SH792 Series 2-stage servo valve

The SH792 series servo valve is a flow control servo valve designed for both three-way and four-way applications. This two-stage servo valve series has been specifically developed to meet the demanding requirements of high-flow and high dynamic performance systems. The integrated electronic control unit incorporates advanced SMD technology, representing an improvement over previous designs. Each valve in this series features a pilot valve configuration and offers the option of standard or high-response variants. The maximum rated flow capacity of the SH792 series reaches 1000 L/min, making it suitable for use in position, velocity, force (or pressure) servo control systems where exceptional dynamic response is required.

- Electrical position feedback with Linear Variable Displacement Transducer(LVDT),no wear
- Integrated SMD electronics with false polarity protection
- Optional external pilot supply and return connections via fifth and sixth port in valve body
- Low threshold and hysteresis, excellent null stability
- Preadjusted at factory

Principle of operation

An electrical command signal (set point, input signal) is applied to the integrated control amplifier which drives a current through the pilot valve coils. The pilot valve produces differential pressure in its control ports. This pressure difference results in a pilot flow which causes main spool displacement.

The position transducer which is excited via an oscillator measures the position of the main spool （actual value, position voltage）.

This signal then is demodulated and fed back to the control amplifier where it is compared with the command signal. The control amplifier drives the pilot valve until the error between command signal and feedback signal is zero. Thus, the position of the main spool is proportional to the electrical command signal.

The actual flow depends on the electrical command signal and the valve pressure drop, and maybe calculated using the square root function for a sharp-edged orifice.

The flow value Q calculated in this way should not exceed an average flow velocity of 30 m/s in ports P, A, B and T.

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

Q [l/min] = calculated flow
Q_N [l/min] = rated flow
ΔP [MPa] = actual valve pressure
ΔP_N [MPa] = rated valve pressure drop

If large flow rates with high valve pressure drops are required, an appropriate higher pilot pressure has to be chosen to overcome the flow forces. An approximate value can be calculated as follows.

$$p_X \geq 2{,}5 \cdot 10^{-2} \cdot \frac{Q}{A_K} \sqrt{\Delta p}$$

Q [l/min] = max.flow
ΔP [MPa] = valve pressure drop with Q
A_K [cm^2] = spool drive area
P_X [MPa] = pilot pressure

The pilot pressure P_X has to be at least 15 bar above the return pressure of the pilot stage.

General technical data

Operating pressure range

Main stage

Ports P, A and B	
with X intemal	≤31.5 MPa
with X extemal	≤35 MPa
Port T	
Port T with Y internal	≤21 MPa
Port T with Y external	≤35 MPa

Pilot valve

Ports P, A and B	
SH10SHR Series	≤35 MPa
Port T	≤5 MPa

Temperature

Ambient	-20 to +60℃
Fluid	-20 to +80℃

Seal material FKM, others on request

Operating fluid Mineral oil based hydraulic fluid (to DIN 51524), others on request

Viscosity recommended 15 to 100mm²/s

Class of cleanliness The cleanliness of the hydraulic fluid greatly effects the performance (spool positioning, high resolution) and wear (metering edges, pressure gain, leakage) of the valve.

Recommended cleanliness class

for normal operation:	ISO 4406<17/14/11
for longer life:	ISO 4406<16/13/10

System filtration

Pilot valve: High pressure filter (without by-pass, but with dirt alarm) mountedin the mainflow and if possible,directly upstream of the servo-valve.

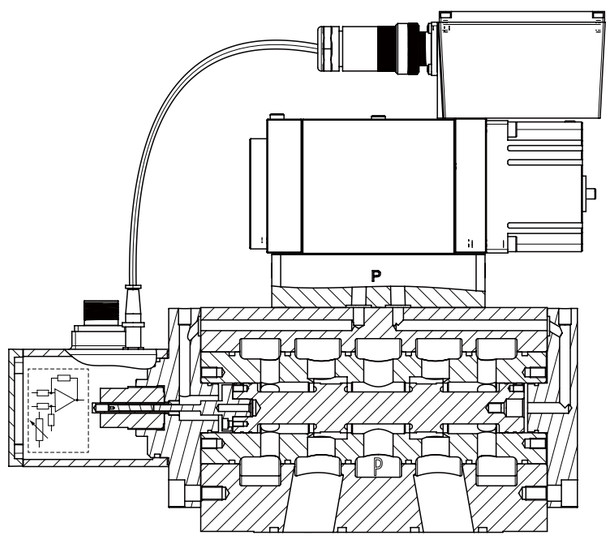
Main stage: Main stage: high pressure filter as for the pilot stage. in combination with a fast regulating VD-pump a bypass filter is possible.

