T_1, X, Y B67728-003	
Connection plates	Upon request			
Mating connectors, waterproof IP 65 6-pole + PE EN 175201-804 [1] 11-pole + PE EN 175201-804 [2]	B97007-061 B97067-111			

[1] Cable diameter minimum 8 mm (0.31 in), maximum 12 mm (0.45 in)
[2] Cable diameter minimum 11.5 mm (0.45 in), maximum 13 mm (0.51 in)

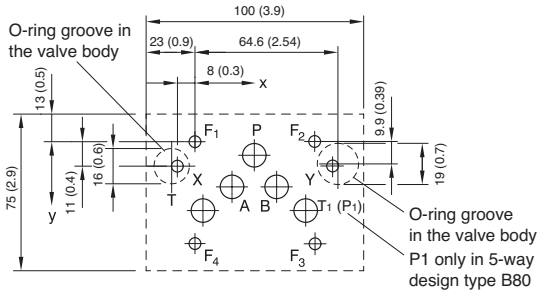
MOUNTING PATTERN VALVE WITH SERVOJET® PILOT VALVE

The mounting surface of the mounting face must comply with ISO 4401-05-05-0-05
Clamping length minimum 100 mm (3.94 in)
For valves of 4-way design with Q_N> 60 l/min (15.9 gpm) and for 2/2-way design the second tank port T_1 is required. For the 5-way design type B80... T_1 becomes P_1. For a maximum flow rate, the ports P, T, A and B to be provided with a diameter of 11.5 mm (0.45 in) (not according to standard). Flatness of mounting face < 0.01 mm (0.0004 in) per 100 mm (3.94 in), mean roughness R_a better than 0.8 µm.



[mm] ([in])	P	A	B	T	T_1	X	Y	F_1	F_2	F_3	F_4
	Ø11.5 (0.45)	Ø11.5 (0.45)	Ø11.5 (0.45)	Ø11.5 (0.45)	Ø11.5 (0.45)	Ø6.3 (0.25)	Ø6.3 (0.25)	M6	M6	M6	M6
x	27 (1.06)	16.7 (0.66)	37.3 (1.47)	3.2 (0.13)	50.8 (2.00)	-8 (-0.31)	62 (2.44)	0	54 (2.13)	54 (2.13)	0
y	6.3 (0.25)	21.4 (0.84)	21.4 (0.84)	32.5 (1.28)	32.5 (1.28)	11 (0.43)	11 (0.43)	0	0	46 (1.81)	46 (1.81)

MOUNTING PATTERN VALVE WITH DIRECT DRIVE PILOT VALVE D633



MODEL		D672	
Valve design		Two-stage, with stub shaft spool	
Pilot valve		ServoJet®	
		Standard	High Flow
Mounting surface		ISO 4401-07-07-0-05	
Installation position		Any position	
Weight	kg (lb)	12.5 (27.6)	
Weight including fail-safe valve	kg (lb)	14 (30.9)	
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)	
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)	
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz	
Shock protection		50 g, 6 directions	
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))			
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)	
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)	
Maximum flow	l/min (gpm)	600 (158)	
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	150 (39.6) / 250 (66.1)	
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	2.5 (0.67)	
Pilot flow static	l/min (gpm)	1.7 (0.45)	2.6 (0.69)
Pilot flow at a 100 % step	l/min (gpm)	1.7 (0.45)	2.6 (0.69)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.	
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)	
Recommended viscosity range	mm²/s (cSt)	15 to 45	
Viscosity range	mm²/s (cSt)	5 to 400	
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11	
TYPICAL STATIC AND DYNAMIC DATA			
Step response time for 0 to 100 % stroke	ms	44	28
Threshold	%	< 0.1	
Hysteresis	%	< 0.2	
Null shift at ΔT = 55 K	%	< 1	
Sample deviation	%	±10	
ELECTRICAL DATA			
Relative duty cycle	%	100	
Degree of protection according to EN 60529		IP 65 (with mating connectors)	
Power supply	V DC	18 to 32	
Maximum current consumption (static)	A	0.25	
Maximum current consumption (dynamic)	A	0.5	
External protection per valve	A	1 A (slow)	
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005	
Connector type		See section "Electronics"	
Control electronics		Integrated in the valve, see section "Electronics"	

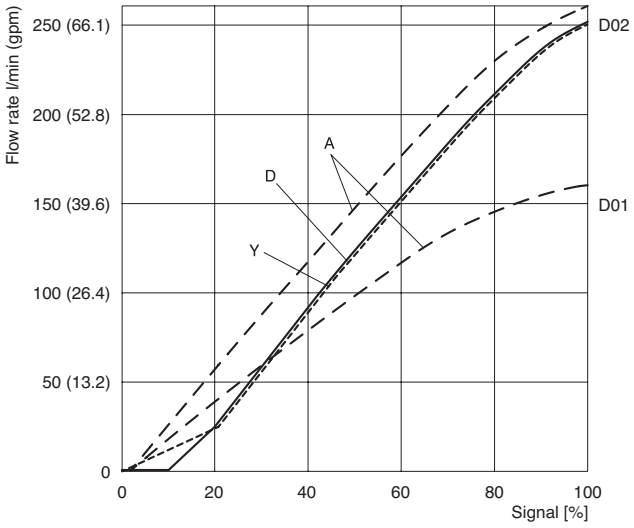
[1] With integrated orifice 350 bar (5000 psi), upon request.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

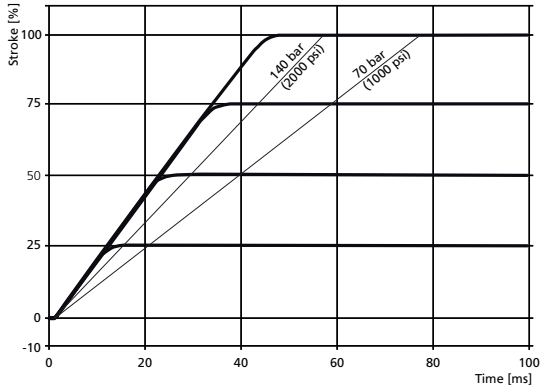
at Δp_N = 5 bar (75 psi) per land



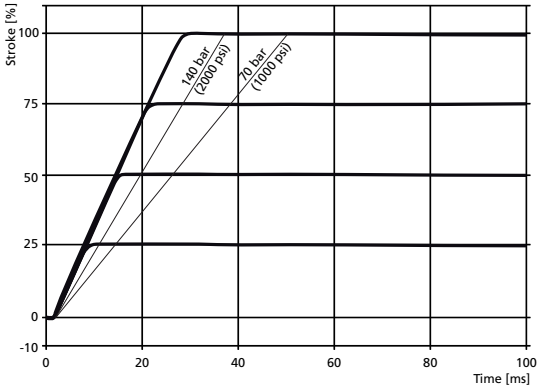
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

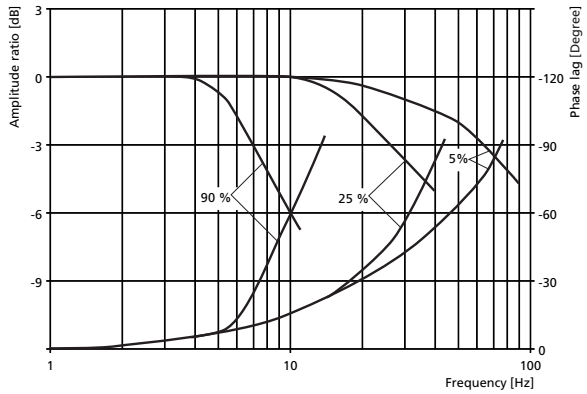
Step response
D672 with ServoJet® Pilot Valve, Standard



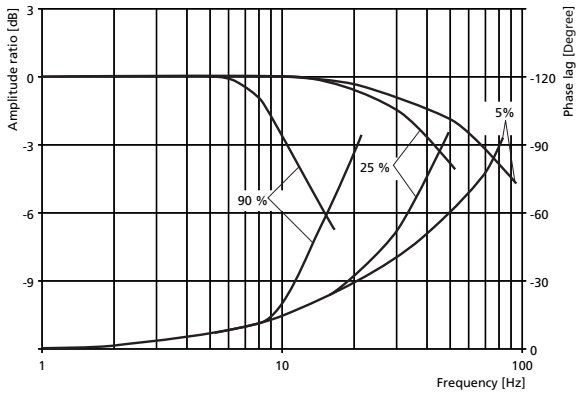
Step response
D672 with ServoJet® Pilot Valve, High Flow



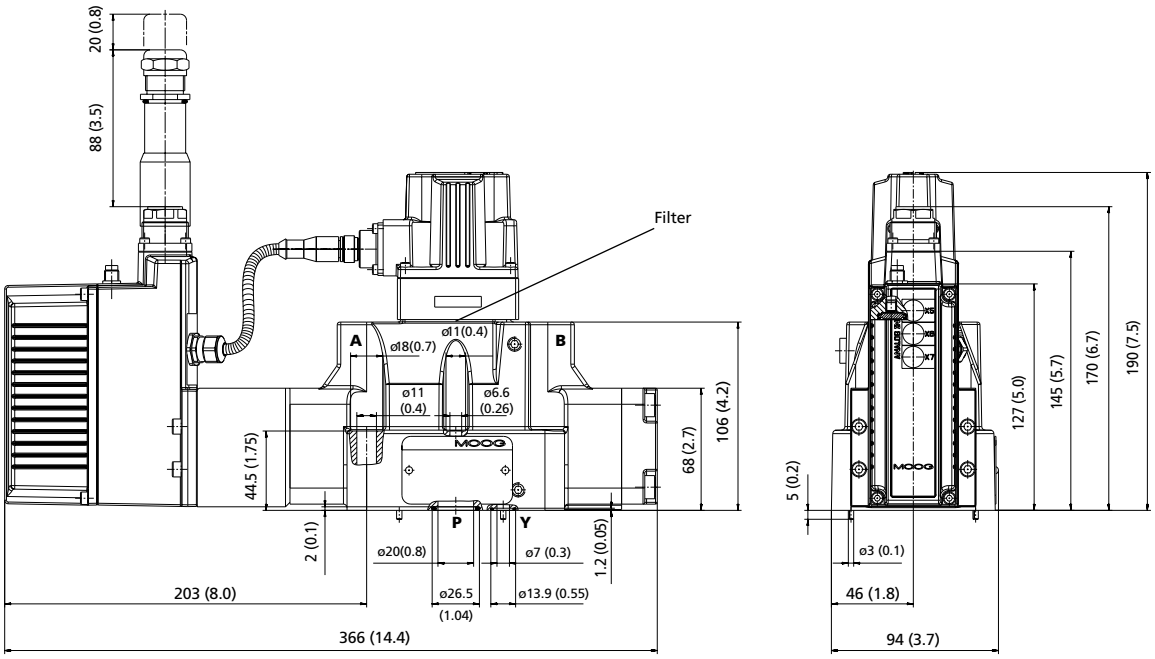
Frequency response
D672 with ServoJet® Pilot Valve, Standard



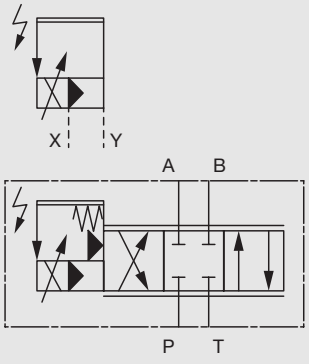
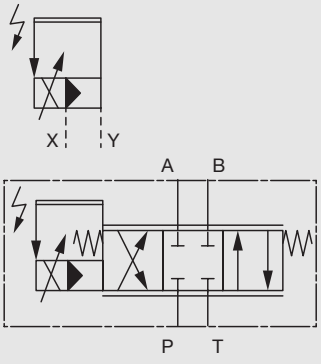
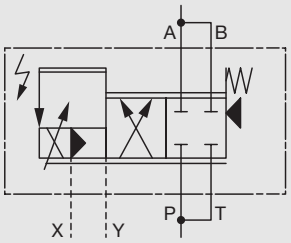
Frequency response
D672 with ServoJet® Pilot Valve, High Flow



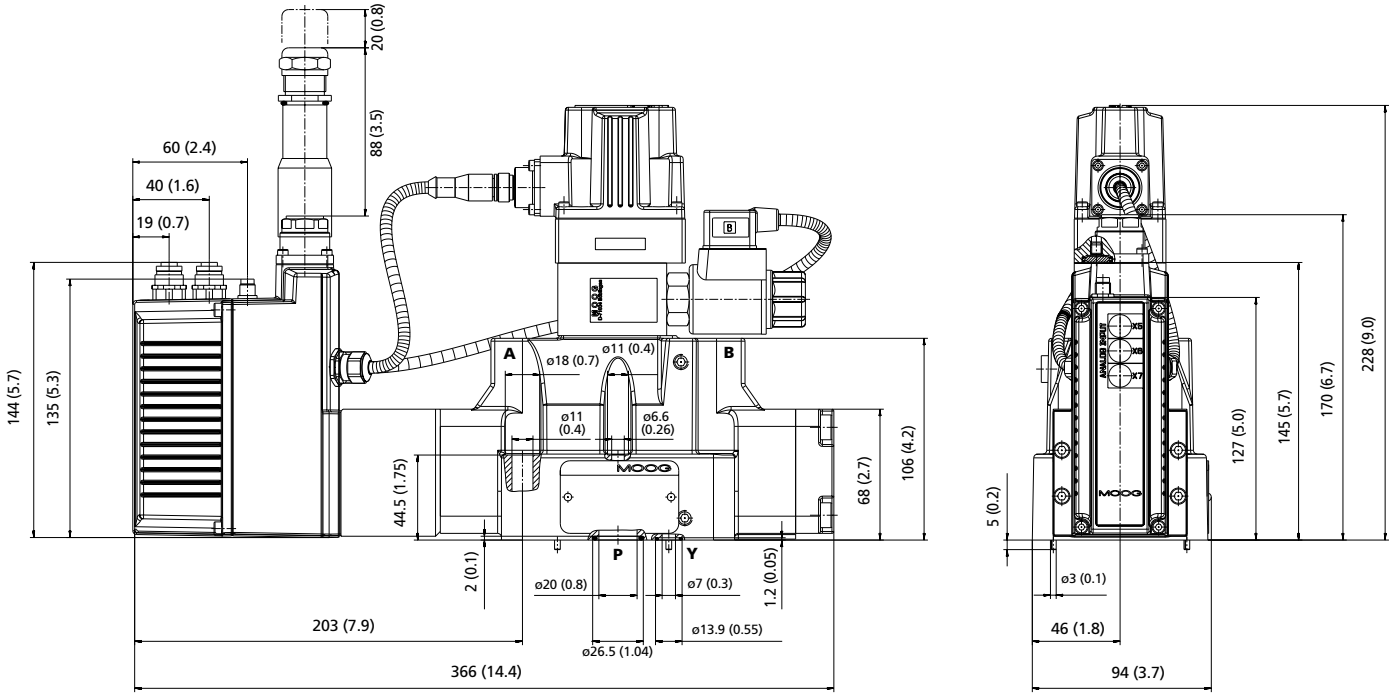
INSTALLATION DRAWING WITH MECHANICAL FAIL-SAFE DESIGN F, M AND D



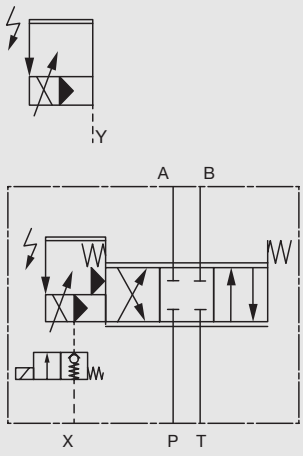
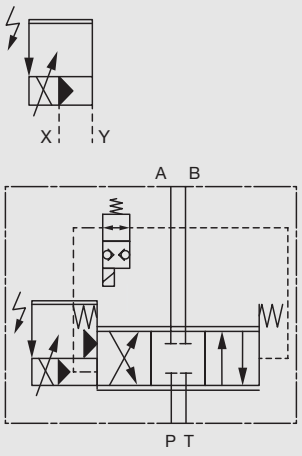
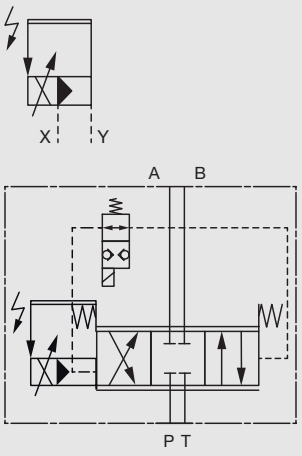
For space requirements of mating connector for various fieldbus systems see section "Electronics".
The mounting surface must conform to ISO 4401-07-07-0-05 (see subsequent section "Mounting Pattern").

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type F 4-way design	Fail-safe type M 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section "Electronics".
The mounting surface must conform to ISO 4401-07-07-0-05 (see subsequent section "Mounting Pattern").

Optional Y external only X external	Optional X and Y external	Optional X and Y external
		
Fail-safe type P 4-way design Defined center position or defined A ➡T	Fail-safe type U 4-way design Defined center position or defined A ➡T	Fail-safe type W 4-way design Defined center position

MODEL		D672
Valve design		Three-stage, with standard spool
Pilot valve		Two-stage ServoJet® Pilot Valve D670
Mounting surface		ISO 4401-0-07-0-05
Installation position		Any position
Weight	kg (lb)	13.5 (29.8)
Weight including fail-safe valve	kg (lb)	15 (33.1)
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz
Shock protection		50 g, 6 directions
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))		
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)
Maximum flow	l/min (gpm)	600 (158)
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	150 (39.6) / 250 (66.1)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	2.5 (0.67)
Pilot flow static	l/min (gpm)	1.0 (0.26)
Pilot flow at a 100 % step	l/min (gpm)	35 (9.2)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)
Recommended viscosity range	mm²/s (cSt)	15 to 45
Viscosity range	mm²/s (cSt)	5 to 400
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11
TYPICAL STATIC AND DYNAMIC DATA		
Step response time for 0 to 100 % stroke	ms	10
Threshold	%	< 0.1
Hysteresis	%	< 0.2
Null shift at ΔT = 55 K	%	< 1.5
Sample deviation	%	±10
ELECTRICAL DATA		
Relative duty cycle	%	100
Degree of protection according to EN 60529		IP 65 (with mating connectors)
Power supply	V DC	18 to 32
Maximum current consumption (static)	A	0.25
Maximum current consumption (dynamic)	A	2.1
External protection per valve	A	2.5 A (slow)
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005
Connector type		See section "Electronics"
Control electronics		Integrated in the valve, see section "Electronics"

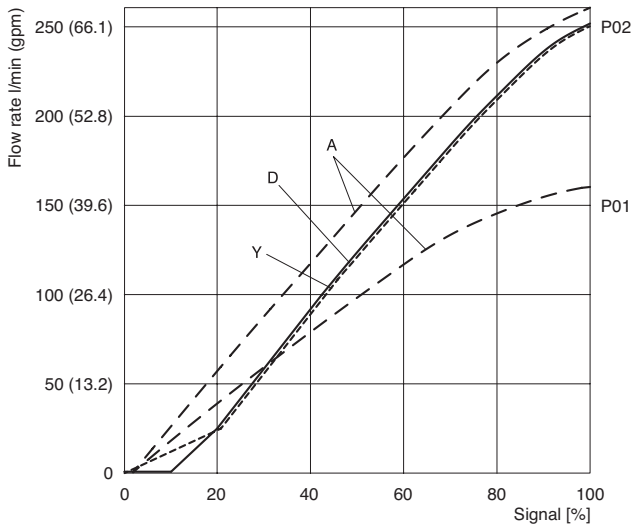
1) With integrated restrictor 350 bar (5000 psi), upon request.
2) The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

at Δp_N = 5 bar (75 psi) per land

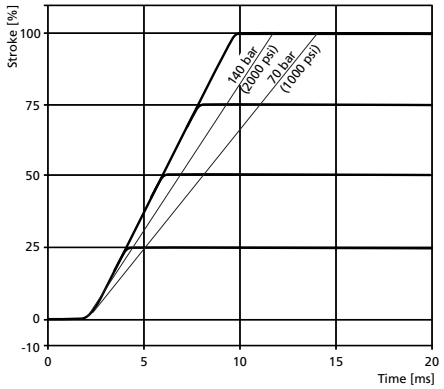


Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

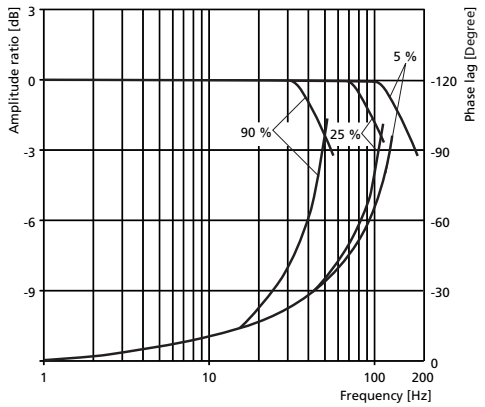
Step response

D672 with two-stage ServoJet® Pilot Valve D670

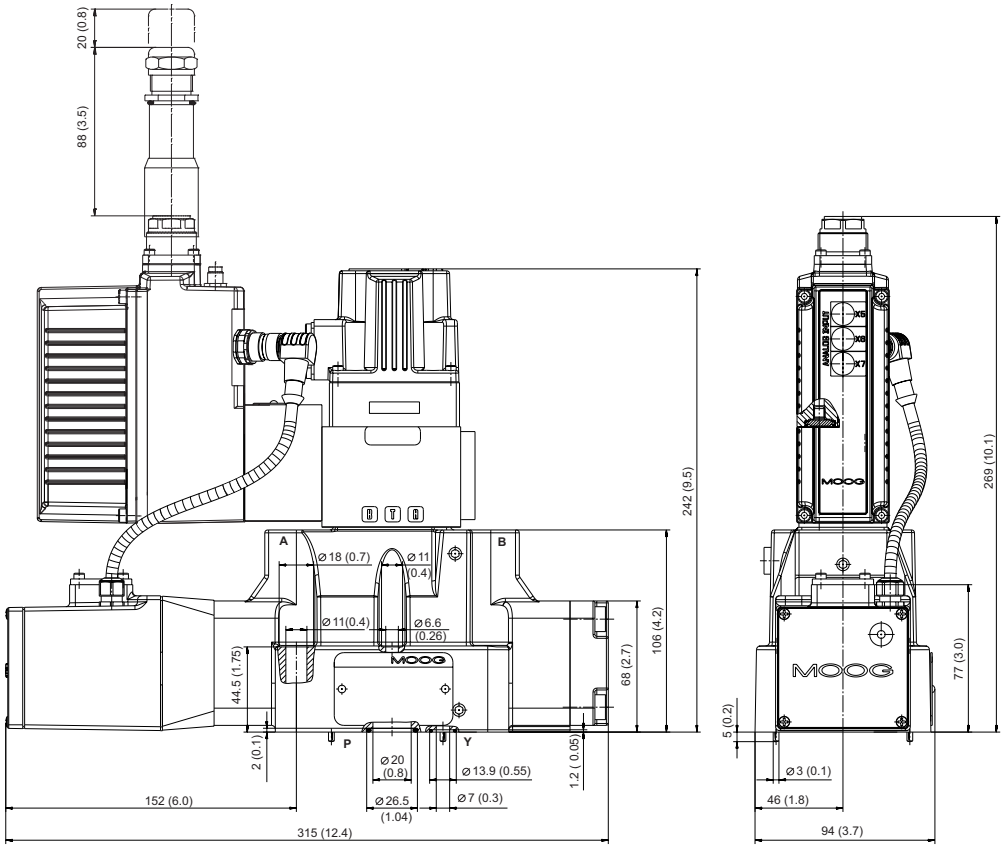


Frequency response

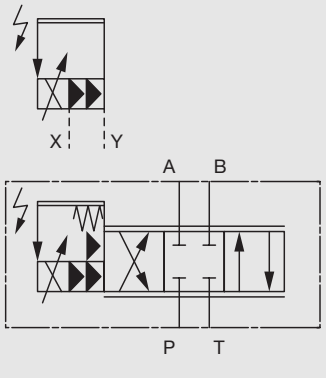
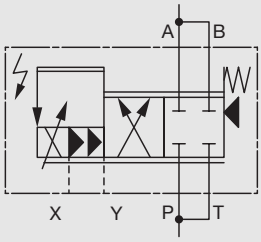
D672 with two-stage ServoJet® Pilot Valve D670



