SH10shr
High Speed Servo Valve

SH10shr Rotary Direct Drive Servo Valve

Product Overview

The SH10shr high speed servo valve is driven by a voice coil motor and enhances the magnetic field through double-layer magnetic array technology. Coils configured in series differentia are embedded in the double-layer magnetic field annulus. The spool of the servo valve is fixed to the end of the coil and can move freely within the valve sleeve. When current passes through the coil in the magnetic field, the coil will generate a strong thrust force to move the spool axially.

Key Features

- High-speed response: High-speed response refers to the dynamic characteristics of the valve, including step response and frequency
- Step response: 1.2 ms (0-100% command signal)
- Frequency response: Under ±24% command signal, the -3dB frequency can reach 750 Hz and -90° frequency can reach 540 Hz
- High safety: In case of emergency power failure, the spool will return to the predetermined position under the action of the spring
- High pollution resistance: Hydraulic cleanliness level NAS 1638 level 8 / ISO 4406-1999 19/16 can be used

SH10shr Technical Data

General		
Design		Bi-directional Drive Servo Drive
Actuation		Voice Coil Motor
Size		DN10 / DN6
Mounting Pattern		ISO 4401-05-05-0-05 / ISO 10372-04-04-0-92
Ambient Temperature	°C (F)	-20...+50 (-4…+122) Integrated amplifier type -40…+85 (-40…+185) Separated amplifier type
Mass	kg (lb)	6 (13.2)
Vibration Resistance	g	10, 3 axes (Integrated amplifier type) 20, 3 axes (Separated amplifier type)
Hydraulic Data		
Max Operating Pressure	bar (psi)	350 (5000) P, A, B, 70 (1000) T 350 (5000) P, A, B, 0.5 (7) Y
Fluid		Hydraulic Oil DIN 51524, Part 1-3, other fluid on request
Fluid Temperature	°C (F)	-20...+80 (-4…+176)
Viscosity	cSt	Recommended: 15-500 Allowed: 5-400
Rated Flow(1)	l/min US gal/min	10 – 80 2.6 – 21
Leakage at 210 bar(2)	l/min US gal/min	2% x Q_N
Filtration		ISO 4406 (1999) 18/16/13
Static/Dynamic Data		
Response Time at 100% Step Input(3)	ms	<2
Frequency Response (±25% signal)(3)	Hz	750
Hysteresis	%	<0.1
Threshold	%	<0.3
Null Shift ΔT=55 K	%	<1
Electronics Data		
Supply Voltage	V	24 / 48
Input Signal		±10V / ±10mA / 4…20mA
Feedback Signal		±10V / ±10mA / 4…20mA
EM Compatibility		EN61000-6-2, EN55011: 1998+A1

1) Axis cut, measured with 70 bar pressure drop (two control edges)
2) Axis cut valve
3) Measured as 90% output rise time dP 70 bar P-T