Filter rating recommended

for normal operation:	$\beta_{10}\geq75$ (10 µm absolute)
for longer life:	$\beta_{5}\geq75$ (5 µm absolute)

Installation options any position, fixed or movable
Vibration 30 g, 3 axes
Degree of protection EN 60529: IP65 (with mating connector mounted)

shipping plate Delivered with an oil sealed shipping plate



2 stage Servovalve
SH792 with Pilot valve
SH10SHR Series

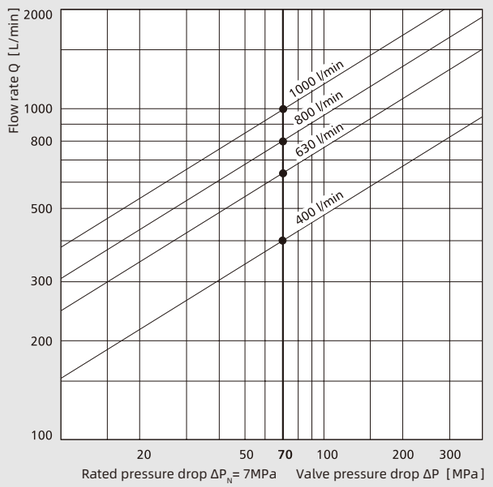
Technical data

Model....Type			SH792				
Mounting pattern			ISO 10372-06-05-0-92				
Valve body version			4-way 2-stage with bushing spool assembly				
Pilot valve			2-stage, optional SH10SHR Series				
Pilot connection	optional, internal or external		X and Y				
Weight			28.2kg				
Dimensions			335.3 x 293.1 x 144 mm				
Rated flow	(±10%) ΔP_N = 3.5MPa/per land	[l/min]	400	630		800	1000
Response time*	for 0 to 100% stroke (dependent on pilot valve)	[ms]		4~12			
Threshold*		[%]		<0,2			
Hysteresis*		[%]		<0.5			
Null shift	with ΔT = 55K	[%]		<2			
Null ieakage fiow*	total, max.	[l/min]	10	14		14	14
Pilot leakage flow*	max., for 100% step signal (dependent on pilot valve)	[l/min]		6~16			

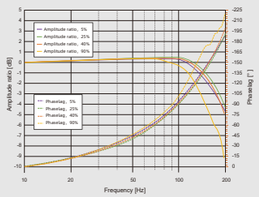
*measured at 210 bar pilot or operating pressure, fluid viscosity of 32 mm²/s and fluid temperature of 40 °c.

Typical characteristic curves measured at 210 bar pilot or operating pressure, fluid viscosity of 32 mm?s and fluid temperature of 40 "c

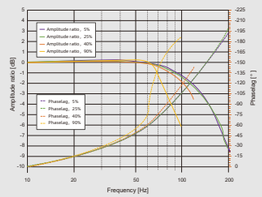
Valve flow diagram



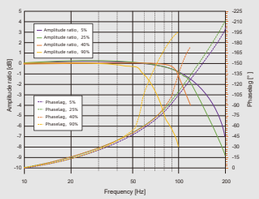
Valve flow for maximum valve opening (100% command signal) as a function of the valve pressure drop



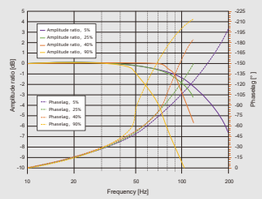
Rated flow 400 l/min
Pilot valve H10SHR 20 l/min