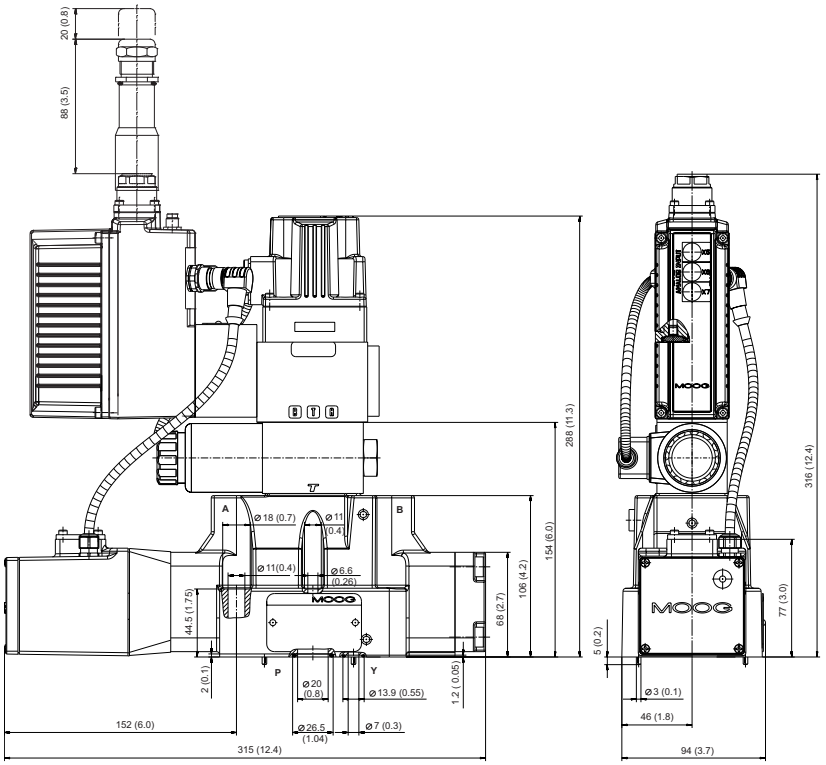
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



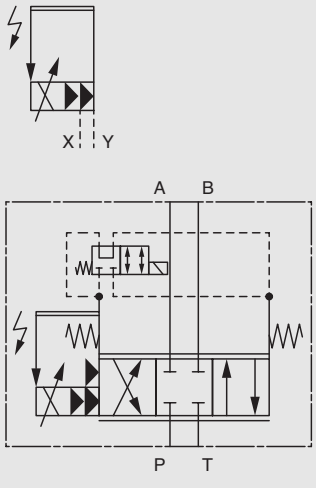
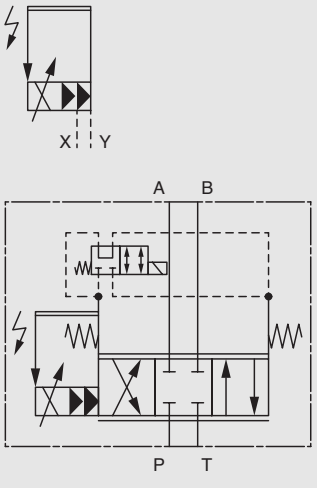
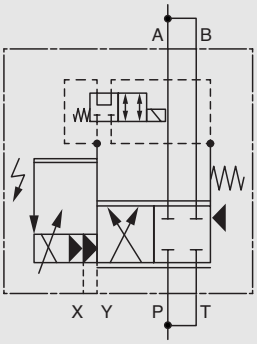
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-07-07-0-05 subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-07-07-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

MODEL		D672	
Valve design		Two-stage, with standard spool	
Pilot valve		Direct Drive Pilot Valve D633	
		Standard	Offset
Mounting surface		ISO 4401-07-07-0-05	
Installation position		Any position	
Weight	kg (lb)	13.5 (29.8)	
Weight including fail-safe valve	kg (lb)	15 (33.1)	
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)	
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)	
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz	
Shock protection		50 g, 6 directions	
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))			
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 10 (145) above T or Y 10 (145) to 350 (5000) 70 (1000) [1]	
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 70 (1000) [1] 350 (5000)	
Maximum flow	l/min (gpm)	600 (158)	
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	150 (39.6) / 250 (66.1)	
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	2.5 (0.66)	
Pilot flow static	l/min (gpm)	0.5 (0.13)	
Pilot flow at a 100 % step	l/min (gpm)	35 (9.2)	26 (6.9)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.	
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)	
Recommended viscosity range	mm²/s (cSt)	15 to 45	
Viscosity range	mm²/s (cSt)	5 to 400	
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 18 / 15 / 12 17 / 14 / 11	
TYPICAL STATIC AND DYNAMIC DATA			
Step response time for 0 to 100 % stroke	ms	11	13
Threshold	%	< 0.1	
Hysteresis	%	< 0.2	
Null shift at ΔT = 55 K	%	< 1	
Sample deviation	%	±10	
ELECTRICAL DATA			
Relative duty cycle	%	100	
Degree of protection according to EN 60529		IP 65 (with mating connectors)	
Power supply	V DC	18 to 32	
Maximum current consumption (static)	A	0.3	
Maximum current consumption (dynamic)	A	1.2	
External protection per valve	A	1.6 A (slow)	
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005	
Connector type		See section "Electronics"	
Control electronics		Integrated in the valve, see section "Electronics"	

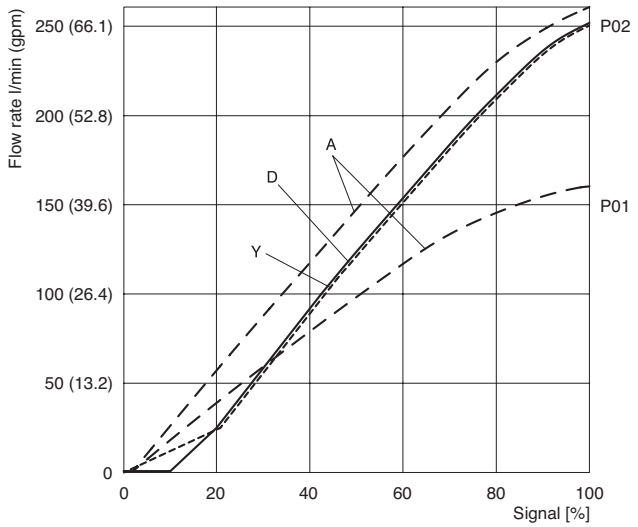
1) Pressure peaks up to 210 bar (3000 psi) permissible.
2) The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

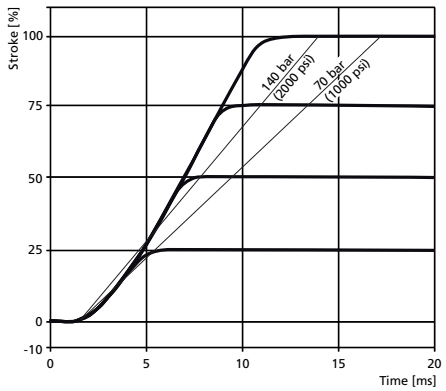
at Δp_N = 5 bar (75 psi) per land



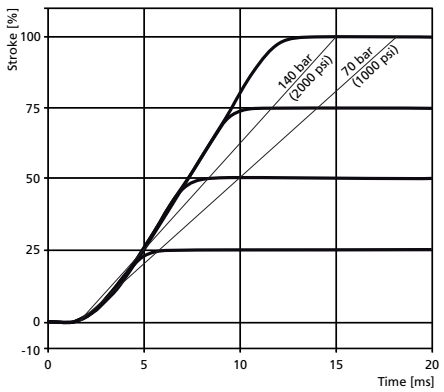
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

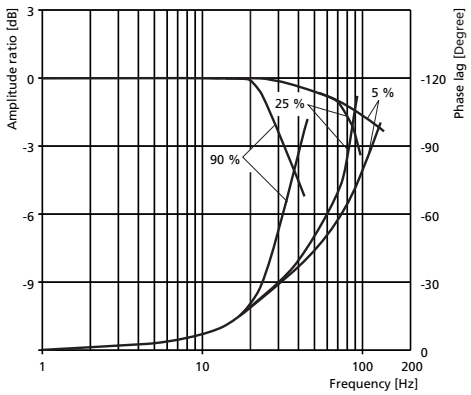
Step response
D672 with Direct Drive Pilot Valve D633, Standard



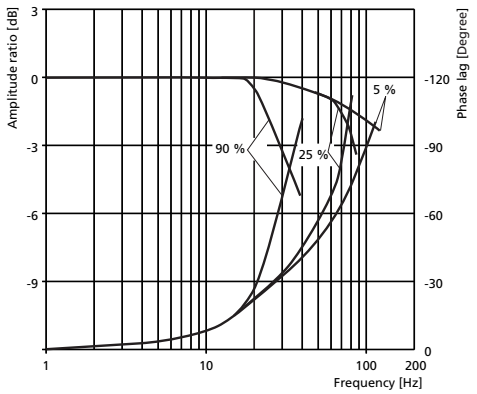
Step response
D672 with Direct Drive Pilot Valve D633, Offset



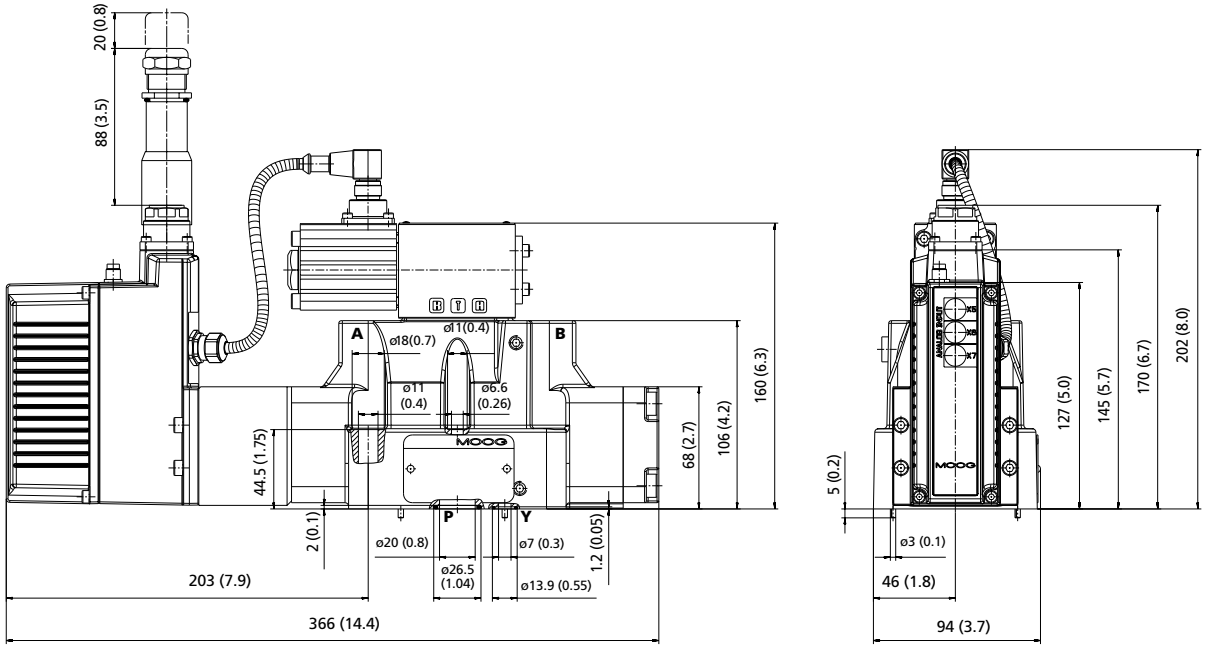
Frequency response
D672 with Direct Drive Pilot Valve D633, Standard



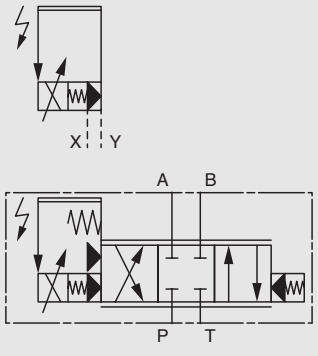
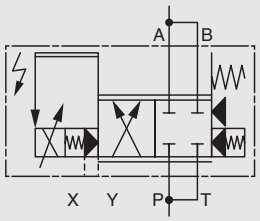
Frequency response
D672 with Direct Drive Pilot Valve D633, Offset



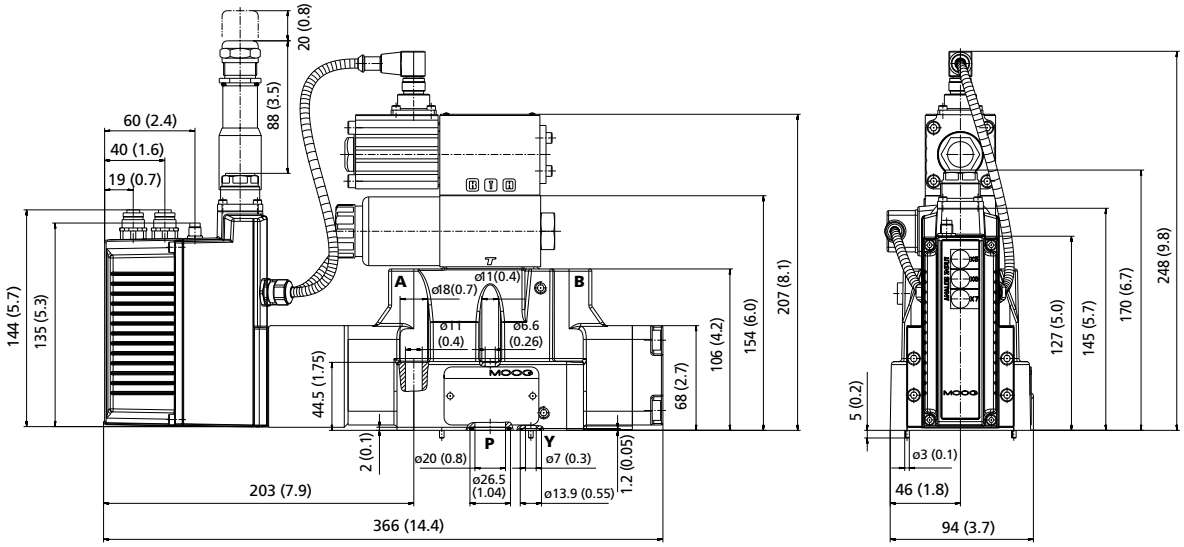
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



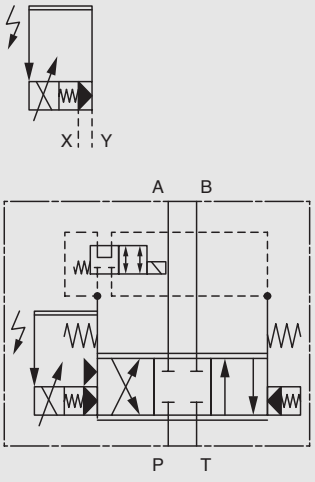
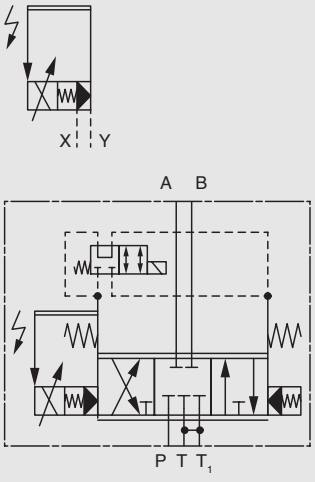
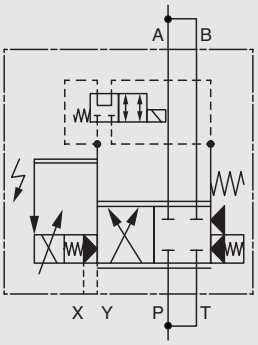
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-07-07-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-07-07-0-05 (see subsequent section “Mounting Pattern”).

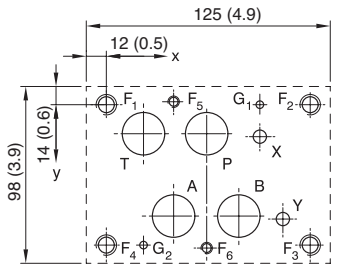
Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

Series	Part number for D672 with ServoJet® Pilot Valve		Part number forD672 with two-stage ServoJet® Pilot Valve D670 and with Direct Drive Pilot Valve D633 respectively	
O-ring material 85 shore	NBR	FKM	NBR	FKM
Sealing service kit for main stage with the following O-rings for P, T, A, B ID 21.89 x Ø 2.6 for X, Y ID 10.82 x Ø 1.8	B97215-N6X2-16 4 pieces -45122-129 2 pieces -45122-022	B97215-V6X2-16 4 pieces -42082-129 2 pieces -42082-022	B97215-N6X2-16 4 pieces -45122-129 2 pieces -45122-022	B97215-V6X2-16 4 pieces -42082-129 2 pieces -42082-022
Sealing service kit for pilot valve	B97215-H618-06	B97215-V618-06	B97215-N630F63	B97215-V630F63
Sealing service kit for fail-safe valve	B97215-N630F63	B97215-V630F63	B97215-N630F63	B97215-V630F63
Replaceable filter	A67999-200 (200 µm nominal)		–	
Fastening screws M10x60 ISO 4762-10.9 4 pieces M6x55 ISO 4762-10.9 2 pieces	A03665-100-060 Tightening torque 54 Nm (40 ft-lbs) A03665-060-055 Tightening torque 11 Nm (97.4 in-lbs)			
Flushing plate	-76741			
Connection plate	B46891-001			
Mating connectors, waterproof IP 65 6-pole + PE EN 175201-804 [1] 11-pole + PE EN 175201-804 [2]	 B97007-061 B97067-111			

[1] Cable diameter minimum 8 mm (0.31 in), maximum 12 mm (0.45 in)
[2] Cable diameter minimum 11.5 mm (0.45 in), maximum 13 mm (0.51 in)

MOUNTING PATTERN VALVE WITH SERVOJET® PILOT VALVE, SERVOJET® PILOT VALVE D670 AND DIRECT DRIVE PILOT VALVE D633

The mounting surface of the mounting face must comply with ISO 4401-07-07-0-05
For a maximum flow rate, the ports P, T, A and B should be provided with a diameter of Ø 20 mm (0.8 in) (not according to standard).
Flatness of mounting face < 0.01 mm (0.0004 in) per 100 mm (3.94 in), mean roughness R_a better than 0.8 µm



[mm] ([in])	P	A	T	B	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
	Ø20 (0.79)	Ø20 (0.79)	Ø20 (0.79)	Ø20 (0.79)	Ø6.3 (0.25)	Ø6.3 (0.25)	Ø4 (0.16)	Ø4 (0.16)	M10	M10	M10	M10	M6	M6
x	50 (1.97)	34.1 (1.34)	18.3 (0.72)	65.9 (2.59)	76.6 (3.02)	88.1 (3.47)	76.6 (3.02)	18.3 (0.72)	0	101.6 (4.00)	101.6 (4.00)	0	34.1 (1.34)	50 (1.97)
y	14.3 (0.56)	55.6 (2.19)	14.3 (0.56)	55.6 (2.19)	15.9 (0.63)	57.2 (2.25)	0	69.9 (2.75)	0	0	69.9 (2.75)	69.9 (2.75)	-1.6 (-0.06)	71.5 (2.81)