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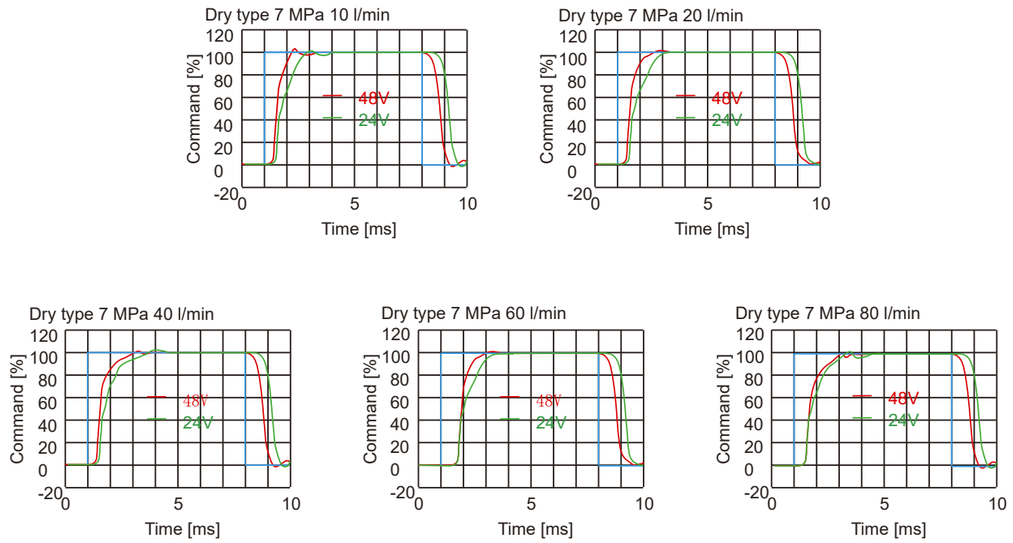
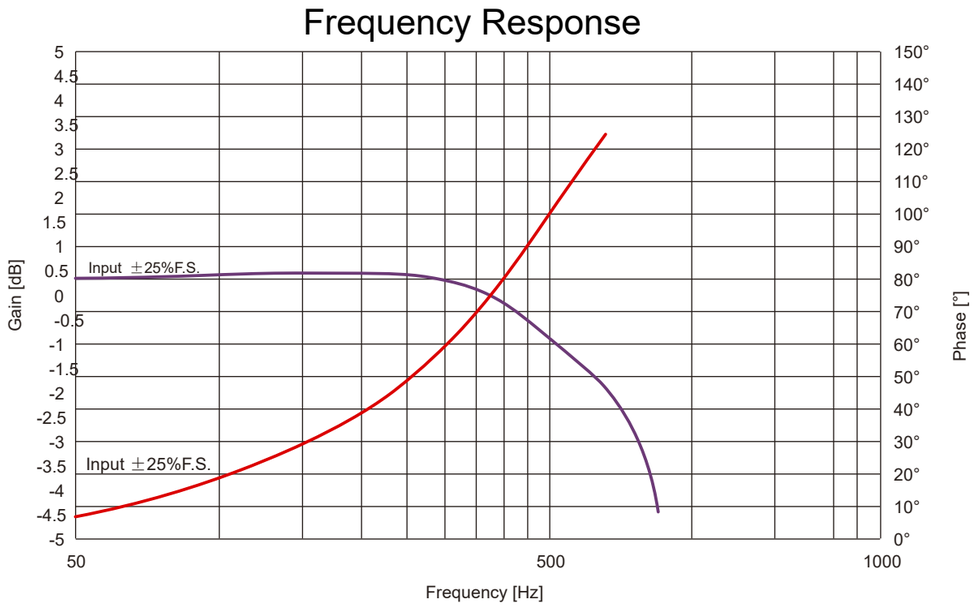
SH10shr Performance Graphs

Step Response



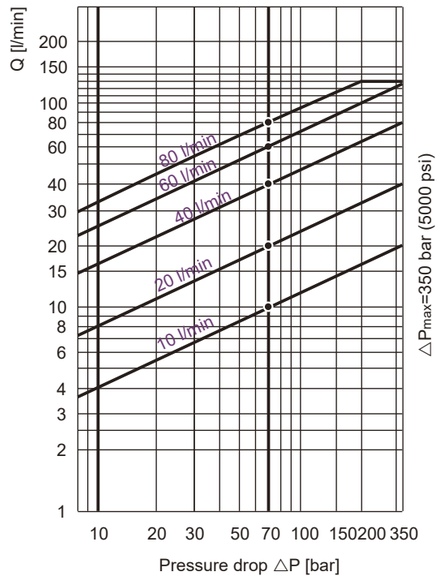
Frequency Response



Test condition: $24V_{DC}$, ΔP=7MPa, Q_N=80 l/min

Valve Load Flow Calculation

The actual flow is related to the displacement of the spool and the pressure drop across the two control edges of the valve port. At 100% demand signal input (e.g. +10V = valve port 100% opened), the flow rate at the rated pressure drop (ΔP_N=35 bar per control Edge) is defined as the rated flow Q_N. For other values other than rated pressure drop, the flow rate of the valve is directly proportional to the square root of the pressure drop across the sharp edge orifices.



$$Q = Q_N \cdot \sqrt{\frac{\Delta P}{\Delta P_N}}$$

Q [l/min] – Actual Flow

Q_N [l/min] – Rated Flow

ΔP [bar] – Actual Pressure Drop across the Edge

ΔP [bar] – Rated Pressure Drop across the Edge

The load flow rate Q of the valve can be calculated by this method when the average fluid velocity of the valve's P, A, B, T ports is less than 30 m/s.

