SH10
Two Stage Servo Valve

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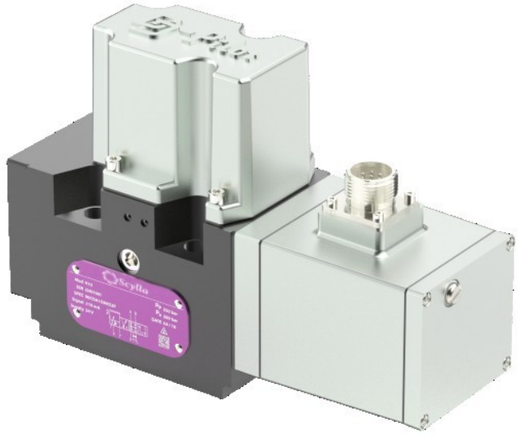
Product Overview

The SH10 series is a two-stage electro-hydraulic servo valve in which a rotary direct drive valve acts as the pilot stage to drive the power stage spool. The power stage spool is controlled by a cylindrical spool valve driven by a servo motor. It overcomes the shortcomings of high-pressure jerking, weak anti-pollution ability and slow response speed of the traditional jet-pipe pilot stage and mechanical feedback pilot stage. It offers a more reliable performance and is widely used in fields such as metallurgy, power, testing, timber and press brakes.

Key Features

- With the rotary direct drive valve as the pilot stage, the leakage flow is reduced by more than 70% compared to the traditional jet-pipe and flapper-nozzle pilot stages, greatly reducing the energy consumption of the entire valve
- The pilot stage has high response characteristics. In particular, the high pressure gain makes the dynamic performance of the entire valve excellent
- The pilot stage has small hysteresis and high resolution. Compared to the traditional jest-pipe and flapper-nozzle valves, the hysteresis is reduced by more than 5x resulting in a significant improvements in the static performance of the entire valve
- Compared to the jet-pipe and flapper-nozzle, the pilot stage can allow a lower starting control pressure, further improving the low-pressure control performance
- The pilot stage is equipped with a built-in servo amplifier, which is easy to adjust, convenient to maintain and has flexible and changeable control methods. Customized products can be made according to different application scenarios



SH10 Technical Data

General		
Design		Two-Stage Electronic Feedback Servo Valve
Actuation		Rotary Direct Drive Pilot Stage Control Valve
Size		DN10
Mounting Pattern		ISO 4401-05-05-0-94
Ambient Temperature	°C	-20...+60
Mass	kg (lb)	5.7 (12.6)
Vibration Resistance	g	30, 3 axis
Hydraulic Data		
Max Operating Pressure	bar (psi)	350 (5000) P, A, B, 210 (3000) T 350 (5000) P, A, B, T, with drain port Y
Fluid		Hydraulic Oil DIN 51524, Part 1-3, other fluid on request
Fluid Temperature	°C	-20...+80
Viscosity	cSt	Recommended: 15-100 Allowed: 5-400
Rated Flow(1)	l/min US gal/min	20 – 200 5 – 53
Leakage at 210 bar(2)	l/min US gal/min	1.5% x Q_N
Filtration		ISO 4406 (1999) 18/16/13
Static/Dynamic Data		
Response Time at 100% Step Input(3)	ms	<12 (see performance graphs)
Frequency Response (±25% signal)(3)	Hz	>85 (see performance graphs)
Hysteresis	%	<0.3
Threshold	%	<0.05
Null Shift ΔT=55 K	%	<1
Electronics Data		
Supply Voltage	V	24
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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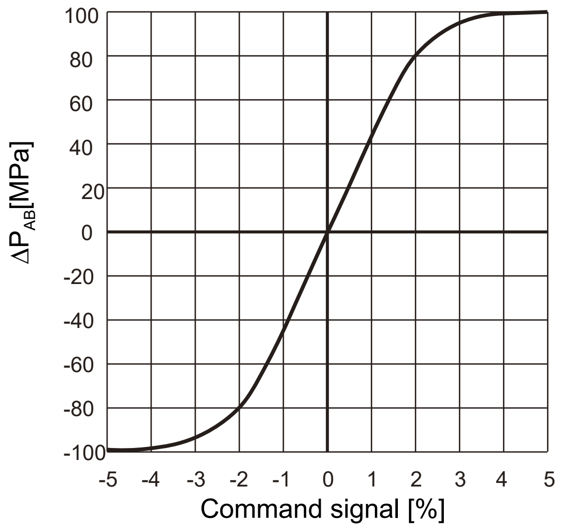
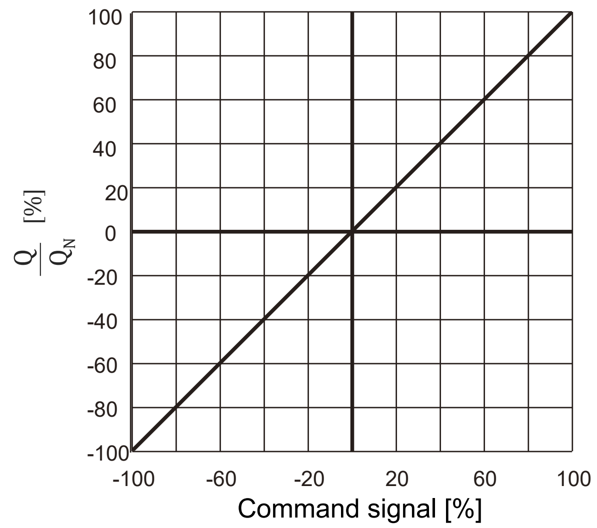
SH10 Performance Graphs