MODEL		D673
Valve design		Two-stage, with stub shaft spool
Pilot valve		ServoJet® Pilot Valve High Flow
Mounting surface		ISO 4401-08-08-0-05
Installation position		Any position
Weight	kg (lb)	20.5 (45.2)
Weight including fail-safe valve	kg (lb)	22 (48.5)
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz
Shock protection		50 g, 6 directions
HYDRAULIC DATA (measured at 210 bar (3150 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))		
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)
Maximum flow	l/min (gpm)	1500 (396)
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	350 (92.5)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	3.0 (0.79)
Pilot flow static	l/min (gpm)	2.6 (0.69)
Pilot flow at a 100 % step	l/min (gpm)	2.6 (0.69)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)
Recommended viscosity range	mm²/s (cSt)	15 to 45
Viscosity range	mm²/s (cSt)	5 to 400
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11
TYPICAL STATIC AND DYNAMIC DATA		
Step response time for 0 to 100 % stroke	ms	33
Threshold	%	< 0.1
Hysteresis	%	< 0.2
Null shift at ΔT = 55 K	%	< 1
Sample deviation	%	±10
ELECTRICAL DATA		
Relative duty cycle	%	100
Degree of protection according to EN 60529		IP 65 (with mating connectors)
Power supply	V DC	18 to 32
Maximum current consumption (static)	A	0.25
Maximum current consumption (dynamic)	A	0.5
External protection per valve	A	1 A (slow)
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005
Connector type		See section "Electronics"
Control electronics		Integrated in the valve, see section "Electronics"

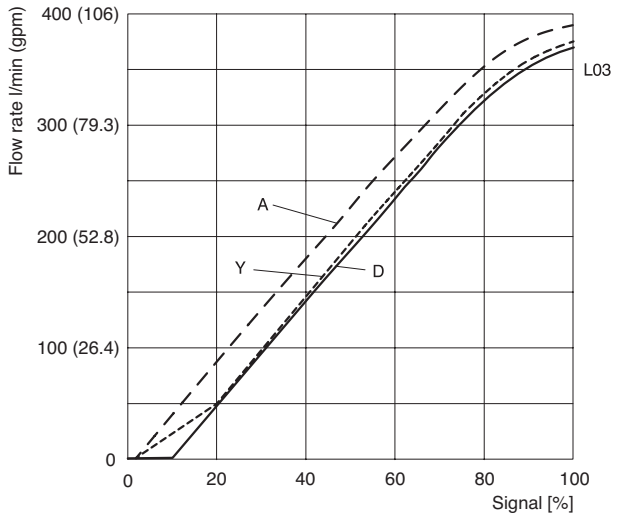
[1] With integrated restrictor 350 bar (5000 psi), upon request.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

at Δp_N = 5 bar (75 psi) per land

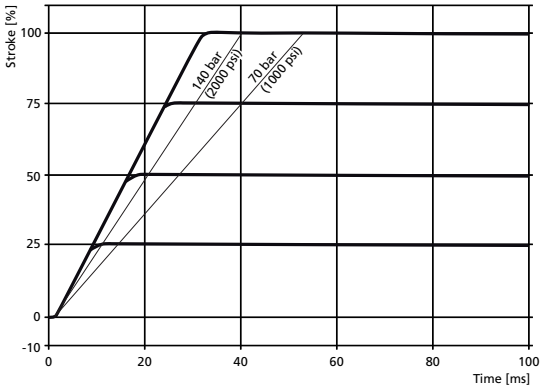


Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

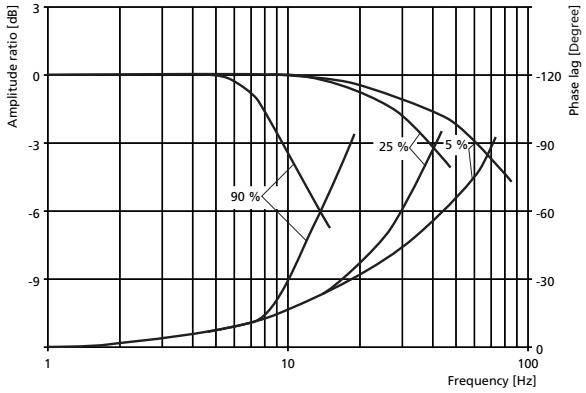
Step response

D673 with ServoJet® Pilot Valve, High Flow

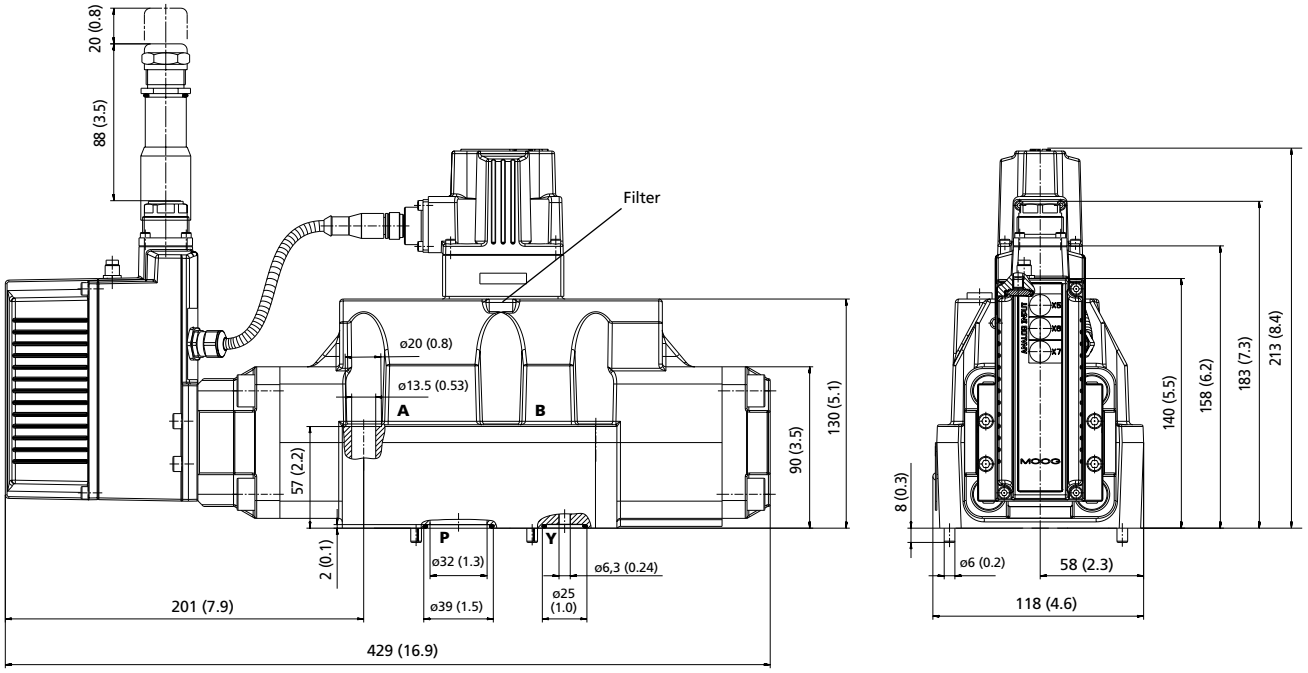


Frequency response

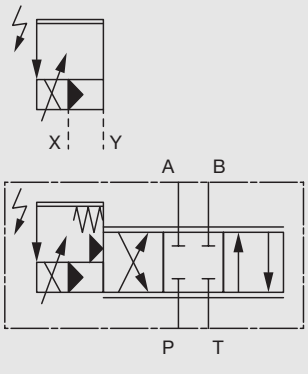
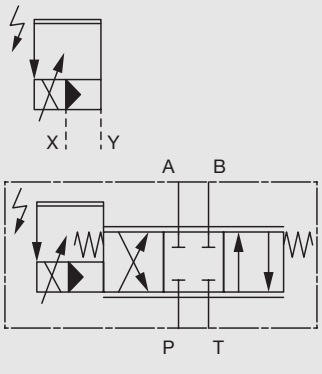
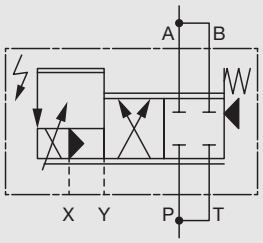
D673 with ServoJet® Pilot Valve, High Flow



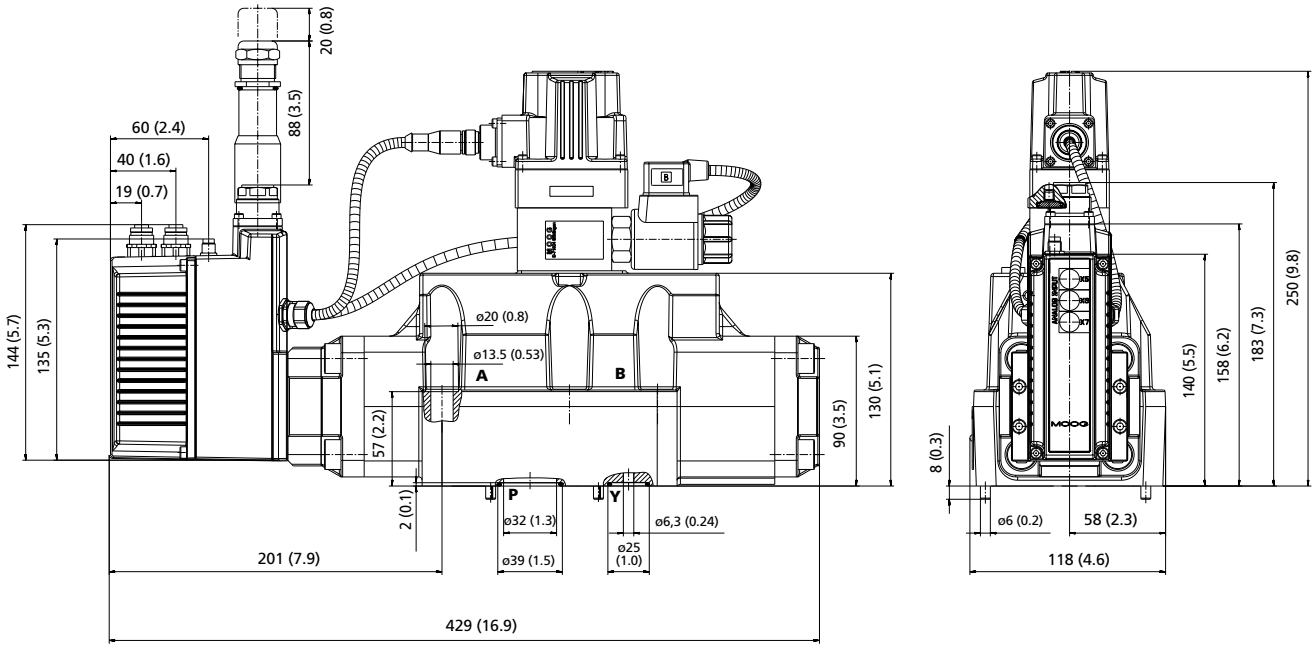
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F, M AND D



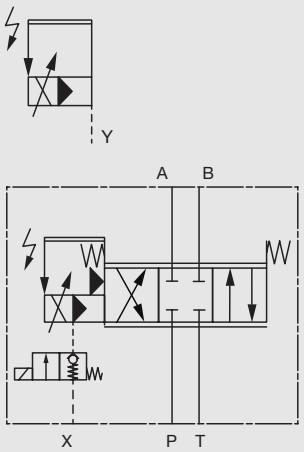
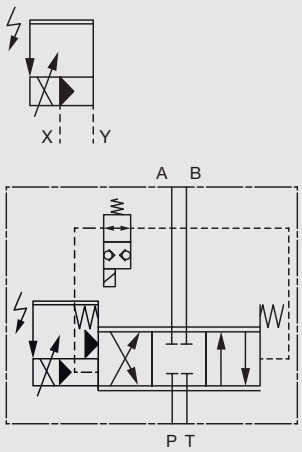
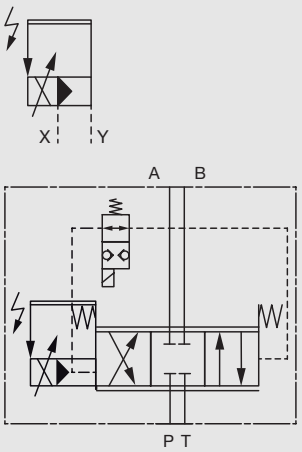
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type F 4-way design	Fail-safe type M 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional Y external only X external	Optional X and Y external	Optional X and Y external
		
Fail-safe type P 4-way design defined center position or defined A ➡T	Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position

MODEL		D673
Valve design		Three-stage, with standard spool
Pilot valve		Two-stage ServoJet® Pilot Valve D670
Mounting surface		ISO 4401-08-08-0-05
Installation position		Any position
Weight	kg (lb)	21.5 (47.4)
Weight including fail-safe valve	kg (lb)	23 (50.8)
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz
Shock protection		50 g, 6 directions
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))		
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)
Maximum flow	l/min (gpm)	1500 (396)
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	350 (92.5)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	3 (0.79)
Pilot flow static	l/min (gpm)	1.0 (0.26)
Pilot flow at a 100 % step	l/min (gpm)	50 (13.2)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)
Recommended viscosity range	mm²/s (cSt)	15 to 45
Viscosity range	mm²/s (cSt)	5 to 400
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11
TYPICAL STATIC AND DYNAMIC DATA		
Step response time for 0 to 100 % stroke	ms	13
Threshold	%	< 0.1
Hysteresis	%	< 0.2
Null shift at ΔT = 55 K	%	< 1.5
Sample deviation	%	±10
ELECTRICAL DATA		
Relative duty cycle	%	100
Degree of protection according to EN 60529		IP 65 (with mating connectors)
Power supply	V DC	18 to 32
Maximum current consumption (static)	A	0.25
Maximum current consumption (dynamic)	A	2.1
External protection per valve	A	2.5 A (slow)
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005
Connector type		See section "Electronics"
Control electronics		Integrated in the valve, see section "Electronics"

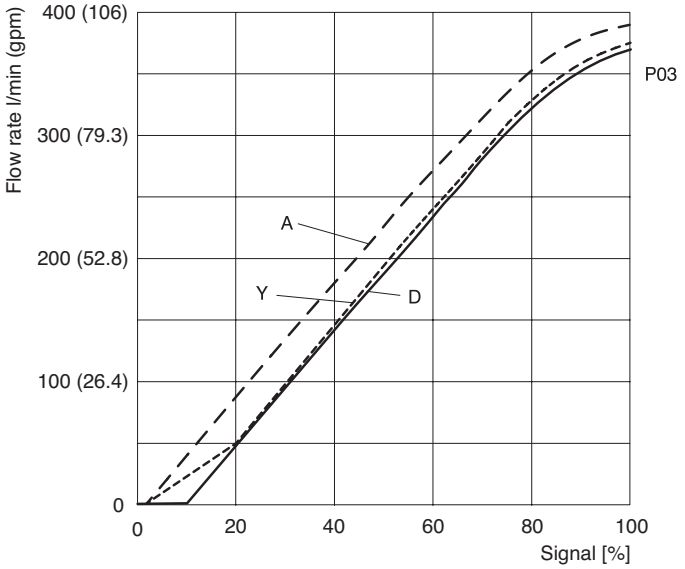
[1] With integrated restrictor 350 bar (5000 psi), upon request.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

at Δp_N = 5 bar (75 psi) per land

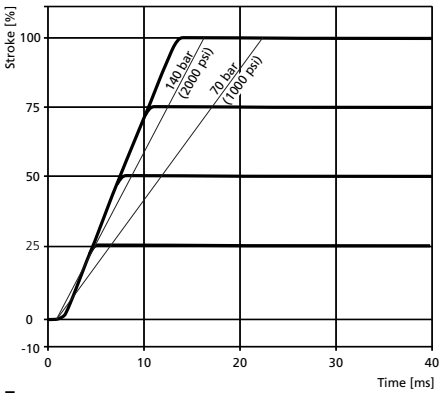


Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

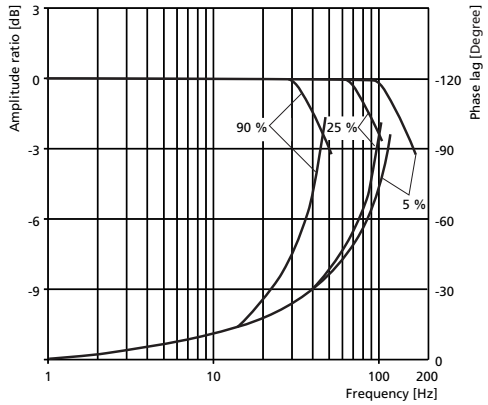
Step response

D673 with two-stage ServoJet® Pilot Valve D670

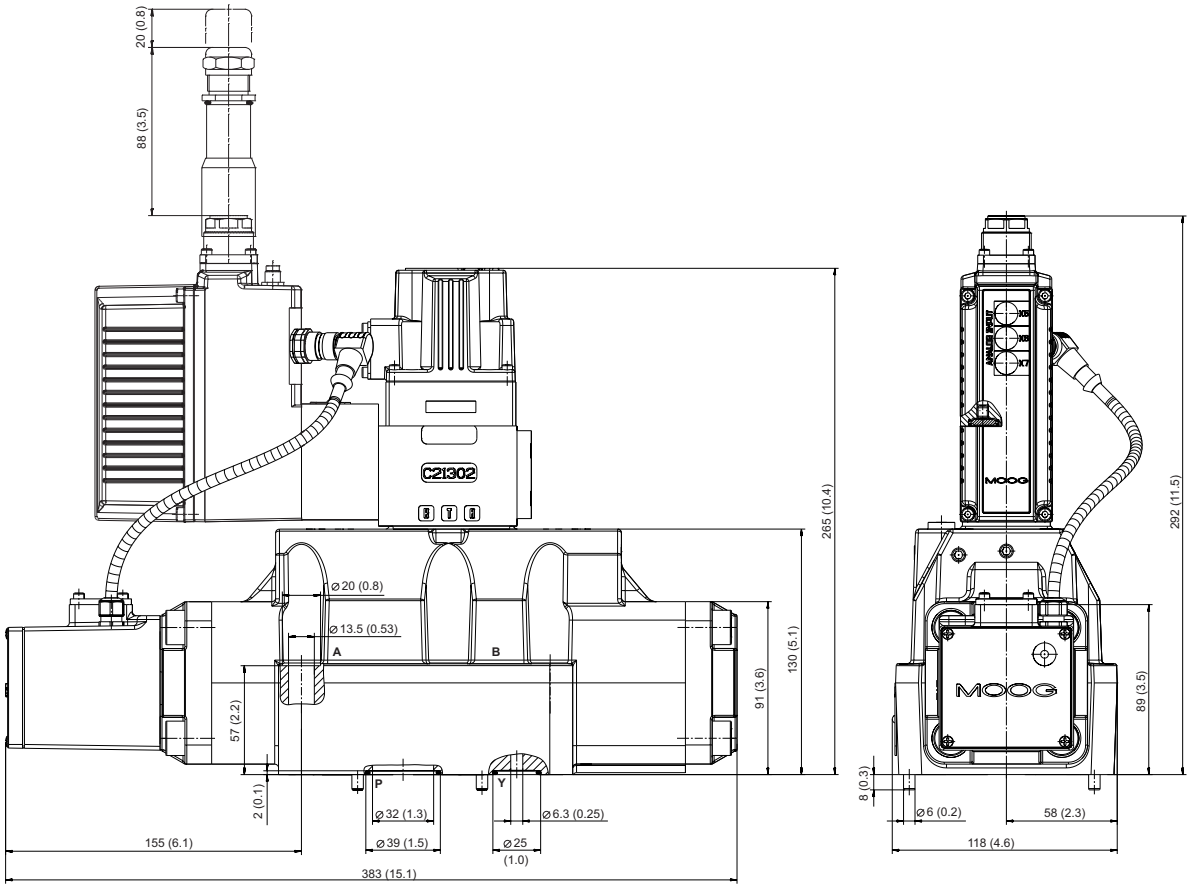


Frequency response

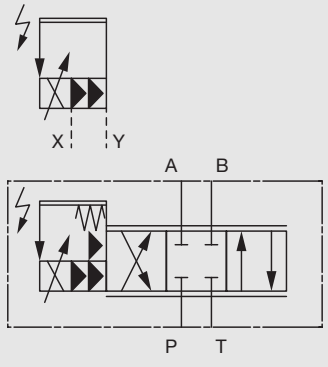
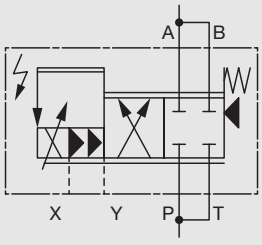
D673 with two-stage ServoJet® Pilot Valve D670



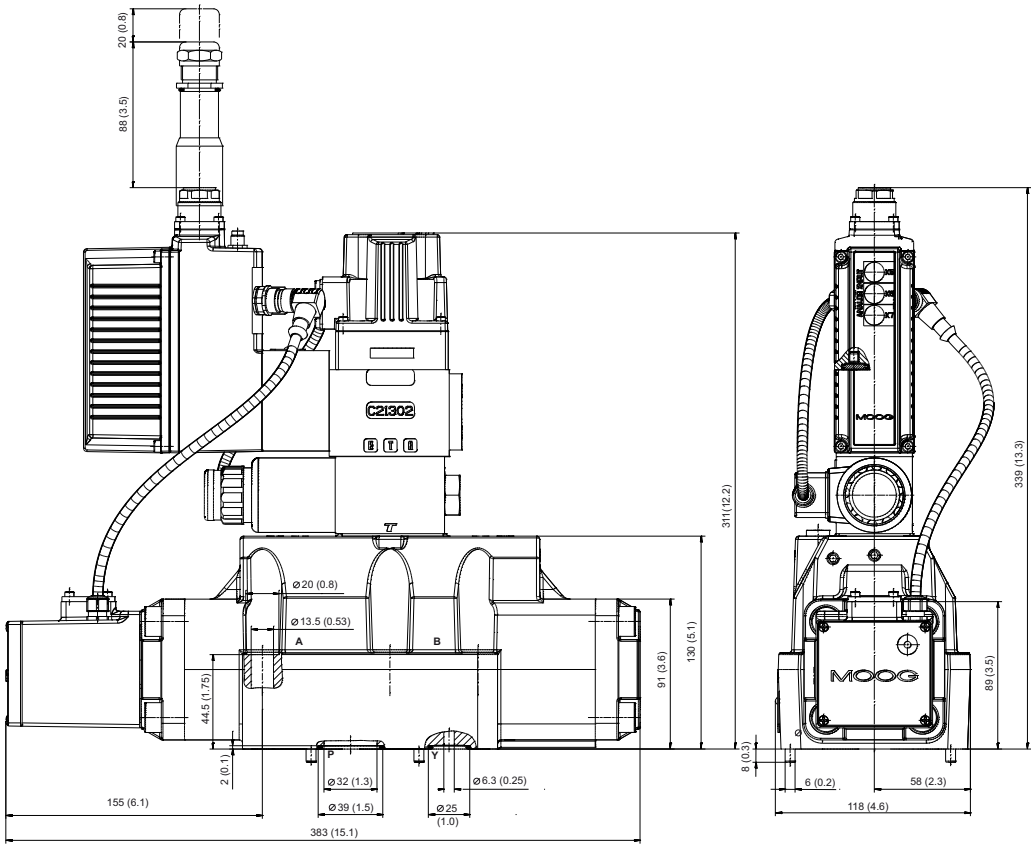
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