Rated flow 630 l/min
Pilot valve H10SHR 20 l/min

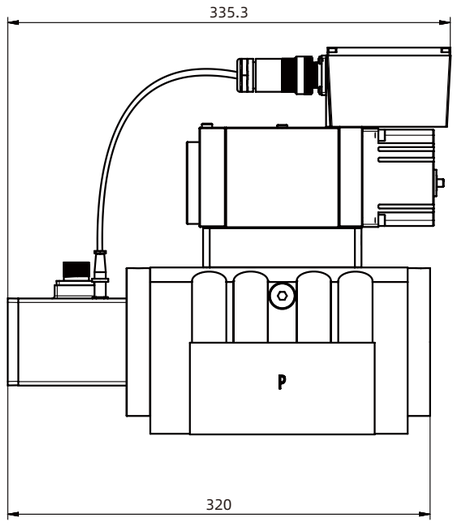


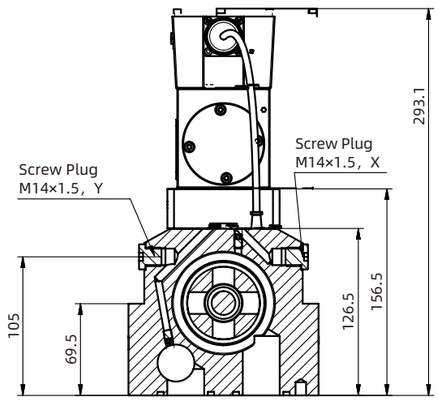
Rated flow 800 l/min
Pilot valve H10SHR 20 l/min

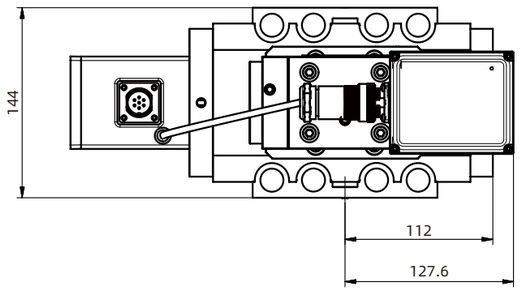


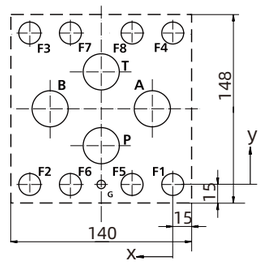
Rated flow 1000 l/min
Pilot valve H10SHR 20 l/min

Installation drawings with SH10SHR series pilot valve（Unit：mm）
Conversion instructions and spare parts and accessories









The X and Y tubes have to be connected to the Hydroservo valve body by fittings.Mounting surface needs to be flat within 0,02 mm.Average surface finish value, Ra, better than 1μm.

	P	A	B	T	G	F1	F2	F3	F4	F5	F6	F7	F8
	Ø28	Ø28	Ø28	Ø28	Ø8	M16	M16	M16	M16	M16	M16	M16	M16
x	55,4	15,8	95,0	55,4	55,4	0	110,8	110,8	0	31,5	79,3	79,3	31,5
y	30,1	58,7	58,7	87,3	0	0	0	117,4	117,4	0	0	117,4	117,4

Spare parts and accessories for SH792 Series

O-rings (included in delivery)			FPM 85 shore
for P，T，A，B	4 pieces	ID 36 × 3.5	as service seal set
Mating connector,waterproof IP 65（included in delivery）		for cable dia	
6+PE-pole DIN43563		min.10 mm，mac.12 mm	
Mounting bolts（included in delivery）			
M 16 × 60 DIN 912-10.9	8 pieces	required 290Nm	
Replaceable filter for pilot valve（not included in delivery）		65μm nominal	

Valve electronics with supply voltage 24 Volt

Command signal 0 to ±10 mA floating
Valves with
current command input
The spool stroke of the valve is proportional to I_D=-I_E.
100% valve opening P→A and B→T is achieved at I_D=+10 mA.At 0m Acommand the spool is in centred position.
The input pins D and E are inverting. Either pin D or E is used according to the required operating direction. The other pin is connected to signal ground at cabinet side.

Command signal 0 to +10 V,
Valves with
voltage command input
The spool stroke of the valve is proportional to (U_D-U_E).
100 % valve opening P→A andB→T is achieved at(U_D-U_E)=+10V.At 0 V command the spool is incentred position.
The input stage is a differential amplifier. lf only one command signal is available, pin D or E is connected to signal ground at cabinet side, according to the required operating direction.

Actual value 4 to 20 mA
The actual spool position value can be measured at pin F (see diagram below). This signal can be used for monitoring and fault detection purposes.
The spool stroke range corresponds to 4 to 20 mA.
The centred position is at 12 mA. 20 mA corresponds to 100 % valve opening P → A and B → T.

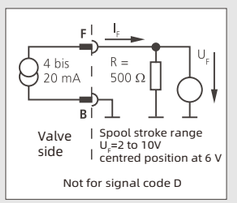
The position signal output 4 to 20 mA allows to detect a cable break when I_F= 0 mA.