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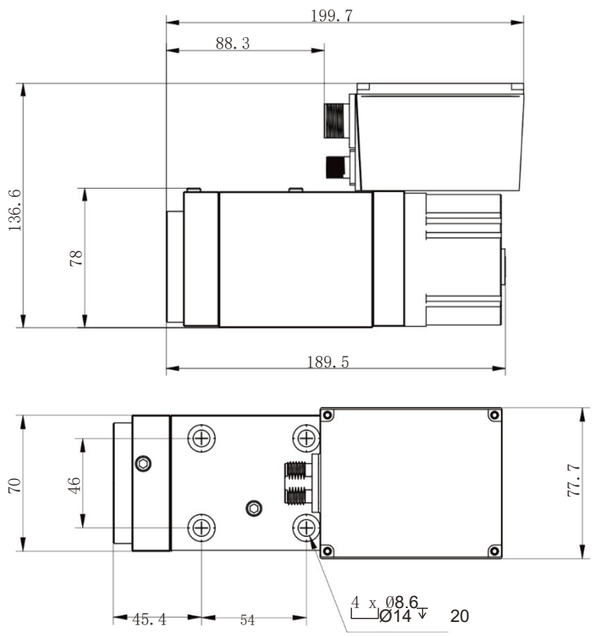
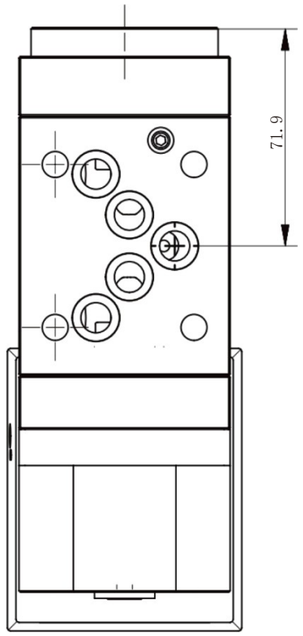
SH10shr Unit Dimensions





Dimensions are displayed in mm. Not to scale.

Mounting Surface Pattern

		P	A	B	T_1	T_2	Y	F_1	F_2	F_3	F_4
Diameter Ø	mm	11	11	11	11	11	6.3	M6	M6	M6	M6
X Position	mm	27	16.7	37.3	3.2	50.8	62	0	62	62	0
Y Position	mm	6.2	21.4	21.4	32.4	32.4	11	0	46	46	46

The mounting manifold must confirm to ISO 4401-05-05-0-05.

Bolts (F_1, F_2, F_3, F_4)

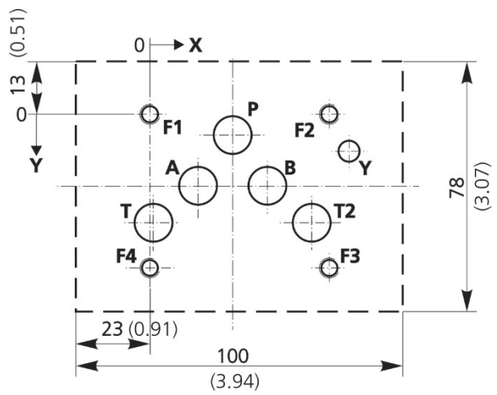
Type: M6 x 65 DIN EN ISO 4762-10.9
Required Torque: 8.5 Nm

O-rings (P, A, B, T_1,T_2)

Type: 12.42 x 1.78, 5 x ISO 3601-1-014
Material: NBR, FKM

O-rings (Y)

Type: 5.28 x 1.78, 1 x ISO 3601-1-009
Material: NBR, FKM



SH10shr	1	2	3	4	5	6
	–	–	–	–	–	–

Rated Flow (ΔP=7MPa)	
1	10 l/min
2	20 l/min
4	40 l/min
6	60 l/min
8	80 l/min

2	Input Signal
B	±10 V
E	±10 mA
S	4…20 mA

3	Output Signal
B	±10 V
E	±10 mA
S	4…20 mA

6	Seal Material
D	NBR
F	FKM
X	Please inquire for other requirement

5	Power Off Protection
Z	Mid position (standard)
D	P-A / B-T
F	P-B / A-T

4	Cooling Mode
V	Y-shaped oil drainage with forced oil cooling
W	Y-shaped forced oil cooling without oil drainage outlet
D	Y-shaped dry cooling system with oil drainage outlet
S	Y-shaped dry cooling system without oil drainage outlet