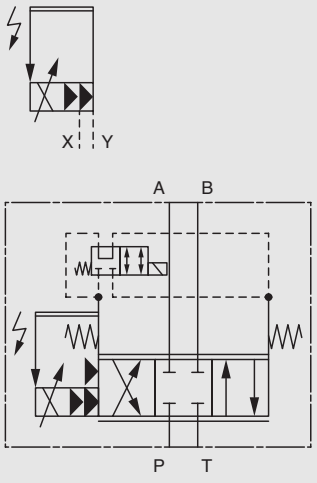
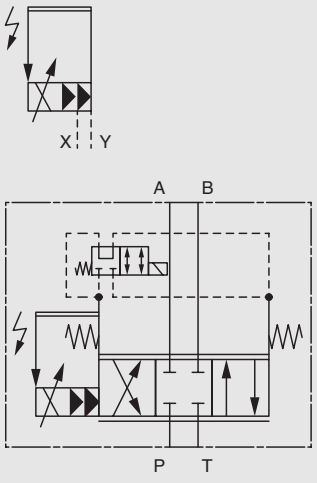
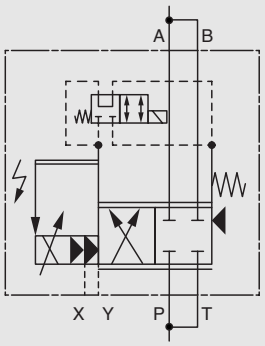
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

MODEL		D673	
Valve design		Two-stage, with standard spool	
Pilot valve		Direct Drive Pilot Valve D633	
		Standard	Offset
Mounting surface		ISO 4401-08-08-0-05	
Installation position		Any position	
Weight	kg (lb)	21.5 (47.4)	
Weight including fail-safe valve	kg (lb)	23 (50.8)	
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)	
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)	
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz	
Shock protection		50 g, 6 directions	
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))			
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 10 (145) above T or Y 10 (145) to 350 (5000) 70 (1000) [1]	
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 70 (1000) [1] 350 (5000)	
Maximum flow	l/min (gpm)	1500 (396)	
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	350 (92.5)	
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	3 (0.79)	
Pilot flow static	l/min (gpm)	0.5 (0.13)	
Pilot flow at a 100 % step	l/min (gpm)	35 (9.2)	26 (6.9)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.	
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)	
Recommended viscosity range	mm²/s (cSt)	15 to 45	
Viscosity range	mm²/s (cSt)	5 to 400	
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 18 / 15 / 12 17 / 14 / 11	
TYPICAL STATIC AND DYNAMIC DATA			
Step response time for 0 to 100 % stroke	ms	15	18
Threshold	%	< 0.1	
Hysteresis	%	< 0.2	
Null shift at ΔT = 55 K	%	< 1	
Sample deviation	%	±10	
ELECTRICAL DATA			
Relative duty cycle	%	100	
Degree of protection according to EN 60529		IP 65 (with mating connectors)	
Power supply	V DC	18 to 32	
Maximum current consumption (static)	A	0.3	
Maximum current consumption (dynamic)	A	1.2	
External protection per valve	A	1.6 A (slow)	
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005	
Connector type		See section "Electronics"	
Control electronics		Integrated in the valve, see section "Electronics"	

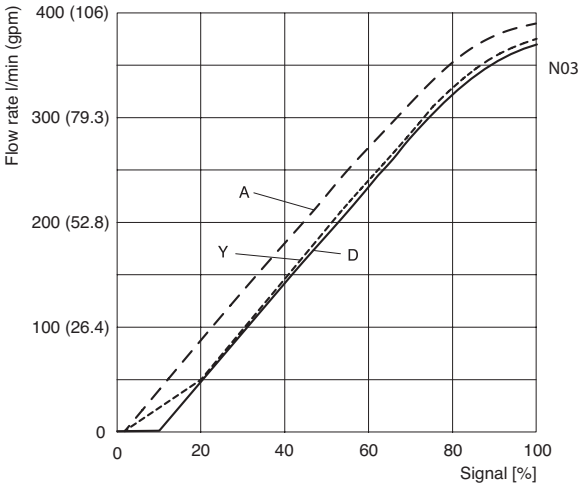
[1] Pressure peaks up to 210 bar (3000 psi) permissible.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

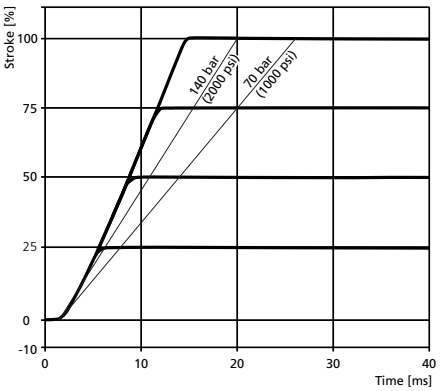
at Δp_N = 5 bar (75 psi) per land



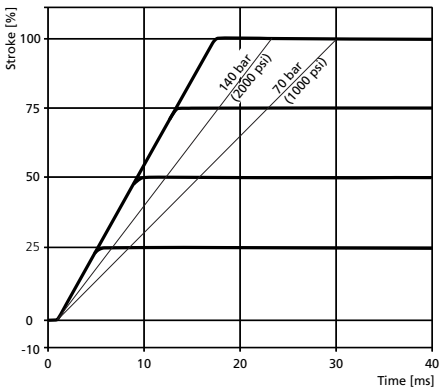
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

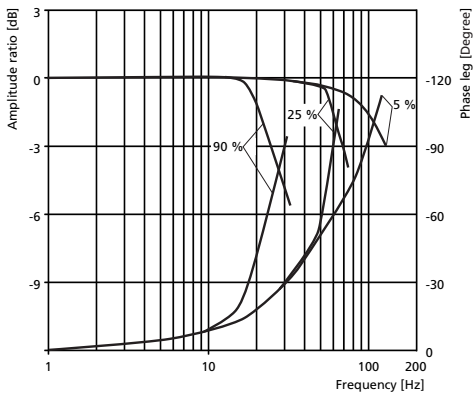
Step response
D673 with Direct Drive Pilot Valve D633, Standard



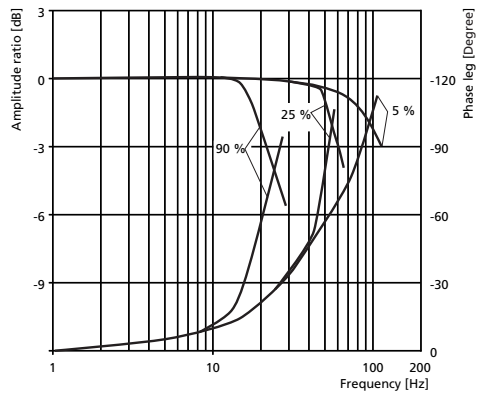
Step response
D673 with Direct Drive Pilot Valve D633, Offset



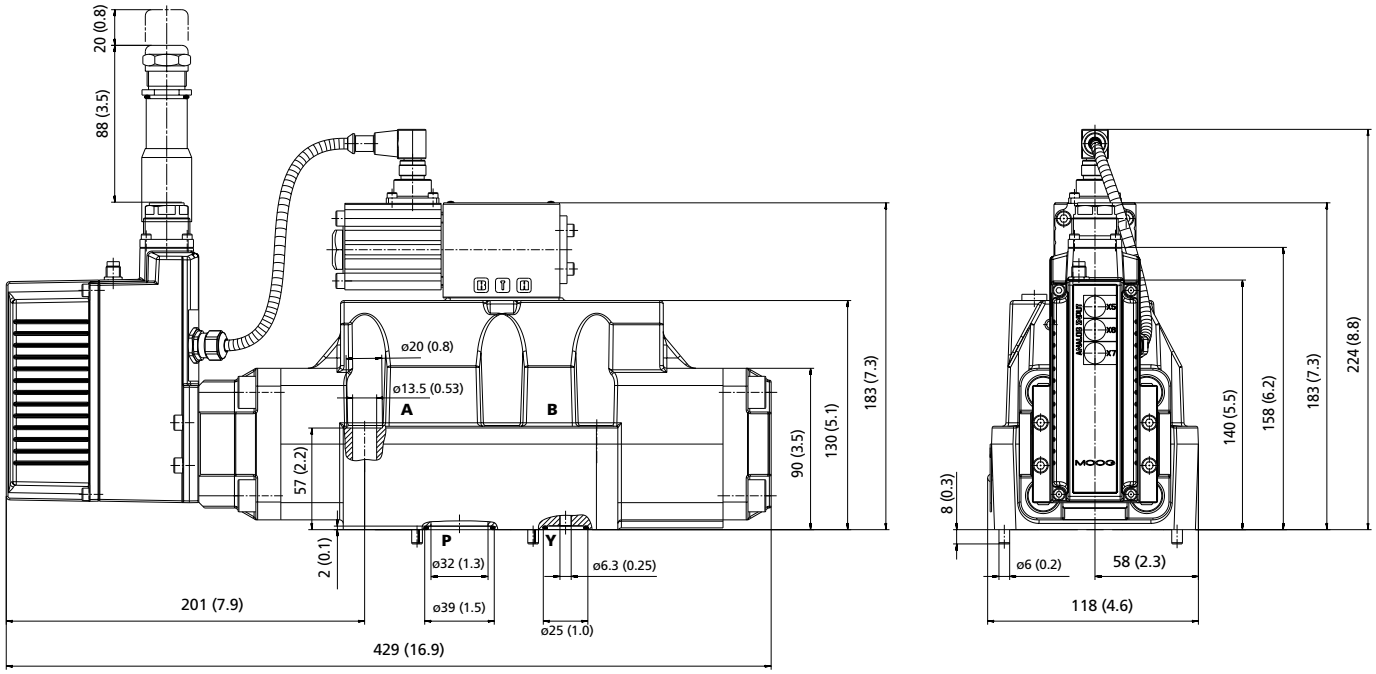
Frequency response
D673 with Direct Drive Pilot Valve D633, Standard



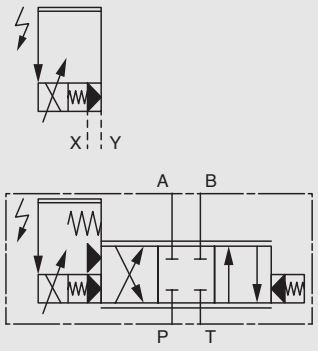
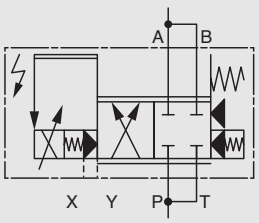
Frequency response
D673 with Direct Drive Pilot Valve D633, Offset



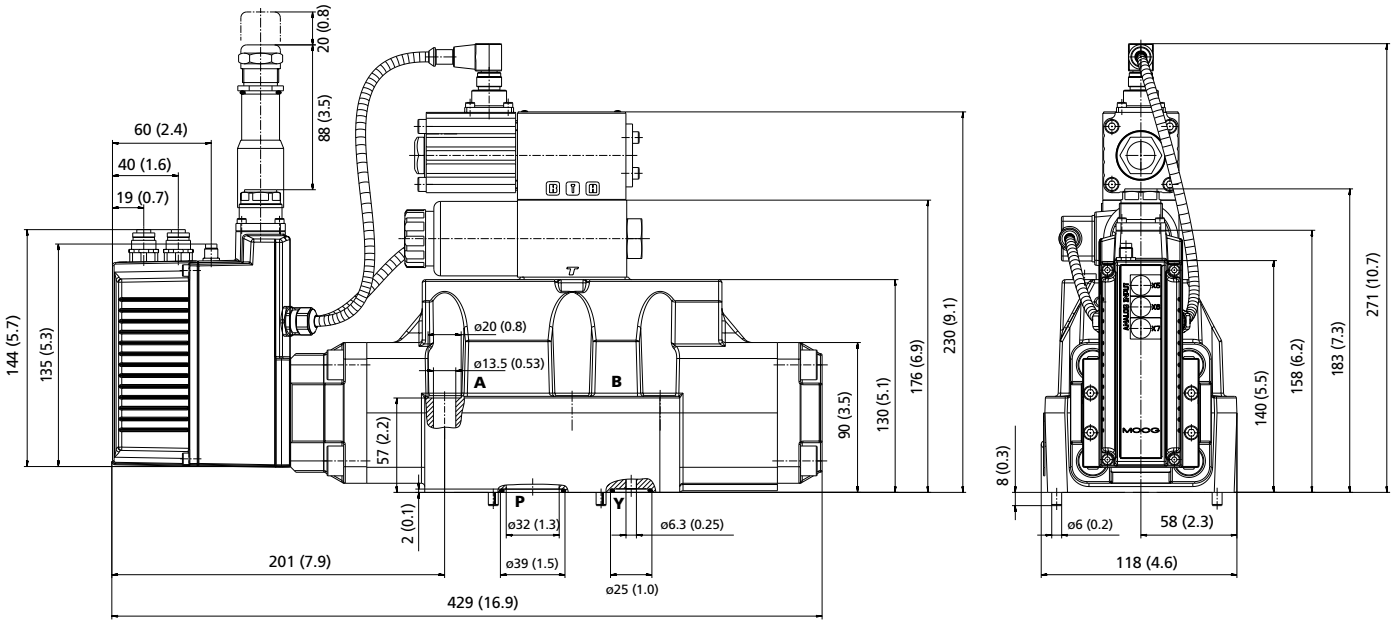
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



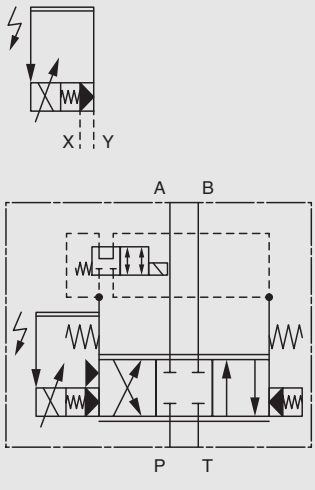
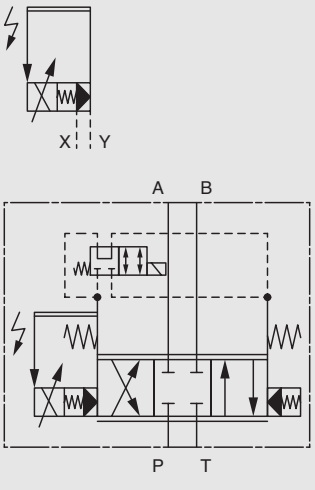
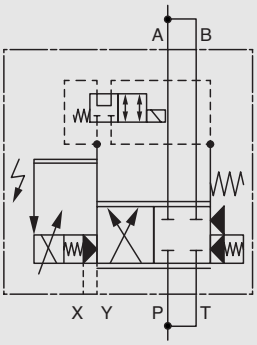
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

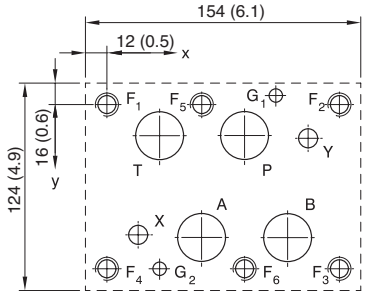
Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

Series	Part number for D673 with ServoJet® Pilot Valve		Part number for D673 with two-stage ServoJet® Pilot Valve D670 and with Direct Drive Pilot Valve D633 respectively	
O-ring material 85 shore	NBR	FKM	NBR	FKM
Sealing service kit for main stage with the following O-rings for P, T, A, B ID 34.60 x Ø 2.6 for X, Y ID 20.92 x Ø 2.6	B97215-N6X4-25 4 pieces -45122-113 2 pieces -45122-195	B97215-V6X4-25 4 pieces -42082-113 2 pieces -42082-195	B97215-N6X4-25 4 pieces -45122-113 2 pieces -45122-195	B97215-V6X4-25 4 pieces -42082-113 2 pieces -42082-195
Sealing service kit for pilot valve	B97215-N618-06	B97215-V618-06	B97215-N630F63	B97215-V630F63
Sealing service kit for fail-safe valve	B97215-N630F63	B97215-V630F63	B97215-N630F63	B97215-V630F63
Replaceable filter	A67999-200 (200 µm nominal)		–	
Fastening screws M12x75 ISO 4762-10.9 6 pieces	A03665-120-075 Tightening torque 94 Nm (69 ft-lbs)			
Flushing plate	-76047-001			
Connection plate	A25855-009			
Mating connectors, waterproof IP 65 6-pole + PE EN 175201-804 [1] 11-pole + PE EN 175201 part-804 [2]	B97007-061 B97067-111			

[1] Cable diameter minimum 8 mm (0.31 in), maximum 12 mm (0.47 in)
[2] Cable diameter minimum 11.5 mm (0.45 in), maximum 13 mm (0.51 in)

MOUNTING PATTERN VALVE WITH SERVOJET® PILOT VALVE, SERVOJET® PILOT VALVE D670 AND DIRECT DRIVE PILOT VALVE D633

The mounting surface of the mounting face must comply with ISO 4401-08-08-0-05
For a maximum flow rate, the ports P, T, A and B should be provided with a diameter of Ø 28 mm (1.1 in) (not according to standard).
Flatness of mounting face < 0.01 mm (0.0004 in) per 100 mm (3.94), mean roughness R_a better than 0.8 µm



[mm] ([in])	P	A	T	B	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
	Ø28 (1.10)	Ø28 (1.10)	Ø28 (1.10)	Ø28 (1.10)	Ø11.2 (0.44)	Ø11.2 (0.44)	Ø7.5 (0.30)	Ø7.5 (0.30)	M12	M12	M12	M12	M12	M12
x	77 (3.03)	53.2 (2.09)	29.4 (1.16)	100.8 (3.97)	17.5 (0.69)	112.7 (4.44)	94.5 (3.72)	29.4 (1.16)	0	130.2 (5.13)	130.2 (5.13)	0	53.2 (2.09)	77 (3.03)
y	17.5 (0.69)	74.6 (2.94)	17.5 (0.69)	74.6 (2.94)	73 (2.87)	19 (0.75)	-4.8 (-0.19)	92.1 (3.63)	0	0	92.1 (3.63)	92.1 (3.63)	0	92.1 (3.63)

MODEL		D674
Valve design		Two-stage, with stub shaft spool
Pilot valve		ServoJet® Pilot Valve High Flow
Mounting surface		ISO 4401-08-08-0-05
Installation position		Any position
Weight	kg (lb)	20.5 (45.2)
Weight including fail-safe valve	kg (lb)	22 (48.5)
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz
Shock protection		50 g, 6 directions
HYDRAULIC DATA (measured at 210 bar (3150 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))		
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)
Maximum flow	l/min (gpm)	1500 (396)
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	550 (145)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	3.0 (0.79)
Pilot flow static	l/min (gpm)	2.6 (0.69)
Pilot flow at a 100 % step	l/min (gpm)	2.6 (0.69)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)
Recommended viscosity range	mm²/s (cSt)	15 to 45
Viscosity range	mm²/s (cSt)	5 to 400
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11
TYPICAL STATIC AND DYNAMIC DATA		
Step response time for 0 to 100 % stroke	ms	44
Threshold	%	< 0.1
Hysteresis	%	< 0.2
Null shift at ΔT = 55 K	%	< 1
Sample deviation	%	±10
ELECTRICAL DATA		
Relative duty cycle	%	100
Degree of protection according to EN 60529		IP 65 (with mating connectors)
Power supply	V DC	18 to 32
Maximum current consumption (static)	A	0.25
Maximum current consumption (dynamic)	A	0.5
External protection per valve	A	1 A (slow)
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005
Connector type		See section "Electronics"
Control electronics		Integrated in the valve, see section "Electronics"