For failure detection purposes it is advised to connect pin F of the mating connector and route this signal to the control cabinet

General requirements

- ☐ Supply 24 VDC, min. 18 VDC, max. 32 VDC
- ☐ All signal lines, also those of external transducers, shielded
- ☐ Shielding connected radially to ⊥ (0V), power supply side, and connected to the mating connector housing (EMC)
- ☐ EMC:Meets the requirements of EN 55011:1998,class B, EN 50082-2:1995,performance criterion class A
- ☐ Minimum cross-section of all leads ≥ 0,75 mm²
  Consider voltage losses between cabinet and valve.
- ☐ Note:When making electrical conn ections to the valve (shield, protective grounding)appropriate measures must be taken to ensure that locally different earth potentials do not result in excessive ground currents. See also Moog Application Note AM 353 E.

Circuit diagram for measurement of actual value I_F.(position of main spool)



Note: Enable input

With enable signal off, the main spool will move to asafe position.

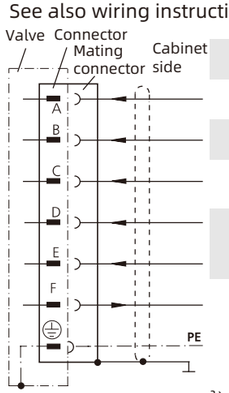
a) Centred position
(unbiased pilot valve)
function code A[1])

b) End position
(biased pilot valve)
function code B[1])

[1])see type designation

Wiring for valves with 6+PE pole connector

to EN 175201 Part 804[2], and mating connector (type R and s, metal shell)with leading protective earth connection(⏚).
See also wiring instructions AM 426 E



Function	Current command	Voltage command
Supply	24 VDC (min.18 VDC, max. 32 VDC).I_{max}=300 m	
Supply / Signal ground	⊥（0V）	
Enabled Not enabled	U_{C-B}>+8.5 VDC U_{C-B}<+6.5 VDC　24 VDC 时 I_e=2.0mA （see note above）	
Input rated command（differential）	Input command　I_D=-I_E:0~±10mA Input command（inverted）　I_E=-I_D:0~±10mA　（R_e=200Ω） Input voltage for U_{D-B}andU_{E-B} for both signal types is limited to min.-15Vand max.+32V	U_{D-E}=0~±10V R_e=10kΩ
Output actual value spool position	I_{F-B}=4 to 20mA: At 12 mA spool is in centred position.R_L =100 to 500 Ω Signal code **D** (see page 7):UF-B=2 to 10 V.At 6 V Spool is in centred position.R_a=500Ω	
Protective earth		

[2]) formerly DIN 43563

Ordering information

Model-Number

SH792 – □□□□□ – □□□□□□ — □□□□□□

Type designation

Factory code	
	assigned at the factory

Valve version	
S	Servovalve 2-stage

Rated flow Q_N[L/min] at ΔP_N=3.5MPa per land	
40	400
63	630
80	800
100	1000

Maximum operating pressure p_p	
J	315 bar. At p,≤ 315 bar (X and Y external) operating pressure in ports P, A, B and T up to 350 bar possible

Main spool type	
O	4-way: axis cut, linear characteristic
X	Special structure

Pilot valve		
P	SH7lc	Standard
Q	SH10SHR	High response

Spool position of main stage without electrical supply		
	position	Pilot pressure（bar）
O	undefined	≥15
A	P→B，A→T	≥15
B	P→A，B→T	≥15

Function code		
O	24V	Without enable input
A	24V	Without enable signal applied the spool moves to adjustable centered position
B	24V	Without enable signal applied the spool moves into defined end position A→T or B→T

Supply voltage	
2	24VDC（18～30VDC）

Signals for 100% spool stroke		
	input	output
A	±10V	±10V
X	±10mA，floating	4～20mA
B	±10mA	±10mA
S	4～20mA	4～20A
M	±10V	4～20mA

Valve connector	
S	6+PE，DIN 43563

Seal material	
V	FKM

Pilot connections and pressure			
	Supply X	ReturnY	
4	internal	internal	Parameters of the control electronics are adapted to the pilot pressure. See operating pressure on the nameplate and in this ordering information.
5	external	internal	
6	external	external	
7	internal	external	

Memorandum