



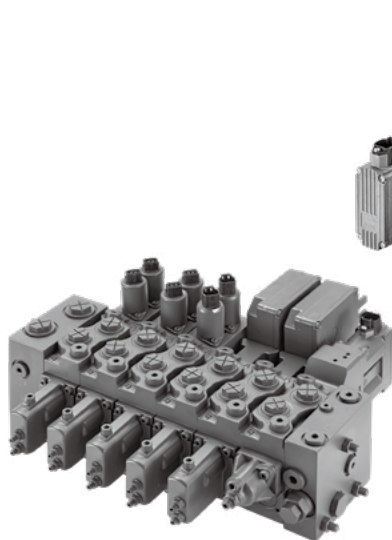
1.4

HVSP SERIES

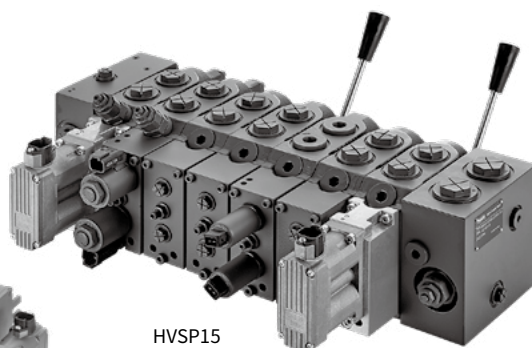
LOAD SENSING PROPORTIONAL CONTROL VALVE

HVSP:

Nominal size:	12	15
Rated pressure(bar):	350 (pump side) 420 (actuator side)	350 (pump side) 420 (actuator side)
Rated flow(L/min):	120	200



HVSP12



HVSP15

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Features

1. System

Load pressure independent flow distribution

- Open center, for fixed displacement pump system
- Closed center, for load sensing variable pump system
- Priority function
- Various pilot control methods

2. Structure

- Sandwich plate of design
- Max. 15 middle section (HVSP12)
- Max. 9 middle section (HVSP15)

3. Pressure

- Primary and secondary pressure relief valve
- LS relief valve (With LS pressure relief valve in each section)

4. Flow

- Load pressure compensated
- Quick response
- Low hysteresis

5. Applications



Aerial work platform



Forestry machine



Drilling rigs



Mining truck



Concrete pump truck



Crane



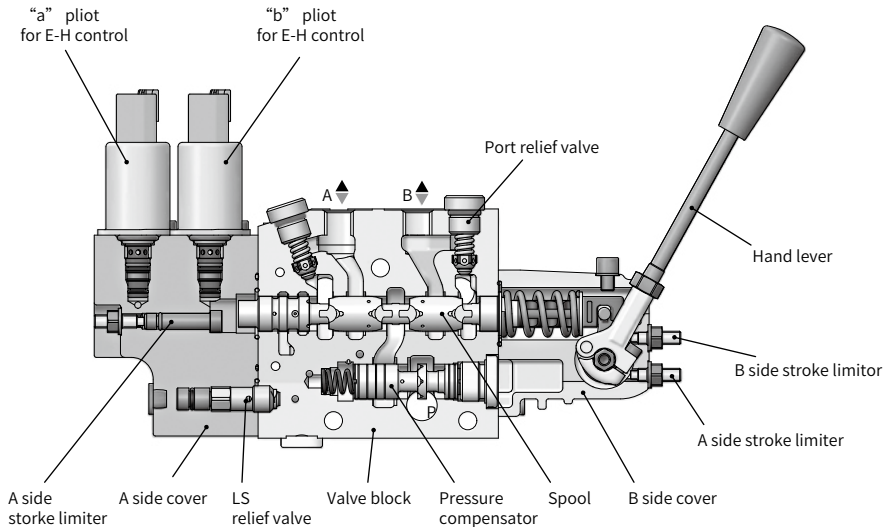
Telehandler



Stone Crusher

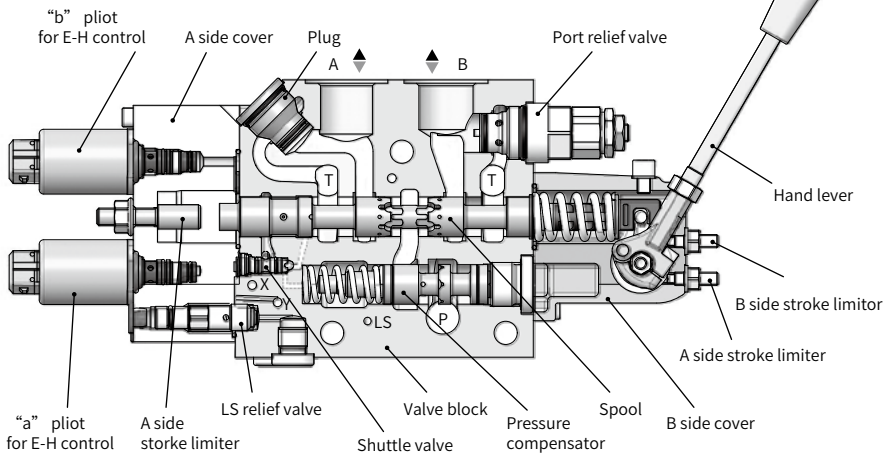
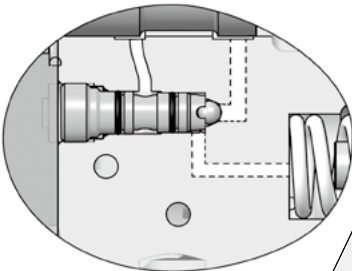
Section view