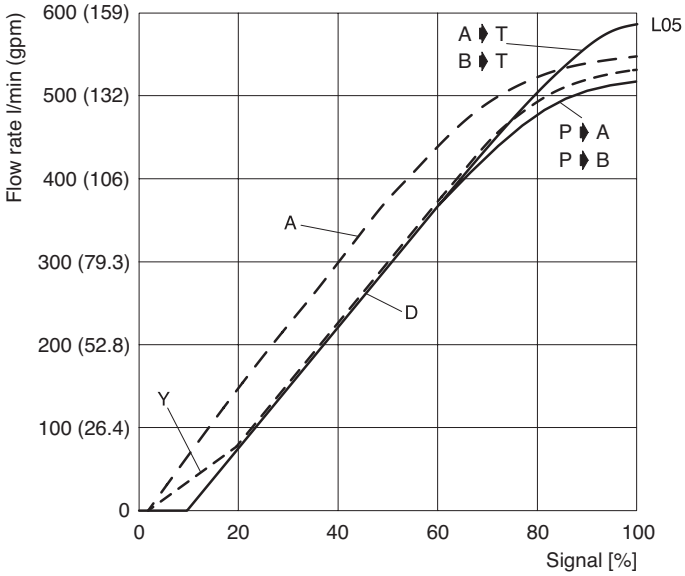
1) With integrated restrictor 350 bar (5000 psi), upon request.
2) The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

at Δp_N = 5 bar (75 psi) per land

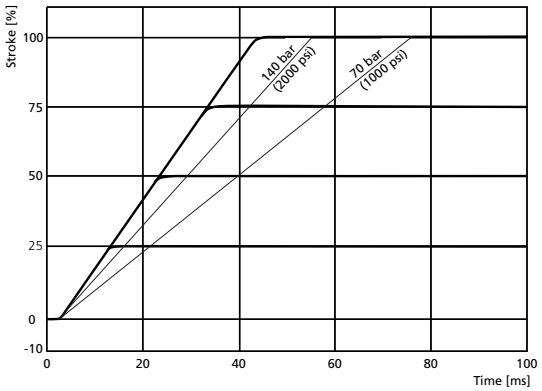


Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

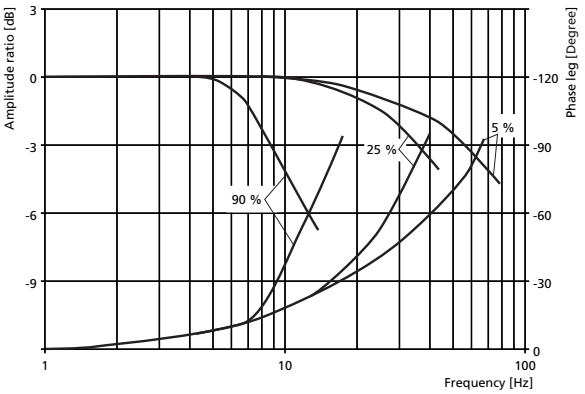
Step response

D674 with ServoJet® Pilot Valve, High Flow

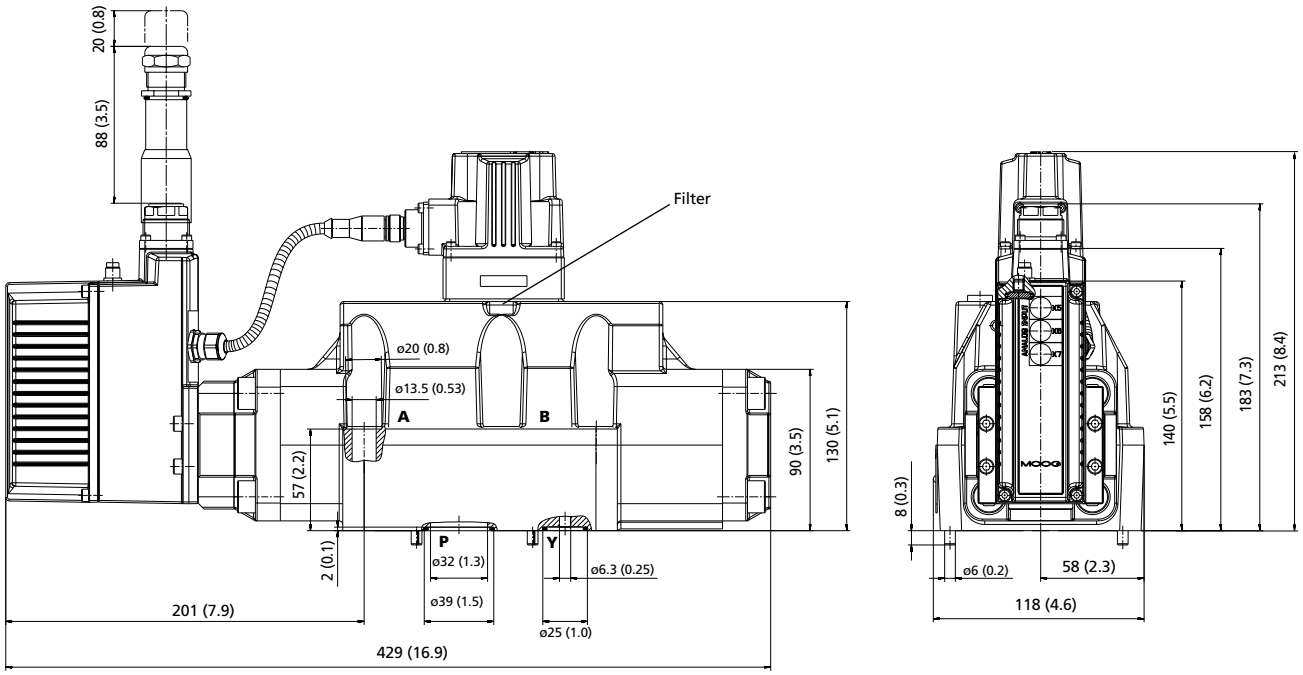


Frequency response

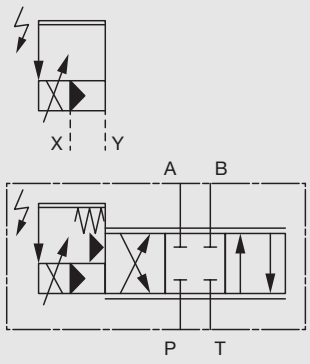
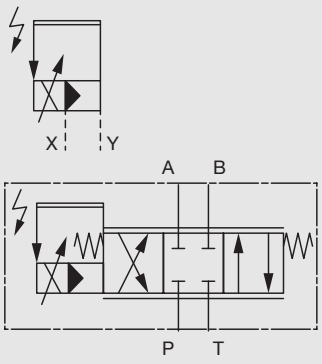
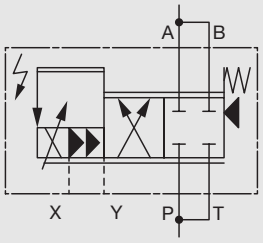
D674 with ServoJet® Pilot Valve, High Flow



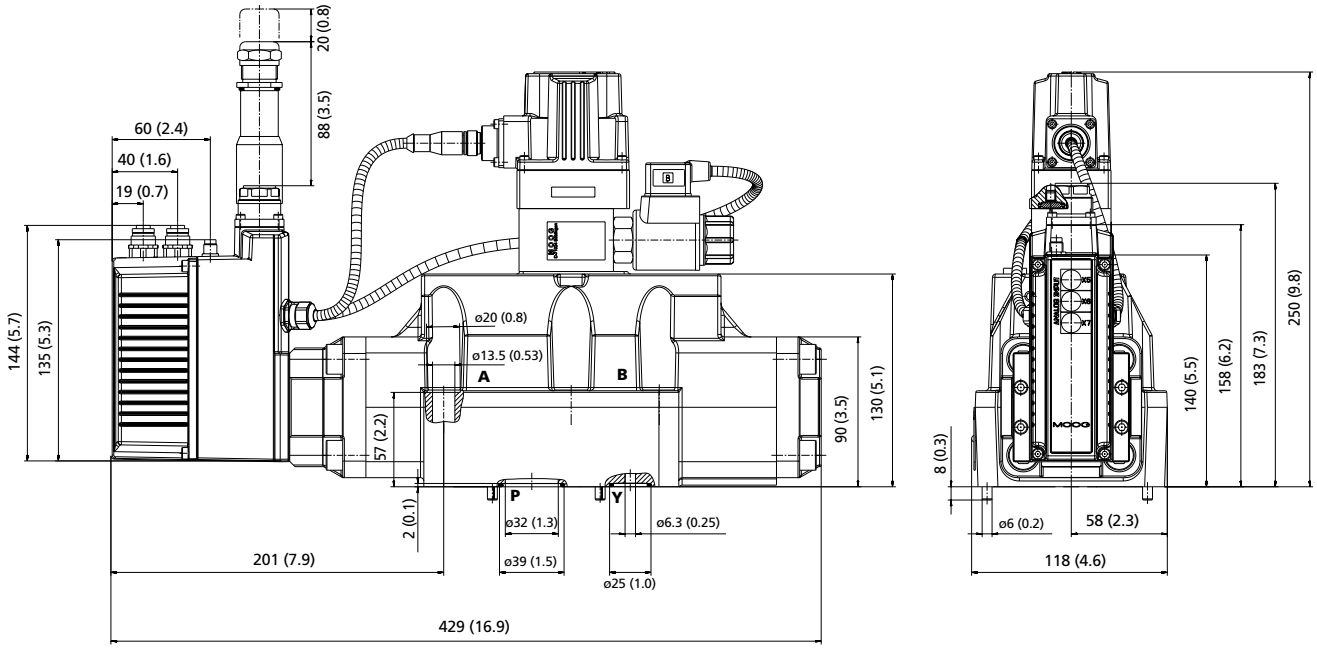
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F, M AND D



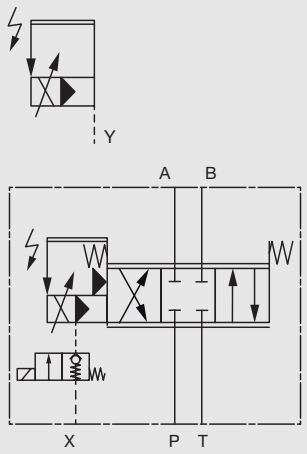
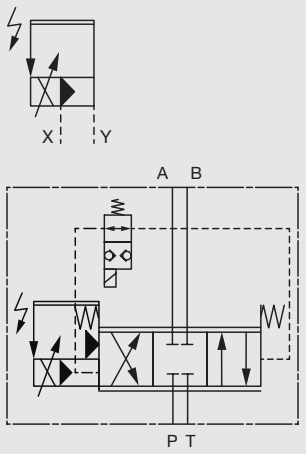
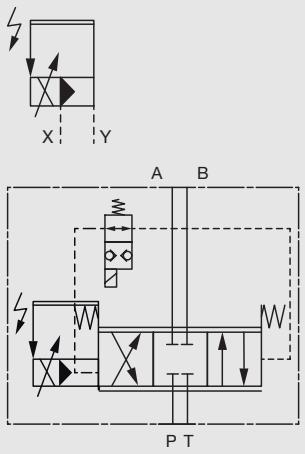
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type F 4-way design	Fail-safe type M 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional Y external only X external	Optional X and Y external	Optional X and Y external
		
Fail-safe type P 4-way design Defined center position or defined A ➡T	Fail-safe type U 4-way design Defined center position or defined A ➡T	Fail-safe type W 4-way design Defined center position

MODEL		D674
Valve design		Three-stage, with standard spool
Pilot valve		Two-stage ServoJet® Pilot Valve D670
Mounting surface		ISO 4401-08-08-0-05
Installation position		Any position
Weight	kg (lb)	21.5 (47.4)
Weight including fail-safe valve	kg (lb)	23 (50.7)
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz
Shock protection		50 g, 6 directions
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))		
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)
Maximum flow	l/min (gpm)	1500 (396)
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	550 (145)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	3.0 (0.79)
Pilot flow static	l/min (gpm)	1.0 (0.26)
Pilot flow at a 100 % step	l/min (gpm)	50 (13,2)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)
Recommended viscosity range	mm²/s (cSt)	15 to 45
Viscosity range	mm²/s (cSt)	5 to 400
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11
TYPICAL STATIC AND DYNAMIC DATA		
Step response time for 0 to 100 % stroke	ms	14
Threshold	%	< 0.1
Hysteresis	%	< 0.2
Null shift at ΔT = 55 K	%	< 1.5
Sample deviation	%	±10
ELECTRICAL DATA		
Relative duty cycle	%	100
Degree of protection according to EN 60529		IP 65 (with mating connectors)
Power supply	V DC	18 to 32
Maximum current consumption (static)	A	0.25
Maximum current consumption (dynamic)	A	2.1
External protection per valve	A	2.5 A (slow)
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005
Connector type		See section "Electronics"
Control electronics		Integrated in the valve, see section "Electronics"

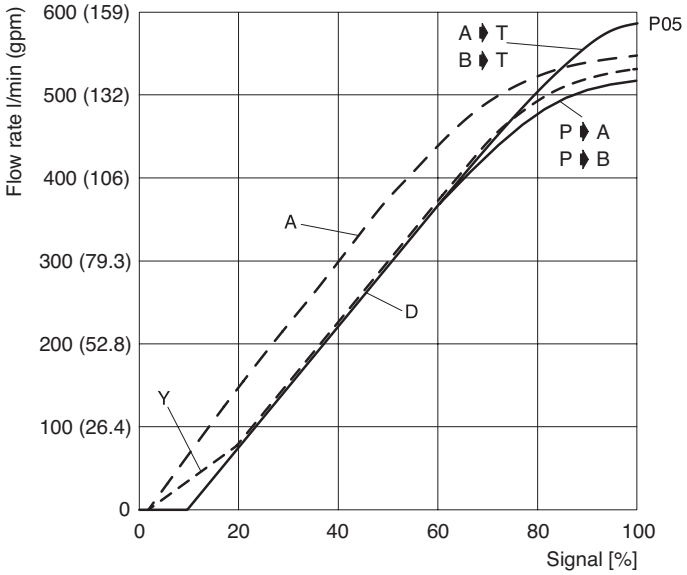
1) With integrated restrictor 350 bar (5000 psi), upon request.
2) The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

at Δp_N = 5 bar (75 psi) per land

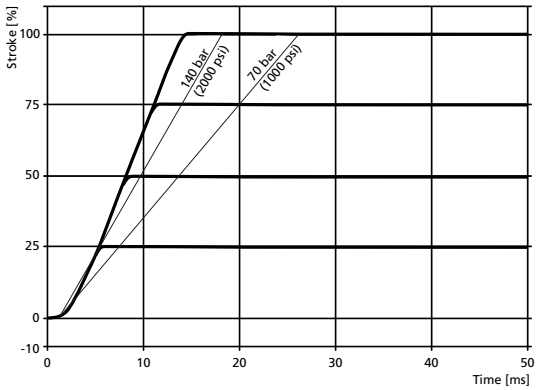


Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

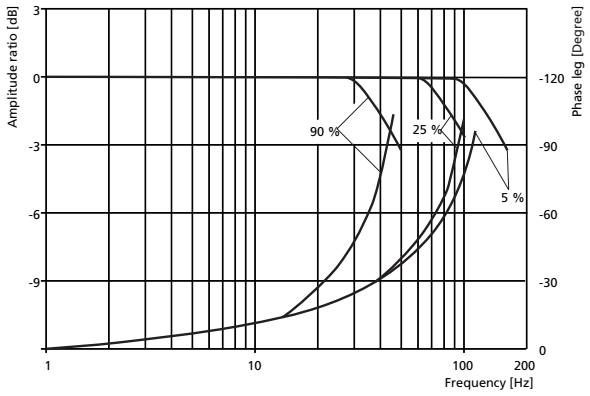
Step response

D674 with two-stage ServoJet® Pilot Valve D670

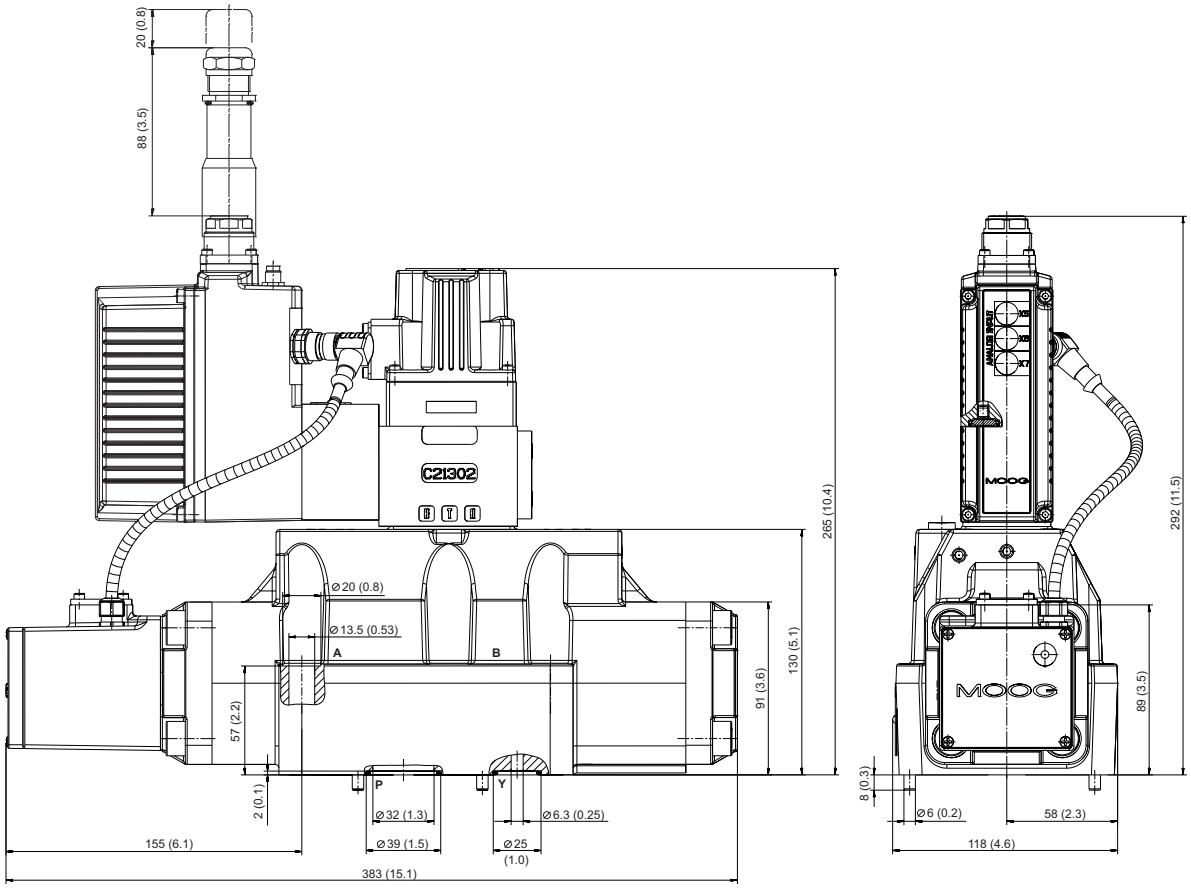


Frequency response

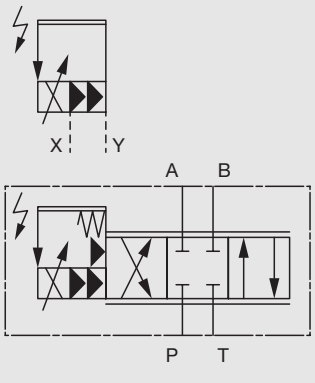
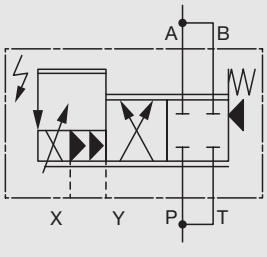
D674 with two-stage ServoJet® Pilot Valve D670



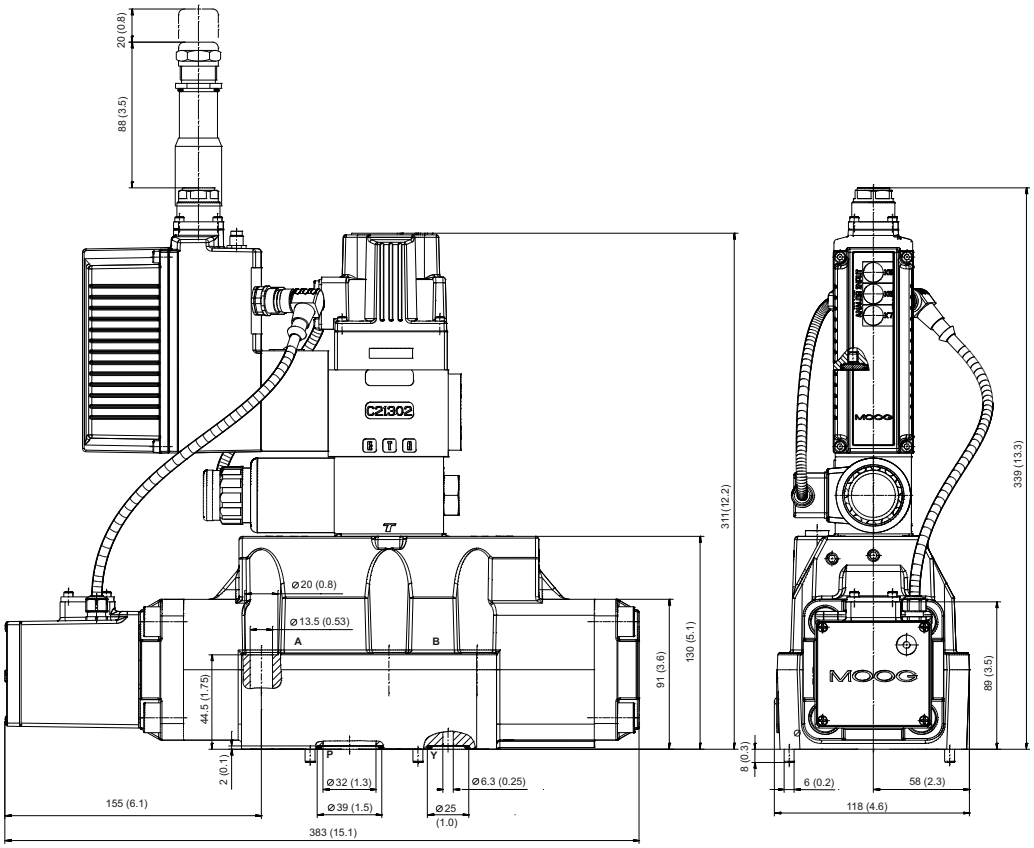
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



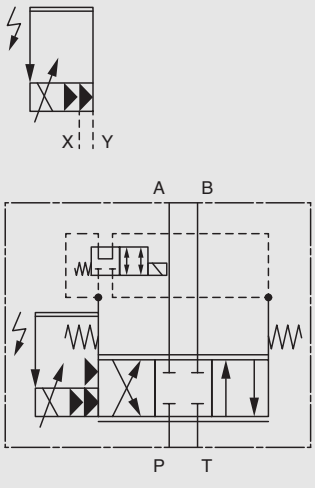
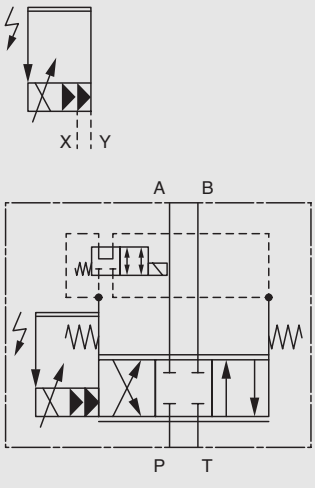
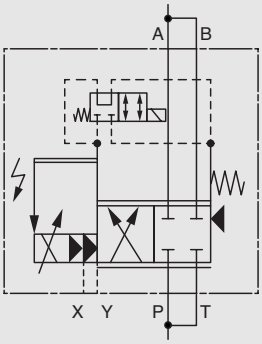
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