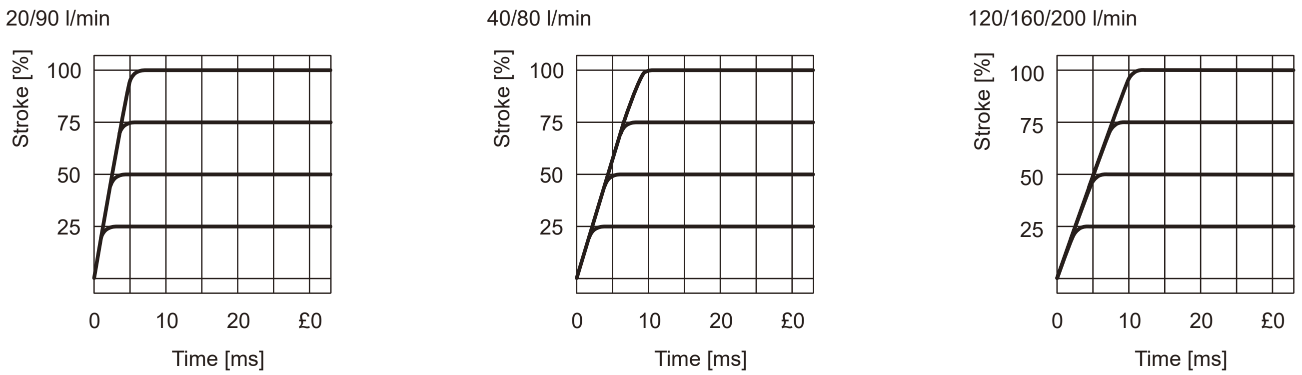
Pressure Gain



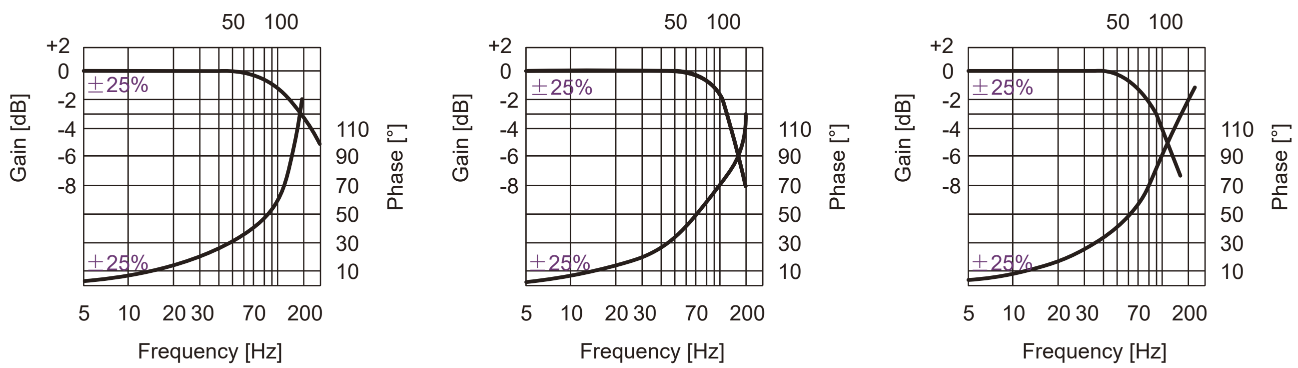
Flow vs Command



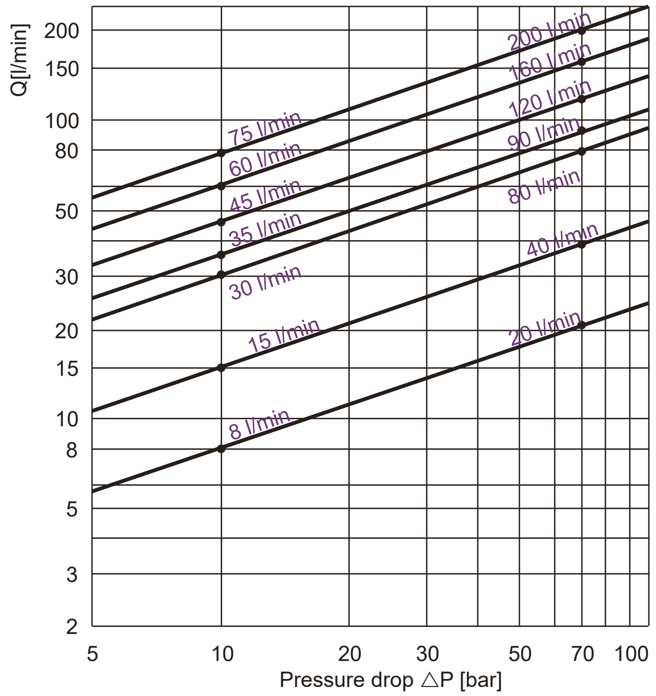
Step Response



Frequency Response



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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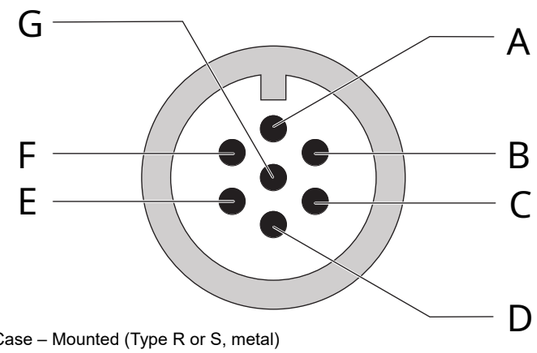