HVSP12:



HVSP15:

Shuttle valve for A, B port pressure signal selection



Technical data

General

Nominal Size			12	15
Structure	Stackable, proportional, load sensing, pre-compensated			
Type of connection	ISO BSP thread, metric thread (with SAE thread option per SAE J1626)			
Mass (kg)	Inlet element	Open center	5.53/5.29	9.8
		Closed center	4.34	6.5
	Middle section	Hydraulic operation	4.25	5.4
		Normal E-H operation	4.65	6.5
		Super E-H operation	4.95	7.5
	End element		3.09	4.5

Hydraulic

Nominal Size		12	15
Rated flow Q(L/min)	With load-holding function, without pressure compensator.	140	200
	Without load-holding function, with pressure compensator.	120	190
	With load-holding function, with pressure compensator.	120	150
Max. operating pressure at port (bar)	P	350	
	LS	330	
	A/B	420	
	T	30	
	Y	Less than 2	
Pilot pressure (bar)	a/b	Less than 35	
	X	30	
Pilot pressure control range	For Hydraulic control	7~22bar (102~319psi)	8.5 ~22.5 bar (123 ~ 330 psi)
Required control Δp at the control block		Compensator-S; C; T: 15bar (218psi) Recommended variable pump set pressure difference: 18~20bar (261~290psi)	Compensator-S; C: 18bar (260psi) Compensator-T: 25bar (360psi)
Recommended hydraulic pilot control units	See H-2TH6 characteristic curve 97		
LS pressure relief function (adjustment ranges)	50 ~ 149 bar (725 ~ 2160psi); 150 ~ 330bar (2175 ~ 4800psi))		

Electric

Normal E-H operation	- Electrical on/off valve: Installed on the 'A' side cover - Connection: Deutsch DT04-2P or AMP Junior-Timer - Protection class: IP69k - Supply voltage: 12 or 24VDC	- Electrical proportional valve: Installed on the 'A' side cover - Dither frequency required: 150Hz - Hysteresis: Less than 3%(at valid range) - Connection: Deutsch DT04-2P or AMP Junior-Timer - Protection class: IP69k - Reducing pressure range: 0~30 bar - Control current@24VDC: 0~800mA, @12VDC: 0~1500mA
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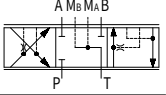
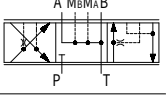
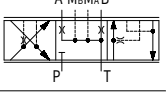
Using environment

Hydraulic fluid	Mineral oil (HL, HLP) according to DIN 51524. Other hydraulic fluids, such as HEES (Synthetic Ester) according to VDMA 24568.
Hydraulic fluid temperature range(°C)	-20 to + 80
Viscosity range ν (mm ² /s)	10 to 380
Maximum permissible degree of contamination of the pressure fluid cleanliness class to ISO 4406 (C)	Class 20/18/15, we therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$

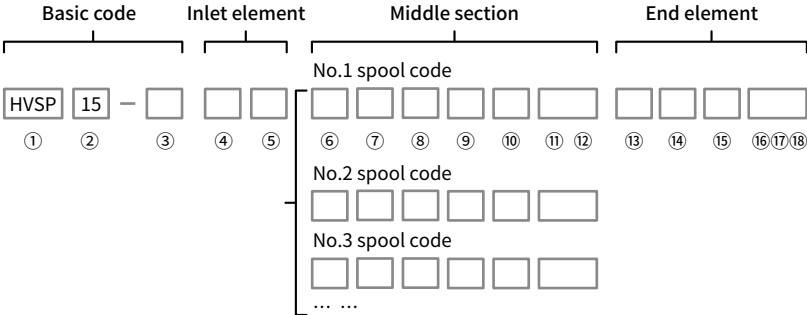
(For applications outside above mentioned parameters, please consult our sales dept.)