MODEL		D674	
Valve design		Two-stage, with standard spool	
Pilot valve		Direct Drive Pilot Valve D633	
		Standard	Offset
Mounting surface		ISO 4401-08-08-0-05	
Installation position		Any position	
Weight	kg (lb)	21.5 (47.4)	
Weight including fail-safe valve	kg (lb)	23 (50.7)	
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)	
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)	
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz	
Shock protection		50 g, 6 directions	
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))			
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 10 (145) above T or Y 10 (145) to 350 (5000) 70 (1000) [1]	
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 70 (1000) [1] 350 (5000)	
Maximum flow	l/min (gpm)	1500 (396)	
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	550 (145)	
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	3 (0.79)	
Pilot flow static	l/min (gpm)	0.5 (0.13)	
Pilot flow at a 100 % step	l/min (gpm)	35 (9.2)	26 (6.9)
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.	
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)	
Recommended viscosity range	mm²/s (cSt)	15 to 45	
Viscosity range	mm²/s (cSt)	5 to 400	
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 18 / 15 / 12 17 / 14 / 11	
TYPICAL STATIC AND DYNAMIC DATA			
Step response time for 0 to 100 % stroke	ms	17	23
Threshold	%	< 0.1	
Hysteresis	%	< 0.2	
Null shift at ΔT = 55 K	%	< 1	
Sample deviation	%	±10	
ELECTRICAL DATA			
Relative duty cycle	%	100	
Degree of protection according to EN 60529		IP 65 (with mating connectors)	
Power supply	V DC	18 to 32	
Maximum current consumption (static)	A	0.3	
Maximum current consumption (dynamic)	A	1.2	
External protection per valve	A	1.6 A (slow)	
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005	
Connector type		See section "Electronics"	
Control electronics		Integrated in the valve, see section "Electronics"	

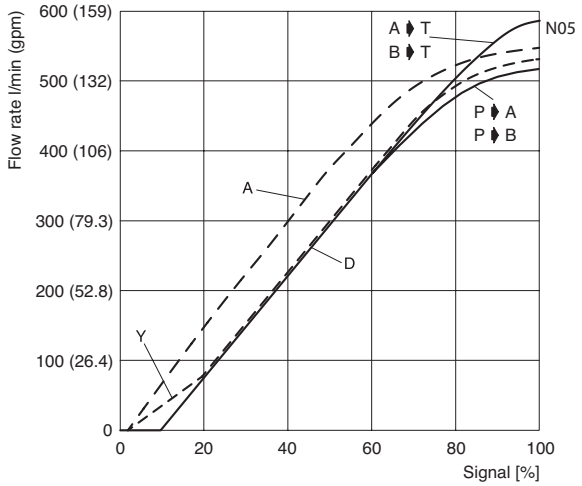
1) Pressure peaks up to 210 bar (3000 psi) permissible.
2) The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

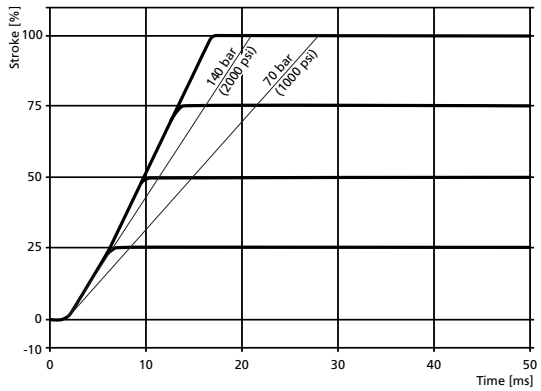
at Δp_N = 5 bar (75 psi) per land



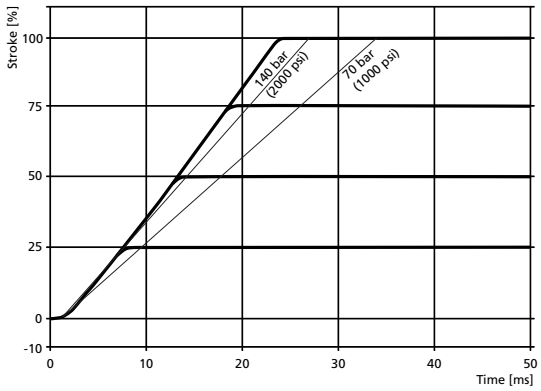
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic

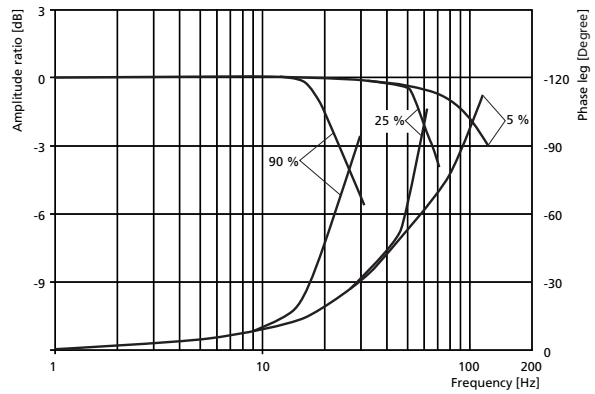
Step response
D674 with Direct Drive Pilot Valve D633, Standard



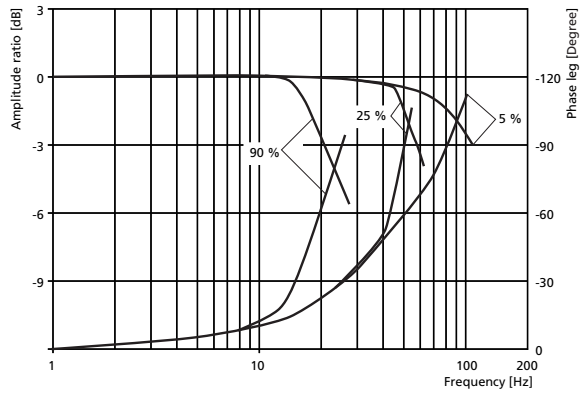
Step response
D674 with Direct Drive Pilot Valve D633, Offset



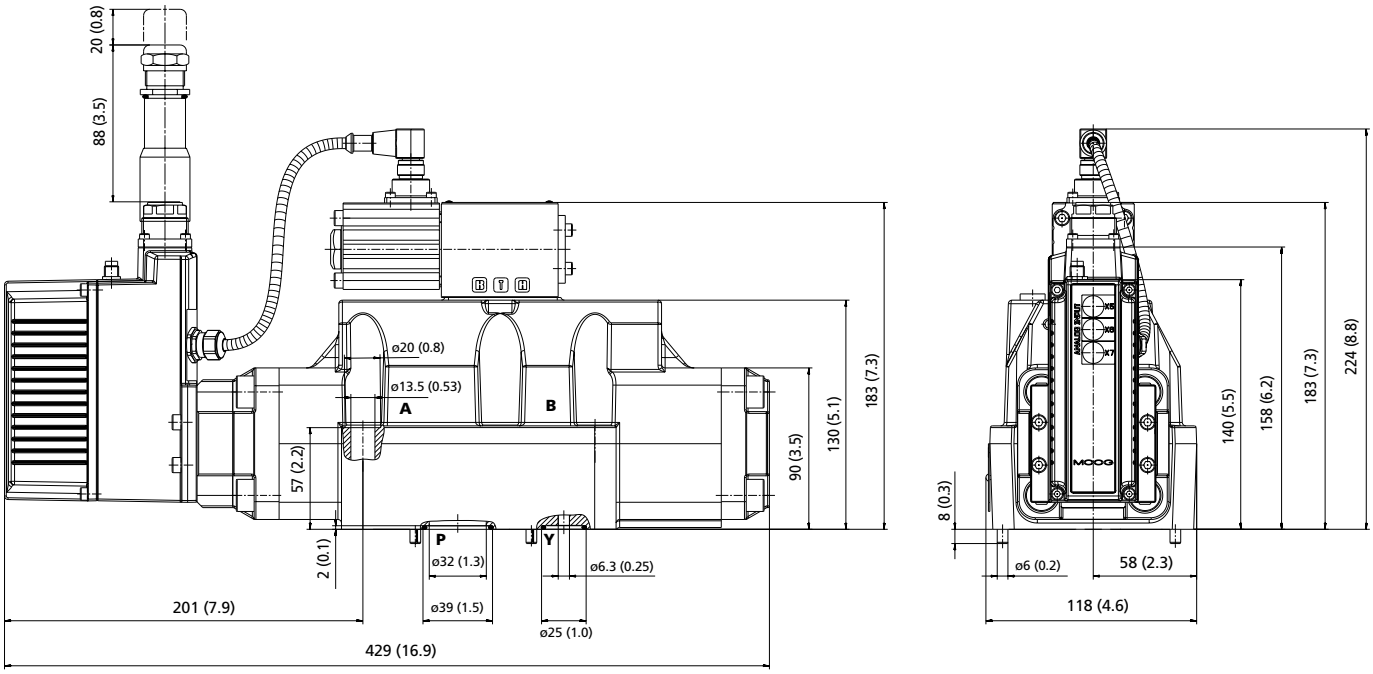
Frequency response
D674 with Direct Drive Pilot Valve D633, Standard



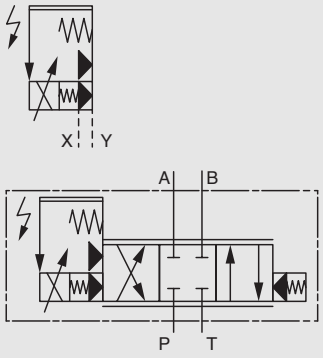
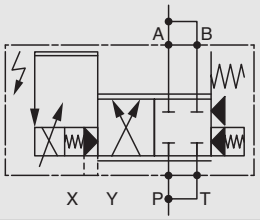
Frequency response
D674 with Direct Drive Pilot Valve D633, Offset



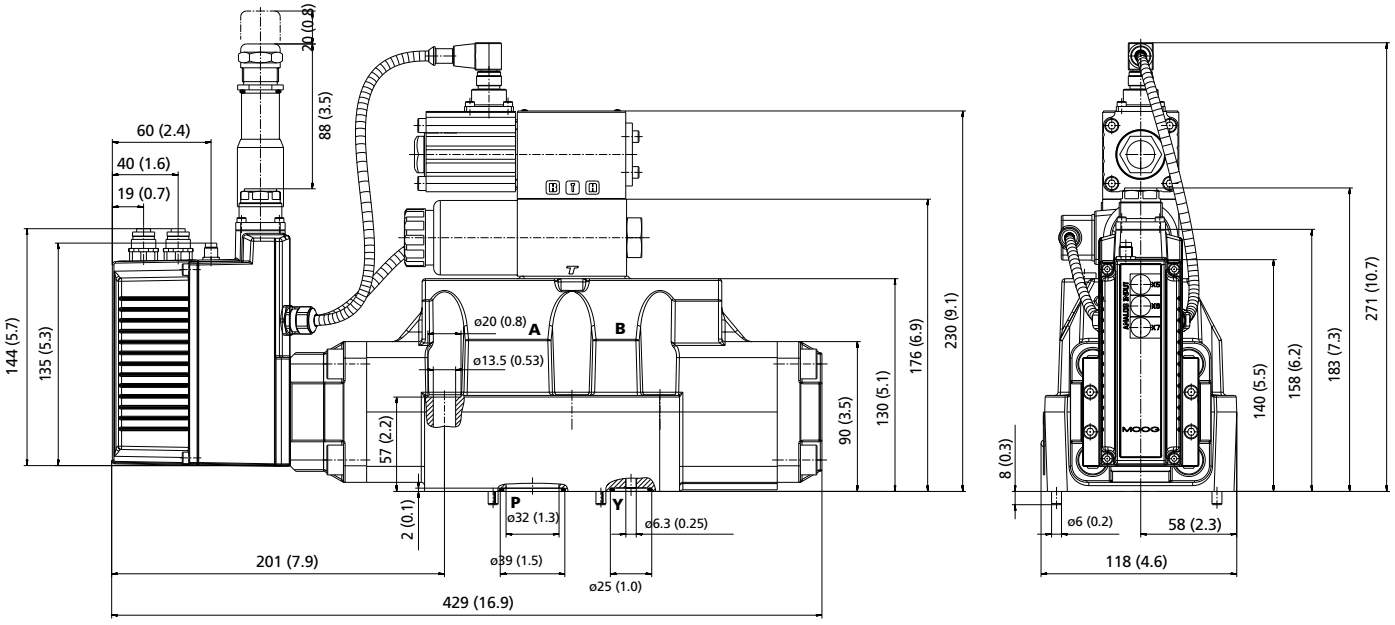
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



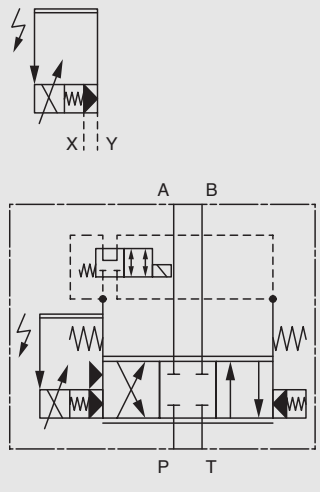
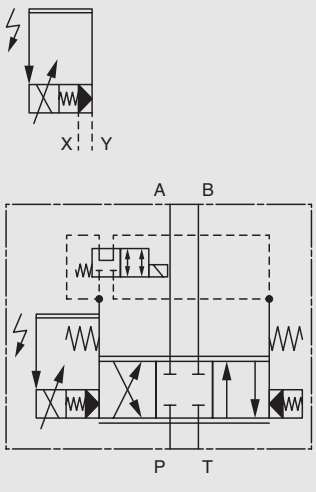
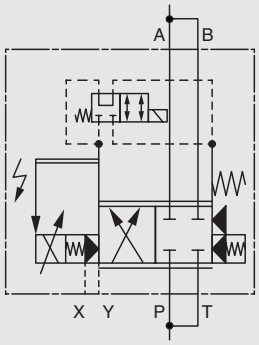
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-08-08-0-05 (see subsequent section “Mounting Pattern”).

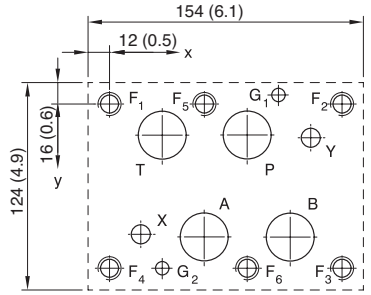
Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

Series	Part number for D674 with ServoJet® Pilot Valve		Part number for D674 with two-stage ServoJet® Pilot Valve D670 or with Direct Drive Pilot Valve D633	
O-ring material 85 shore	NBR	FKM	NBR	FKM
Sealing service kit for main stage with the following O-rings for P, T, A, B ID 34.60 x Ø 2.6 for X, Y ID 20.92 x Ø 2.6	B97215-N6X4-25 4 pieces -45122-113 2 pieces -45122-195	B97215-V6X4-25 4 pieces -42082-113 2 pieces -42082-195	B97215-N6X4-25 4 pieces -45122-113 2 pieces -45122-195	B97215-V6X4-25 4 pieces -42082-113 2 pieces -42082-195
Sealing service kit for pilot valve	B97215-N618-06	B97215-V618-06	B97215-N630F63	B97215-V630F63
Sealing service kit for fail-safe valve	B97215-N630F63	B97215-V630F63	B97215-N630F63	B97215-V630F63
Replaceable filter	A67999-200 (200 µm nominal)		–	
Fastening screws M12x75 ISO 4762-10.9 6 pieces	A03665-120-075 Tightening torque 94 Nm (69 ft-lbs)			
Flushing plate	-76047-001			
Connection plate	A25855-009			
Mating connectors, waterproof IP 65 6-pole + PE EN 175201-804 [1] 11-pole + PE EN 175201-804 [2]	 B97007-061 B97067-111			

[1] Cable diameter minimum 8 mm (0.31 in), maximum 12 mm (0.47 in)
[2] Cable diameter minimum 11.5 mm (0.45 in), maximum 13 mm (0.51 in)

MOUNTING PATTERN VALVE WITH SERVOJET® PILOT VALVE, SERVOJET® PILOT VALVE D670 AND DIRECT DRIVE PILOT VALVE D633

The mounting surface of the mounting face must comply with ISO 4401-08-08-0-05.
For a maximum flow rate, the ports P, T, A and B should be provided with a diameter of Ø 32 mm (1.3 in) (not according to standard).
Flatness of mounting face < 0.01 mm (0.0004 in) per 100 mm (3.94 in), mean roughness R_a better than 0.8 µm



[mm] ([in])	P	A	T	B	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
	Ø32 (1.26)	Ø32 (1.26)	Ø32 (1.26)	Ø32 (1.26)	Ø11.2 (0.44)	Ø11.2 (0.44)	Ø7.5 (0.30)	Ø7.5 (0.30)	M12	M12	M12	M12	M12	M12
x	77 (3.03)	53.2 (2.09)	29.4 (1.16)	100.8 (3.97)	17.5 (0.69)	112.7 (4.44)	94.5 (3.72)	29.4 (1.16)	0	130.2 (5.13)	130.2 (5.13)	0	53.2 (2.09)	77 (3.03)
y	17.5 (0.69)	74.6 (2.94)	17.5 (0.69)	74.6 (2.94)	73 (2.87)	19 (0.75)	-4.8 (-0.19)	92.1 (3.63)	0	0	92.1 (3.63)	92.1 (3.63)	0	92.1 (3.63)

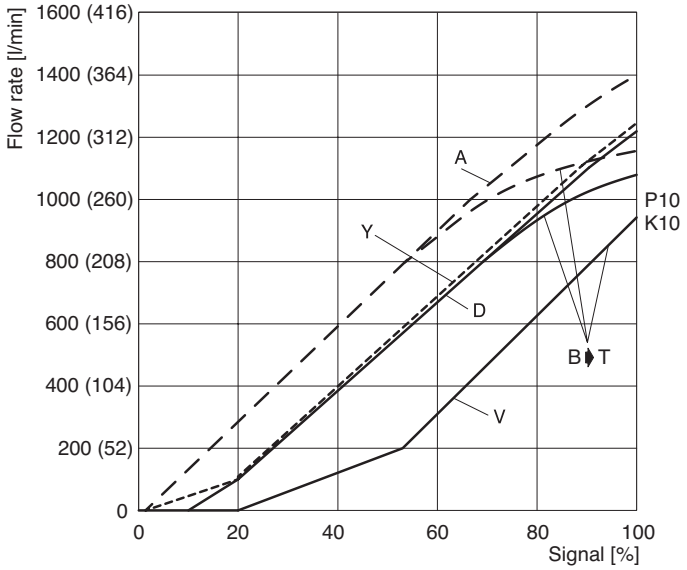
MODEL		D675			
Valve design		Three-stage, with standard spool		Three-stage, with stub shaft spool	
Pilot valve		Two-stage ServoJet® Pilot Valve D671			
Mounting surface		ISO 4401-10-09-0-05			
Installation position		Any position			
Weight	kg (lb)	75 (165.3)			
Weight including fail-safe valve	kg (lb)	76.5 (168.7)			
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)			
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)			
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz			
Shock protection		50 g, 6 directions			
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))					
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 25 (360) above T or Y 25 (360) to 280 (4000) [1] 140 (2000)			
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 140 (2000) 350 (5000)			
Maximum flow	l/min (gpm)	3600 (951)			
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	1000 (264)	1500 (396)	1000 (264)	1500 (396)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	7 (1.8)			
Pilot flow static	l/min (gpm)	4 (1.1)			
Pilot flow at a 100 % step	l/min (gpm)	80 (1.1)			
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.			
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)			
Recommended viscosity range	mm²/s (cSt)	15 to 45			
Viscosity range	mm²/s (cSt)	5 to 400			
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 19 / 16 / 13 17 / 14 / 11			
TYPICAL STATIC AND DYNAMIC DATA					
Step response time for 0 to 100 % stroke	ms	24	28	10	12
Threshold	%	< 0.1	< 0.1	< 0.1	< 0.1
Hysteresis	%	< 0.2	< 0.2	< 0.2	< 0.2
Null shift at Δ T = 55K	%	< 1.5	< 1	< 2.5	< 2
Sample deviation	%	±10			
ELECTRICAL DATA					
Relative duty cycle	%	100			
Degree of protection according to EN 60529		IP 65 (with mating connectors)			
Power supply	V DC	18 to 32			
Maximum current consumption (static)	A	0.25			
Maximum current consumption (dynamic)	A	2.1			
External protection per valve	A	2.5 A (slow)			
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection accord-ing to EN 61000-6-2:2005			
Connector type		See section "Electronics"			
Control electronics		Integrated in the valve, see section "Electronics"			

[1] With integrated restrictor 350 bar (5000 psi), upon request.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

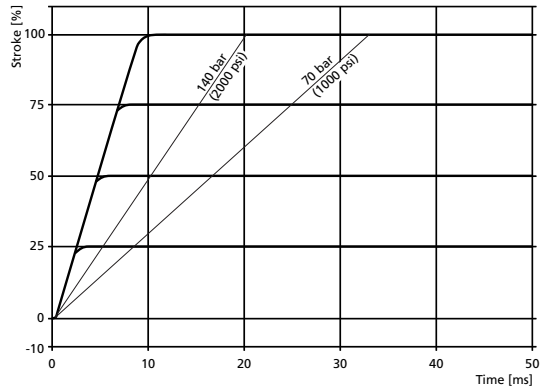
Flow-signal characteristic K10/P10
at Δp_N = 5 bar (75 psi) per land



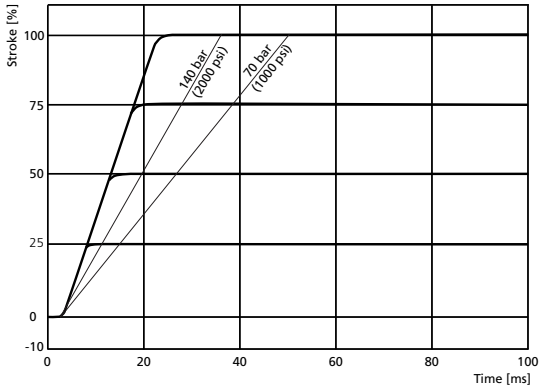
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic
Spool V: 10 % lap, dual gain flow characteristic