SH10 Electronics Interface Diagrams

7 Pin Circular Interface Diagrams (Code E7)

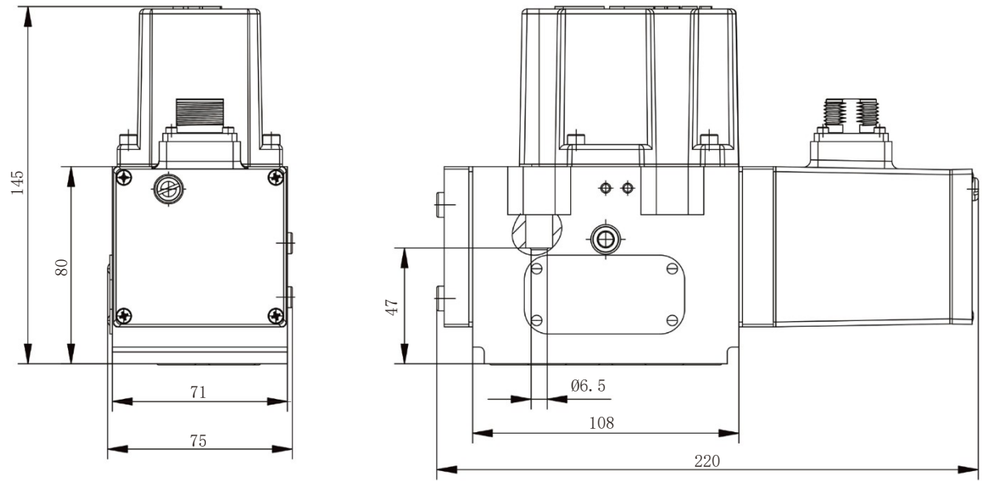


Type:	Case – Mounted (Type R or S, metal)
Termination:	Connector according to EN 175201-804/MIN 5015 equivalent, shell size 14
Number of Contacts:	7