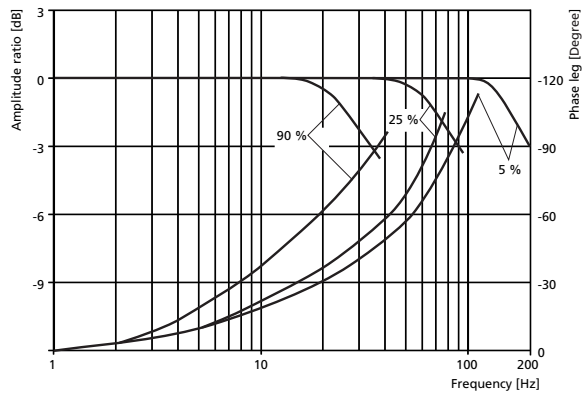
Step response
D675 with two-stage ServoJet® Pilot Valve D671, stub shaft spool K10



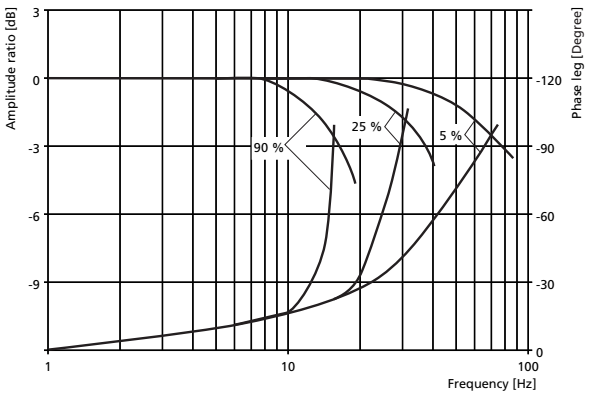
Step response
D675 with two-stage ServoJet® Pilot Valve D671, standard spool P10



Frequency response
D675 with two-stage ServoJet® Pilot Valve D671, stub shaft spool K10



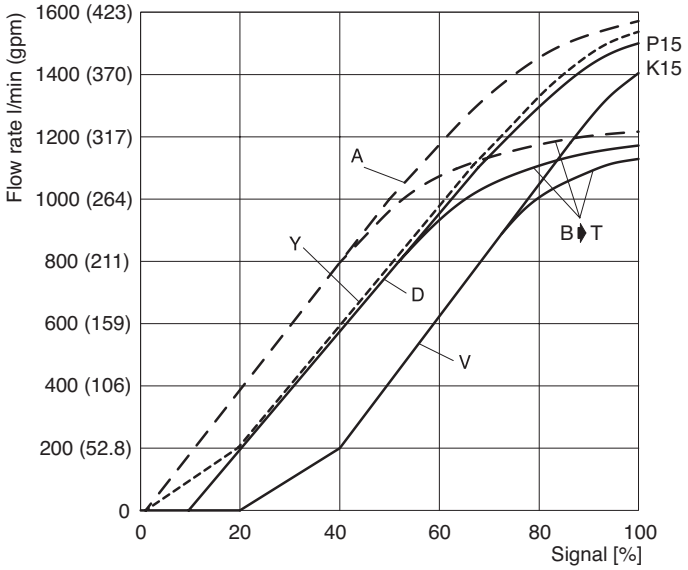
Frequency response
D675 with two-stage ServoJet® Pilot Valve D671, standard spool P10



TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

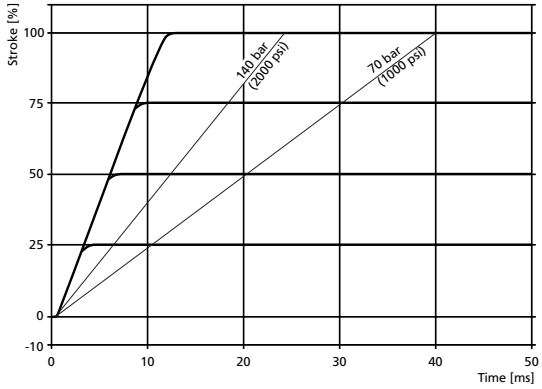
Flow-signal characteristic K15/P15
at Δp_N = 5 bar (75 psi) per land



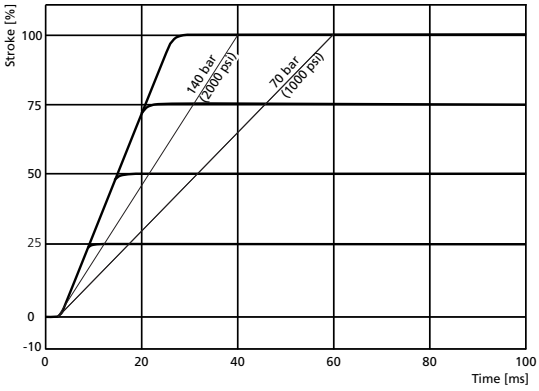
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic
Spool V: 10 % lap, dual gain flow characteristic

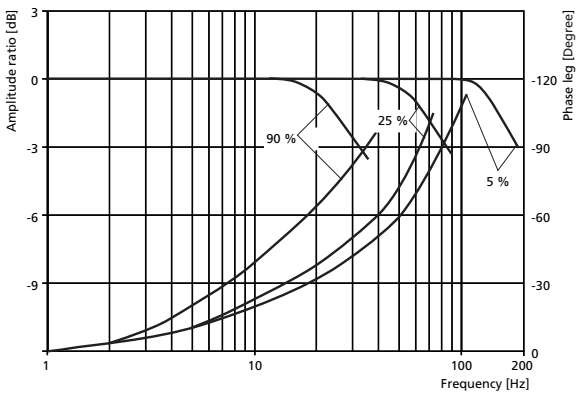
Step response
D675 with two-stage ServoJet® Pilot Valve D671, stub shaft spool K15



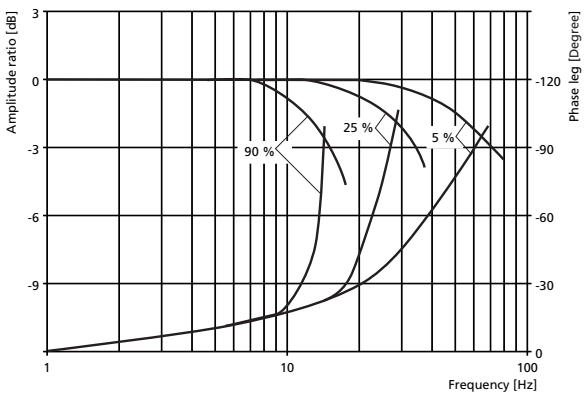
Step response
D675 with two-stage ServoJet® Pilot Valve D671, standard spool P15



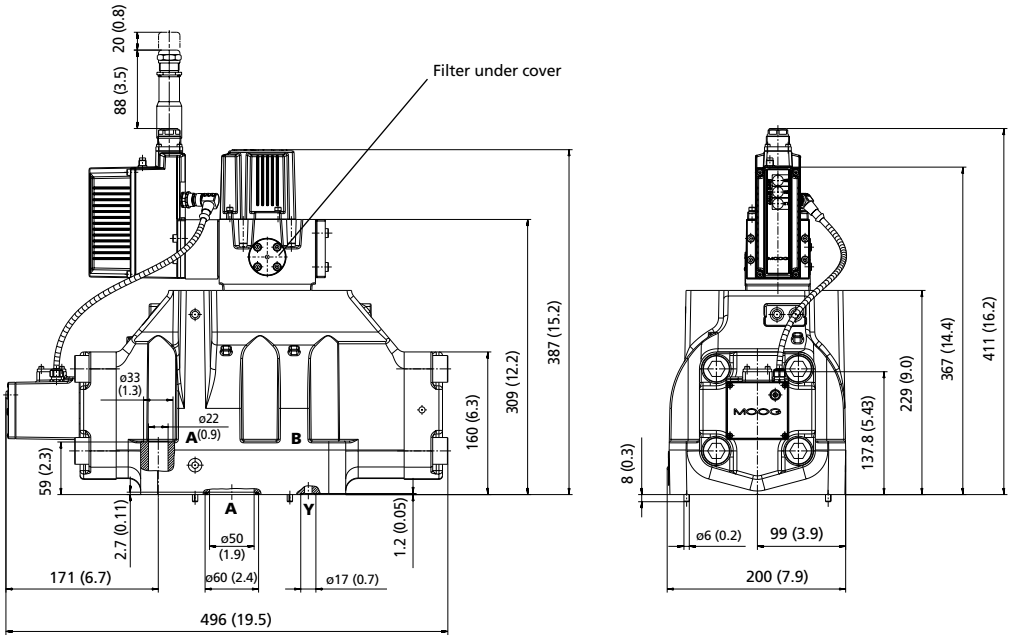
Frequency response
D675 with two-stage ServoJet® Pilot Valve D671, stub shaft spool K15



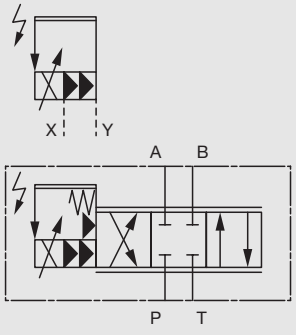
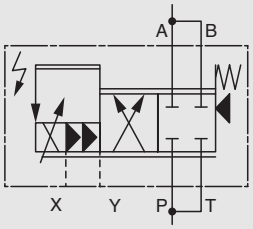
Frequency response
D675 with two-stage ServoJet® Pilot Valve D671, standard spool P15



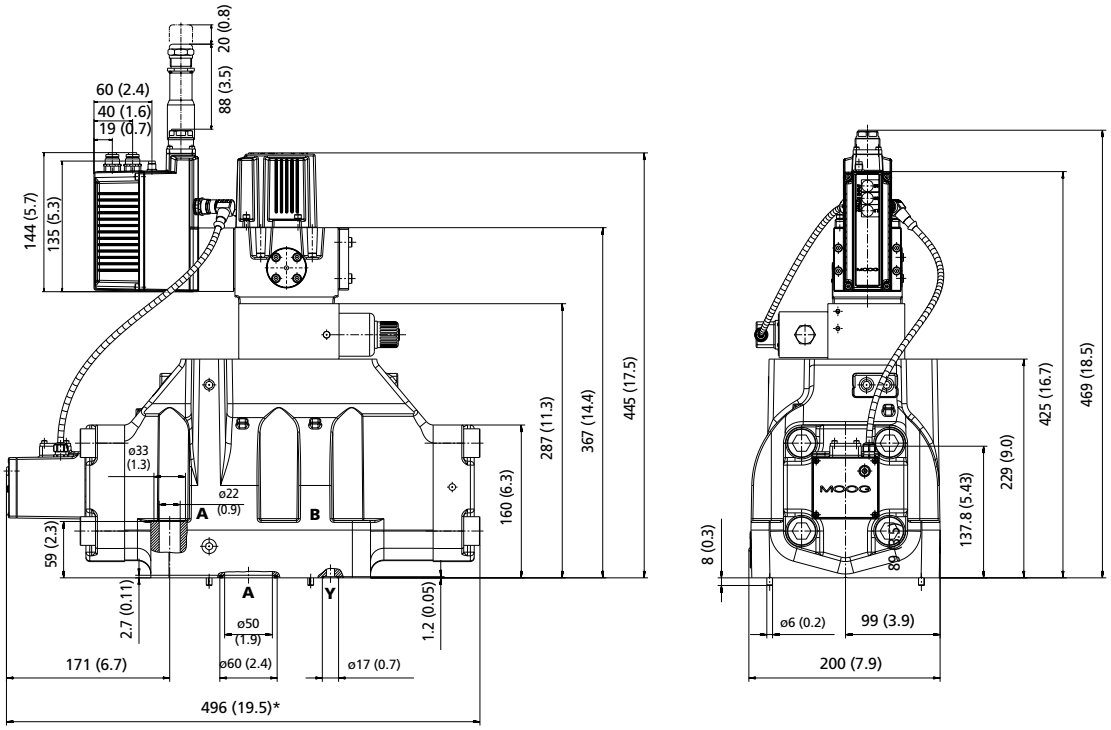
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-10-09-0-05 (see subsequent section “Mounting Pattern”).

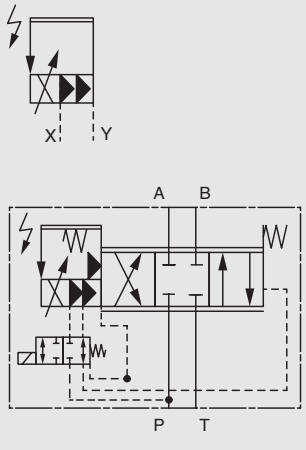
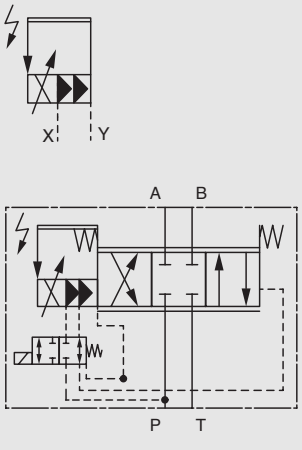
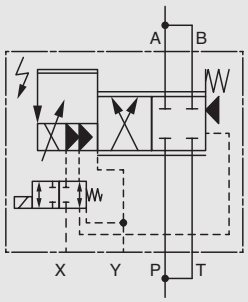
Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



* K10/K15 (524 mm for fail-safe function U)

For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-10-09-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

MODEL		D675			
Valve design		Two-stage, with standard spool			
Pilot valve		Direct Drive Pilot Valve D633			
		Standard		Offset	
Mounting surface		ISO 4401-10-09-0-05			
Installation position		Any position			
Weight	kg (lb)	71.5 (157.6)			
Weight including fail-safe valve	kg (lb)	73 (160.9)			
Storage temperature range	°C (°F)	–40 to +80 (–40 to +176)			
Ambient temperature range	°C (°F)	–20 to +60 (–4 to +140)			
Vibration resistance		30 g, 3 axes, 10 Hz to 2 kHz			
Shock protection		50 g, 6 directions			
HYDRAULIC DATA (measured at 210 bar (3000 psi), fluid viscosity of 32 mm²/s (cSt) and oil temperature of 40 °C (104 °F))					
Operating pressure pilot valve Operating pressure X port Maximum pressure Y port	bar (psi) bar (psi) bar (psi)	Minimum 10 (145) to T or Y 10 (145) to 350 (5000) 50 (725) [1]			
Maximum operating pressure range of main stage Ports P, A and B Port T with Y internal Port T with Y external	 bar (psi) bar (psi) bar (psi)	 350 (5000) 50 (725) [1] 350 (5000)			
Maximum flow	l/min (gpm)	3600 (951)			
Rated flow for 5 bar (75 psi) per land	l/min (gpm)	1000 (264)	1500 (396)	1000 (264)	1500 (396)
Main stage leakage flow (rate) (~ zero lap)	l/min (gpm)	7 (1.8)			
Pilot flow static	l/min (gpm)	1.4 (0.37)			
Pilot flow at a 100 % step	l/min (gpm)	70 (18.5)		52 (13.7)	
Hydraulic fluid		Hydraulic oil according to DIN 51524 parts 1 to 3 and ISO 11158. Others upon request.			
Temperature range of the hydraulic fluid	°C (°F)	–20 to +80 (–4 to +176)			
Recommended viscosity range	mm²/s (cSt)	15 to 45			
Viscosity range	mm²/s (cSt)	5 to 400			
Recommended cleanliness class according to ISO 4406 [2] For operational reliability (functional safety) For longer service life		 18 / 15 / 12 17 / 14 / 11			
TYPICAL STATIC AND DYNAMIC DATA					
Step response time for 0 to 100 % stroke	ms	30	37	35	43
Threshold	%	< 0.1			
Hysteresis	%	< 0.2			
Null shift at Δ T = 55K	%	< 2			
Sample deviation	%	±10			
ELECTRICAL DATA					
Relative duty cycle	%	100			
Degree of protection according to EN 60529		IP 65 (with mating connectors)			
Power supply	V DC	18 to 32			
Maximum current consumption static	A	0.35			
Maximum current consumption dynamic	A	1.8			
External protection per valve	A	2 A (slow)			
EMC		Transient emissions according to EN 61000-6-4:2001, emission protection according to EN 61000-6-2:2005			
Connector type		See section "Electronics"			
Control electronics		Integrated in the valve, see section "Electronics"			

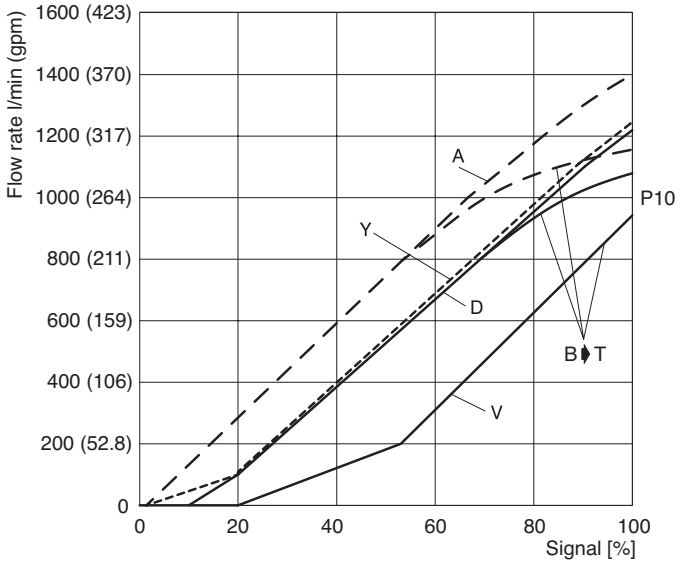
[1] Pressure peaks up to 210 bar (3000 psi) permissible.
[2] The cleanliness of the hydraulic fluid strongly affects functional safety (e.g. safe positioning of the spool, high resolution) and wear of lands (e.g. pressure gain, leak losses).

TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

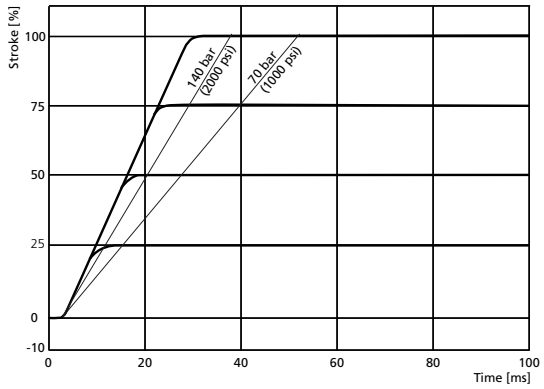
at Δp_N = 5 bar (75 psi) per land



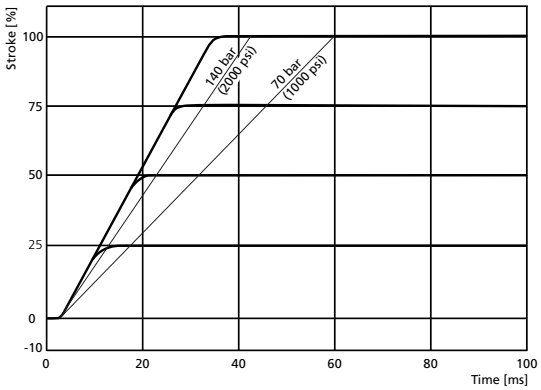
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic
Spool V: 10 % lap, dual gain flow characteristic

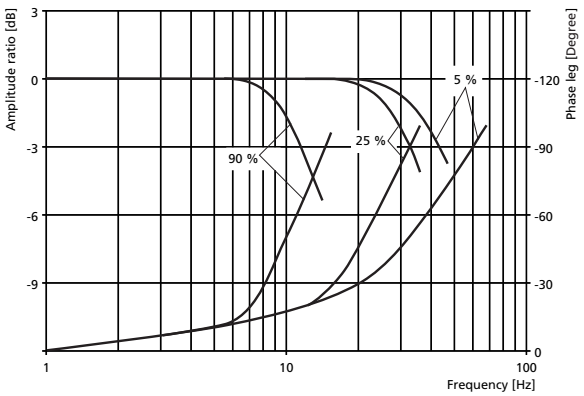
Step response
D675 with Direct Drive Pilot Valve D633, Standard, standard spool P10



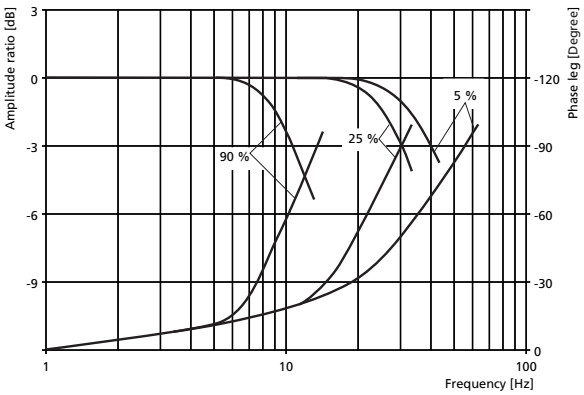
Step response
D675 with Direct Drive Pilot Valve D633, Offset, standard spool P10



Frequency response
D675 with Direct Drive Pilot Valve D633, Standard, standard spool P10



Frequency response
D675 with Direct Drive Pilot Valve D633, Offset, standard spool P10

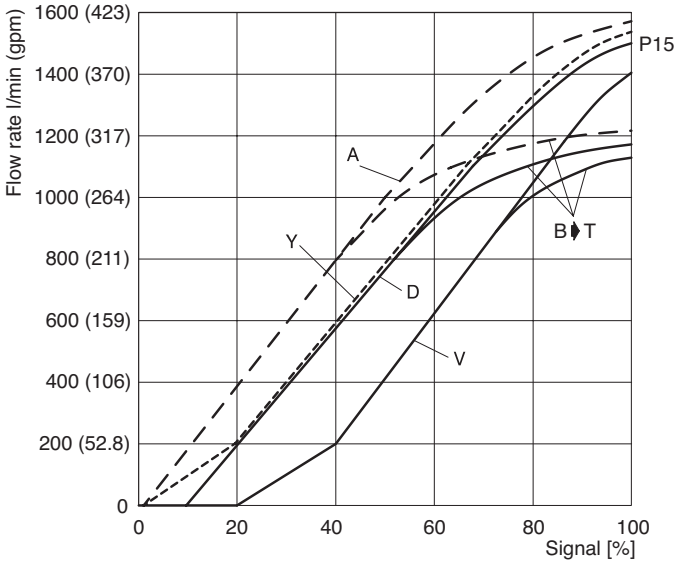


TECHNICAL DATA

Typical characteristic curves at 210 bar (3000 psi) control or operating pressure, fluid viscosity of 32 mm²/s (cSt), oil temperature of 40 °C (104 °F)

Flow-signal characteristic

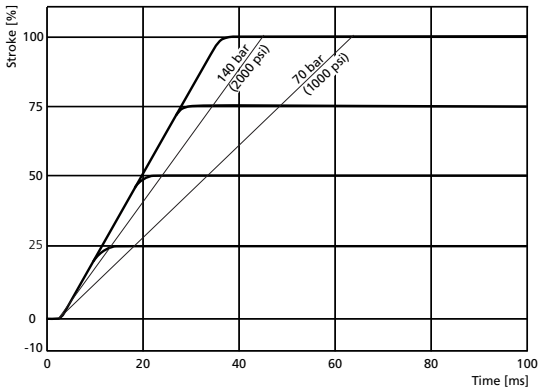
at Δp_N = 5 bar (75 psi) per land



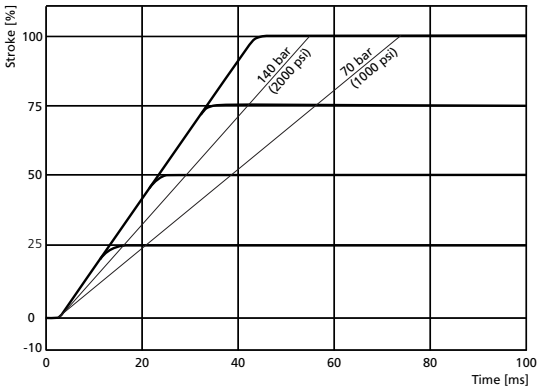
Other spools with different flow characteristics (e.g. adapted to cylinder geometry, regenerative circuits, dual flow gain etc.) are available upon request.

Spool A: ~zero lap, linear flow characteristic
Spool D: 10 % overlap, linear flow characteristic
Spool Y: ~zero lap, dual gain flow characteristic
Spool V: 10 % lap, dual gain flow characteristic

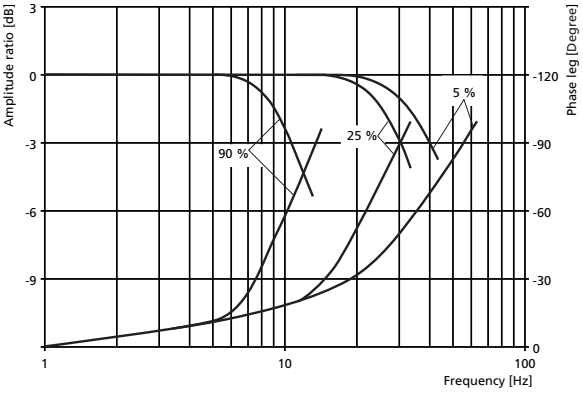
Step response
D675 with Direct Drive Pilot Valve D633, Standard, standard spool P15



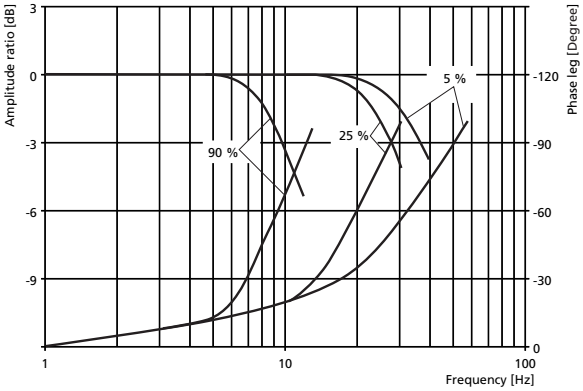
Step response
D675 with Direct Drive Pilot Valve D633, Offset, standard spool P15



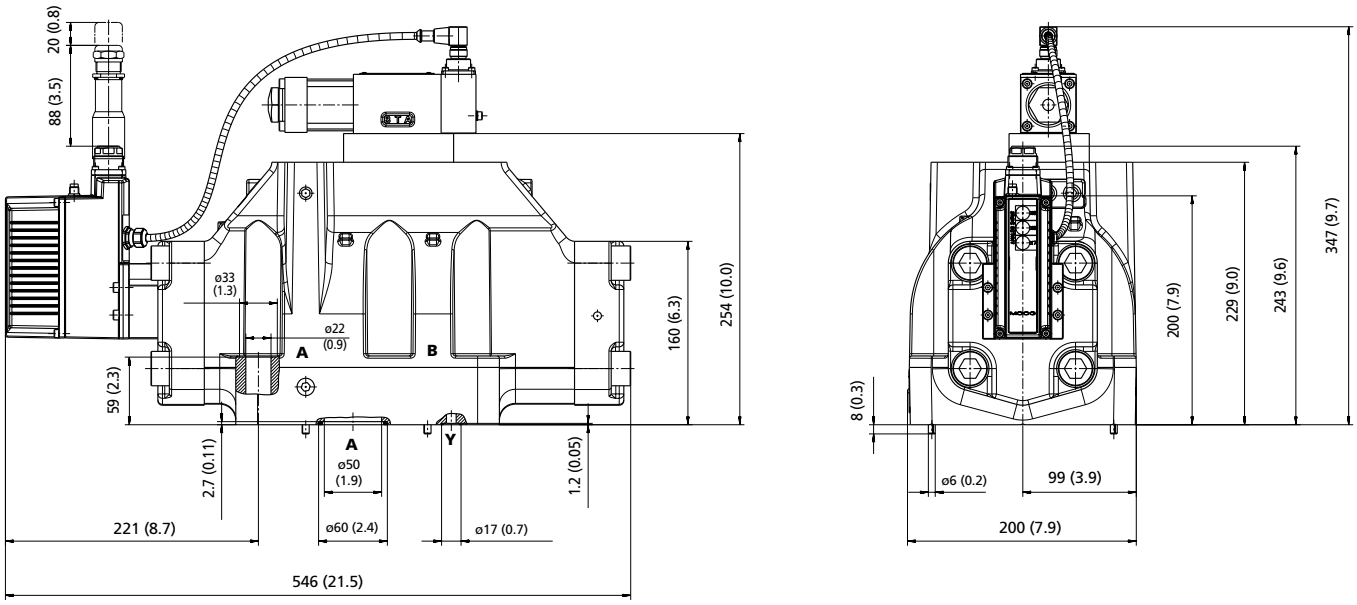
Frequency response
D675 with Direct Drive Pilot Valve D633, Standard, standard spool P15



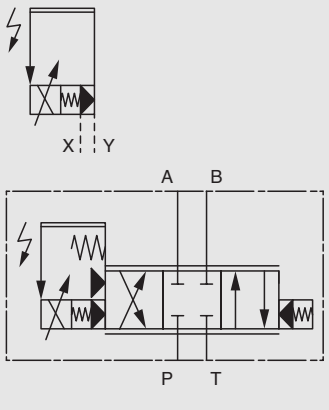
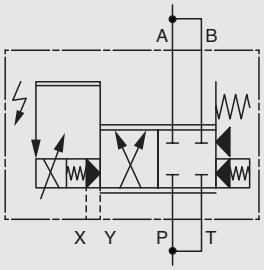
Frequency response
D675 with Direct Drive Pilot Valve D633, Offset, standard spool P15



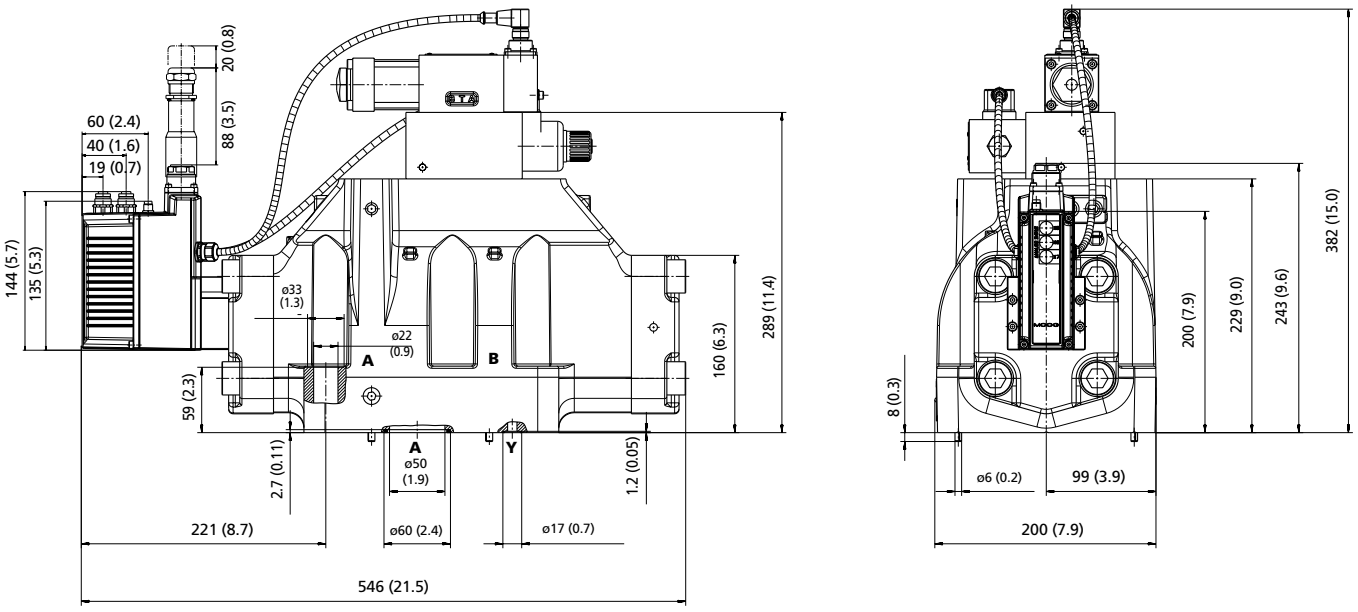
INSTALLATION DRAWING FOR MECHANICAL FAIL-SAFE DESIGN F AND D



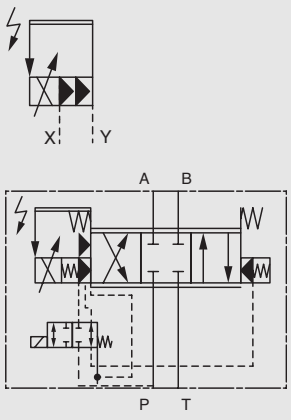
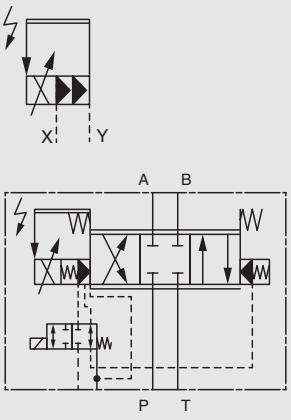
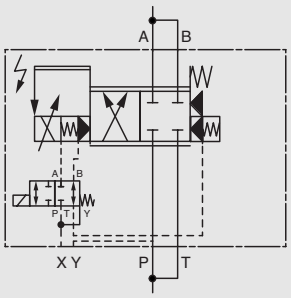
For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-10-09-0-05 (see subsequent section “Mounting Pattern”).

Optional X and Y external	Only X and Y external
	
Fail-safe type F 4-way design	Fail-safe type M 2/2-way design flow direction according to symbol

INSTALLATION DRAWING WITH ELECTRICAL FAIL-SAFE VALVE



For space requirements of mating connector for various fieldbus systems see section “Electronics”.
The mounting surface must conform to ISO 4401-10-09-0-05 (see subsequent section “Mounting Pattern”).

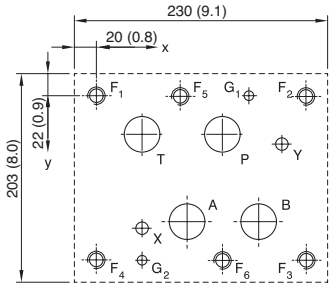
Optional X and Y external	Optional X and Y external	Only X and Y external
		
Fail-safe type U 4-way design defined center position or defined A ➡T	Fail-safe type W 4-way design defined center position	Fail-safe type W 2/2-way design defined center position by mechanical spool stop flow direction according to symbol

Series	Part number for D675 with ServoJet® Pilot Valve D671		Part number for D675 with Direct Drive Pilot Valve D633	
O-ring material 85 shore	HNBR	FKM	HNBR	FKM
Sealing service kit for main stage with the following O-rings for P, T, A, B ID 53.60 x Ø 3.5 for X, Y ID 14.00 x Ø 1.8	B97215-S6X5-32 4 pieces B97217-227H 2 pieces B97217-015H	B97215-K6X5-32 4 pieces B97217-227V 2 pieces B97217-015V	B97215-S6X5-32 4 pieces B97217-227H 2 pieces B97217-015H	B97215-K6X5-32 4 pieces B97217-227V 2 pieces B97217-015V
O-ring material 85 shore	NBR	FKM	NBR	FKM
Sealing service kit for pilot valve	B97215-N661F10	B97215-V661F10	B97215-N630F63	B97215-V630F63
Sealing service kit for fail-safe valve	B97215-N630F63	B97215-V630F63	B97215-N630F63	B97215-V630F63
Sealing service kit for fail-safe adapter plate	B97215-N681-10	B97215-V681-10	B97215-N681-10	B97215-V681-10
Replaceable filter	A67999-200 (200 µm nominal)		–	
Fastening screws M20x90 ISO 4762-10.9 6 pieces	A03665-200-090 Tightening torque 460 Nm (339 ft-lbs)			
Flushing plate	not available			
Connection plate	A25856-001			
Mating connectors, waterproof IP 65 6-pole + PE EN 175201-804 [1] 11-pole + PE EN 175201-804 [2]	 B97007-061 B97067-111			

[1] Cable diameter minimum 8 mm (0.31 in), maximum 12 mm (0.47 in)
[2] Cable diameter minimum 11.5 mm, (0.45 in), maximum 13 mm (0.51 in)

MOUNTING PATTERN VALVE WITH SERVOJET® PILOT VALVE D671 AND DIRECT DRIVE PILOT VALVE D633

The mounting surface of the mounting face must comply with ISO 4401-10-09-0-05
For a maximum flow rate, the ports P, T, A and B should be provided with a diameter of Ø 50 mm (1.9 in)(not according to standard).
Flatness of mounting face < 0.01 mm (0.0004 in) per 100 mm (3.94 in), mean roughness R_a better than 0.8 µm



* Dimension not according to ISO but EN 24340. The position of the mounted safety pin is according to EN. Hole G1 according to ISO is 138.6 mm (5.46 in) and it is drilled in the valve body in line with ISO.

[mm] ([in])	P	A	T	B	X	Y	G_1	G_2	F_1	F_2	F_3	F_4	F_5	F_6
	Ø50 (1.97)	Ø50 (1.97)	Ø50 (1.97)	Ø50 (1.97)	Ø11.2 (0.44)	Ø11.2 (0.44)	Ø7.5 (0.30)	Ø7.5 (0.30)	M20	M20	M20	M20	M20	M20
x	114.3 (4.50)	82.5 (3.25)	41.3 (1.63)	147.6 (5.81)	41.3 (1.63)	168.3 (6.63)	147.6* (5.81*)	41.3 (1.63)	0	190.5 (7.50)	190.5 (7.50)	0	76.2 (3.00)	114.3 (4.50)
y	35 (1.38)	123.8 (4.87)	35 (1.38)	123.8 (4.87)	130.2 (5.13)	44.5 (1.75)	0	158.8 (6.25)	0	0	158.8 (6.25)	158.8 (6.25)	0	158.8 (6.25)

ACCESSORIES

ACCESSORIES FOR ALL SIZES*

Part designation	Quantity	Part number	Comments
Dust protection cover for fieldbus mounting connector X3/X4 **- for external thread** **- for internal thread**	 1 1	 C55823-001 CA24141-001	Required for operation without mating connector (IP protection)
Mating connector for 6-pole + PE connector, IP65	1	B97007-061	EN 175201-804 cable with minimum Ø 8 mm (0.315 in), maximum Ø 12 mm (0.472 in)
Mating connector for 11-pole + PE connector, IP65	1	B97067-111	EN 175201-804 cable with minimum Ø 11.5 mm (0.453 in), maximum Ø 13 mm (0.512 in)
6-pole + PE cable 3 m (9.84 ft)	1	C21033-003-001	
11-pole + PE cable 3 m (9.84 ft)	1	C21031-003-001	
Configuration/ commissioning software	1	B99104	
USB commissioning module	1	C43094-001	
Configuration/ commissioning cable 2 m (6.56 ft)	1	TD3999-137	
Adapter service connector X10, M8x1 to M12x1	1	CA40934-001	Additionally configuration/commissioning cable TD3999-137 is required
M12x1 connector with terminator for CAN bus	1	CA63585-001	
M12x1 bushing with terminator for CAN bus	1	CA63584-001	
SELV - power supply (10 A, 24 V DC)	1	D137-003-001	
Power cable 2 m (6.56 ft)	1	B95924-002	

* Spare parts and accessories that depend on the size are listed under the respective size.

DOCUMENTS FOR ALL SIZES

Designation	Part number	Description
Manual D671 to D675 Series Servo-Proportional Valves	Upon request	Operating Instructions
Technical Note TN 353	CA58437-001	Protective Grounding and Electric Shielding of Hydraulic Valves with Integrated Electronics
Technical Note TN 494	CA48851-001	Maximum Permissible Length of Electric Cables for Valves with Integrated Electronics

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ORDERING INFORMATION

Model number (assigned at the factory)

D671 - D675	.	. . . .	-	. . . .

Type designation

1	2	3	4	5	6
.	.	.	.	.	.

Specification status

–	Series specification
Z	Special specification

Model designation

Variants

1	Spool version	Series
P	Standard spool	D671 to D675
B	Standard spool (5 way)	D671 (with P_1 port)
D	Stub shaft spool	D672 with ServoJet® Pilot Valve
L	Stub shaft spool	D673 and D674 with ServoJet® Pilot Valve
K	Stub shaft spool	D675 Two-stage ServoJet® Pilot Valve D671

2	Rated flow l/min (gpm)	
	(For Δp_N = 5 bar (75 psi) per spool land	Series
30	30 (7.8)	D671
60	60 (15.6)	D671
80	80 (20.8)	D671
01	150 (39)	D672
02	250 (65)	D672
03	350 (91)	D673
05	550 (143)	D674
10	1000 (260)	D675
15	1500 (390)	D675

3	Maximum operating pressure For internal pilot connection X, the maximum operating pressure is the maximum pilot pressure. The valve electronics is adapted to the control pressure.
B	70 bar (500 psi) (preferably with Direct Drive Pilot Valve D633)
F	210 bar (3000 psi)
H	280 bar (4000 psi)
K	350 bar (5000 psi)
	Others upon request

4	Spool design	
A	4-way	~ zero lap, linear flow characteristic
D	4-way	10 % overlap, linear flow characteristic
R	4-way	10 % overlap, dual gain flow characteristic
Q	5-way:	P ◗ A, P1 ◗ B, A ◗ T; 5 % overlap, linear flow characteristic (only D671-B)
Y	4-way	~ zero lap, dual gain flow characteristic
Z	2/2-way:	A ◗ T, B ◗ T1: (D671)
		P ◗ B, T ◗ A: Only X and Y external (D672 to D675)
		Others upon request

5	Pilot stage designs	Series
W	ServoJet® Pilot Valve Standard	D671 and D672
C	ServoJet® Pilot Valve High Flow	D671 to D674
Z	Direct Drive Pilot Valve D633	D671 to D674
K	Two-stage ServoJet® Pilot Valve D670	D672 to D674
D	Two-stage ServoJet® Pilot Valve D671	D675
T	Direct Drive Pilot Valve D633	D675

6	**Fail-safe function** (for more information, see section “Fail-Safe Function”)
M	Center position (only with ServoJet® Pilot Valve)
F	P ◗ B, A ◗ T
D	P ◗ A, B ◗ T
W	Center position (not for D675 with stub shaft spool)
U	P ◗ B, A ◗ T
P	P ◗ B, A ◗ T (only with ServoJet® Pilot Valve)
	Others upon request

ORDERING INFORMATION

7	8	9	10	11	12	13	14	15	16
.	.	.	.	2	–	.	.	. .	. .

16	Factory-defined

15	Factory-defined

14	Fieldbus connector X3, X4
C	CANopen
D	Profibus-DP
E	EtherCAT
O	without fieldbus interface

13	Enable function
A	Without enable signal, the spool moves to a factory defined zero position.
B	Without enable signal, the spool moves to a defined final position A ◗ T or B ◗ T
K	Without enable signal, the spool moves to a factory define zero position. With spool position monitoring on pin 11
L	Without enable signal, the spool moves to a defined final position A ◗ T or B ◗ T With spool position monitoring on pin 11
	Others upon request

11	Supply voltage
2	24 V DC, for more information, see section "Electronics"

10	Signals for 100 % spool stroke	
	Input	Measuring output
D	±10 V	2 to 10 V
E	4 to 20 mA	4 to 20 mA
M	±10 V	4 to 20 mA
X	±10 mA	4 to 20 mA
9	Fieldbus	Fieldbus
Y	Others on request	

9	Valve connector X1
S	6-pole + PE EN 175201-804
E	11-pole + PE EN 175201-804

8	Seal material	
N	NBR	D671 to D674
V	FKM	D671 to D675
S	Kantseal HNBR	D675
	Others upon request	

7	Pilot connection [1]	
	Port X	Port Y
4	internal	internal
5	external	internal
6	external	external
7	internal	external

[1] For limitations, see hydraulic symbols

Options may increase price.
All combinations may not be available.

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