Pin	Function	Description	
A	Supply +	+24 V	
B	Supply 0 V	0 V	
C	Enable Input[1]	U_{EN} > 8.5…28 VDC: Valve ready for operation (enabled) U_{EN} < 6.5 V_{DC}: Valve disabled Input resistance: 10 kΩ	
D	Input +	Differential Input Signal +	
E	Output -	Differential Input Signal -	
F	Output +	U_{F-B} = 2 to 10 V; U_{F-B} is proportional to the spool position; 6 V corresponds to the spool center position R_L = 500 Ω	I_{out} = 4 to 20 mA referenced to B; I_{out} is proportional to the spool position; 12 mA corresponds to the spool center position; The output is short-circuit-proof; RL = 0 to 500 Ω
G	Earth		-

1) When the enable function is selected, the function of pin C is the enable input. This replaces the standard pin function.

SH10 Unit Dimensions



Dimensions are displayed in mm. Not to scale.

Mounting Surface Pattern

		P	A	B	T	T_2	X	Y	F_1	F_2	F_3	F_4
Diameter Ø	mm	11.5	11.5	11.5	11.5	11.5	6.3	6.3	M6	M6	M6	M6
X Position	mm	27	16.7	37.3	3.2	50.8	-8	62	0	54	54	0
Y Position	mm	6.2	21.4	21.4	32.4	32.4	11	11	0	0	46	46

Bolts (F_1, F_2, F_3, F_4)

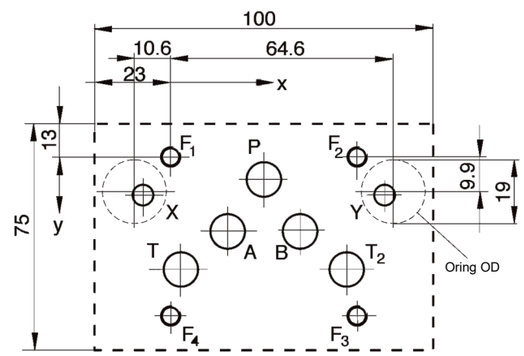
Type: M6 x 55 DIN EN ISO 4762-10.9
Required Torque: 13 Nm

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

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

O-rings (X, Y)

Type: 15.60 x 1.78, 1 x ISO 3601-1-016
Material: NBR, FKM



Variants on request

At Scylla, we are proud of our ability to offer tailored solutions that meet our customer's specific needs. If you require a non-standard configuration, or a bespoke modification, we are confident we can provide you with the best solutions. Talk to us using the contact details provided and one of our team will respond as soon as possible.

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SH10 Ordering Information

SH10	1		_ _	_ _	2 _	3 _	4 _	5 _	6 8	7 9	10 _	11 _ _

1	Rated Flow	
	Servo valve pressure drop △P_N 7MPa	1MPa
20/08	020	08
40/15	040	15
80/30	080	30
90/35	090	35
120/45	120	45
160/60	160	60
200/75	200	75

2	Command Signal	Actual Valve
B	±10 V	2…10 V
E	±10 V	4…20 mA
C	±10 mA	4…20 mA

3	Spool Position	Without Electrical Signal
O	undefined (no fail safe function)	
	Mechanical fail safe versions	Achieved at
	D P→A , B→T	P_x > 1MPa
F	P→B , A→T	P_x > 1MPa

4	Function Code
O	No enable signal input, pin C is not used
A	The main spool moves to the adjustable center position when there is no enable signal.
B	The main spool moves to the A→T or B→T position when there is no enable signal (same as when the 24V power supply is cut off)

Can be customized according to needs.

5	Pilot Connections	
	Inlet port	Return port
1	Internal control	Internal emission
2	External control	Internal emission
3	External control	External emission
4	Internal control	External emission

6	Bushing Spool Design
O	4-way: critical lap, linear characteristic
X	Please inquire for other requirement

7	Valve Dynamics
H	High performance
Q	Response characteristics can be reduced on request

8	Pressure Range [bar(psi)]
	Maximum operating pressure
K	35MPa

9	Valve Connector
S	6+PE , Part 804 of EN175201 R-type or S-type

10	Electrical Supply
2	$24V_{DC}$ (18-$32V_{DC}$)

11	Seal Material
D	NBR
F	FKM
X	Please in quire for other requirement