Ordering code

Basic code			Inlet element			Middle section						End element			
HVSP			15			No.1 spool code						No.2 spool code			
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯⑰⑱
						No.3 spool code									
															

Basic code	① Structure	HVSP	Stackable, proportional control, load sensing, pressure compensated
	② Nominal size	12	15
	③ Number of blocks	..	01~12 01~09
Inlet element	④ Circuit types	J	Closed center, for variable piston pump system
		p	Open center, for fixed displacement pump system
	⑤ Main relief valve	Q	Without main pressure relief valve(not for open center)
Middle section		...	With main pressure relief valve,(pressure in bar, 3-digits)
	⑥ Spool function	S	With load-holding function, with pressure compensator
		T	Without load-holding function, with pressure compensator
		C	With load-holding function, without pressure compensator
	⑦ LS relief valve	QMQ	With LS pressure relief plug, with LS measuring port
		...M...	With LS pressure relief valve, with LS measuring port (pressure in bar, 3-digits)
		...MQ	Only with A port LS pressure relief valve, with LS measuring port (pressure in bar, 3-digits)
		QM...	Only with B port LS pressure relief valve, with LS measuring port (pressure in bar, 3-digits)
		...R...	With remote LS pressure relief valve, decreasing characteristic curve, with LS measuring port (pressure in bar, 3-digits)
		...L...	With remote LS pressure relief valve, increasing characteristic curve, with LS measuring port (pressure in bar, 3-digits)
	⑧ Spool symbol	E	
		J	
		Q	
	⑨ A/B flow	...—...	Flow in l/min, 3-digits, e.g. 50-50

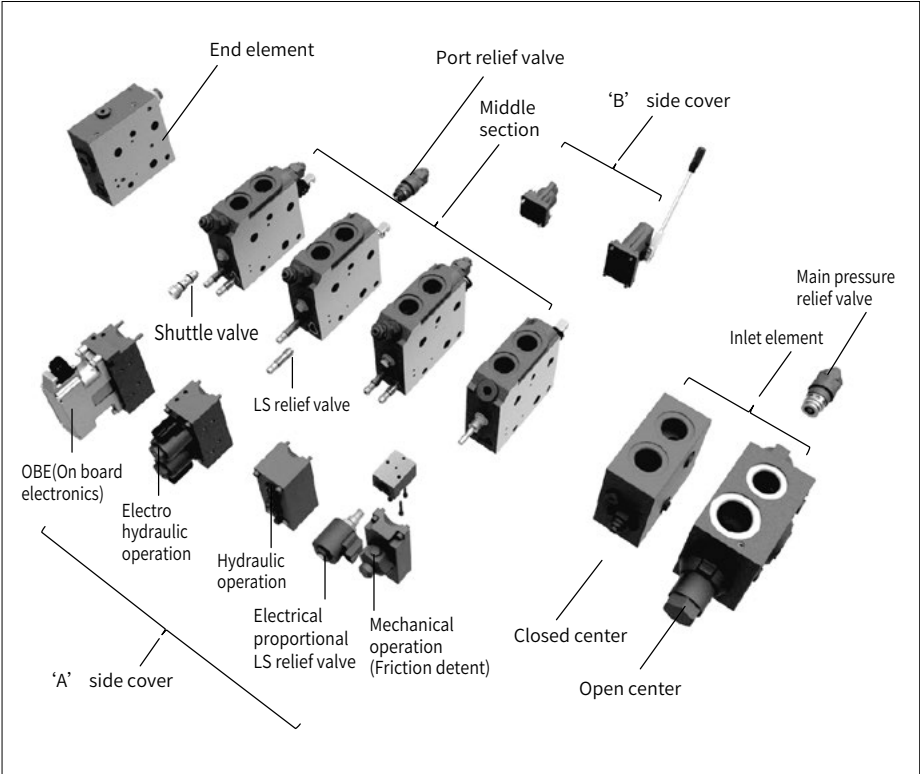
Ordering code



Middle section	⑩ 'A' side cover	M0	Mechanical, standard spring centered (M1: Mechanical, friction detent)		
		H	Hydraulic		
		W21	E-H operation, proportional control, 24V		
		W23	E-H operation, proportional control, 12V		
		W41	E-H operation, on/off control, 24V		
		W43	E-H operation, on/off control, 12V		
		OBE	Super high performance E-H control		
	⑪ 'B' side cover	Blank	Standard cover		
		1(K/L)	Hand lever		
			Hand lever position		
			K	L —**	
			Hand lever position 60°	Others (L—45°)	
		2	Without hand lever (can be added if any demand)		
	⑫ A/B port relief valve	QQ	Plug, without relief valve (port relief valve can be added)		
		GG	Check valve, for anti-cavitation function		
		H...H...	H320H320, pressure in bar, pressure details of port relief valve in 3 digits		
End element	⑬ LS unload	LZ	Without LS unload function		
		LA	With LS unload function		
	⑭ Additional P port	Blank	Without additional P port		
		PT	With additional P port		
	⑮ Pilot pressure control	X	Internal pilot pressure supply		
		Y	External pilot pressure supply		
Others	⑯ Sealing type	V	FKM		
		N	NBR		
	⑰ Design code	001			
	⑱ Special application	Blank	Without special requirement	-450	Without aluminum material
*	Other request	Further requirement in the clear text			

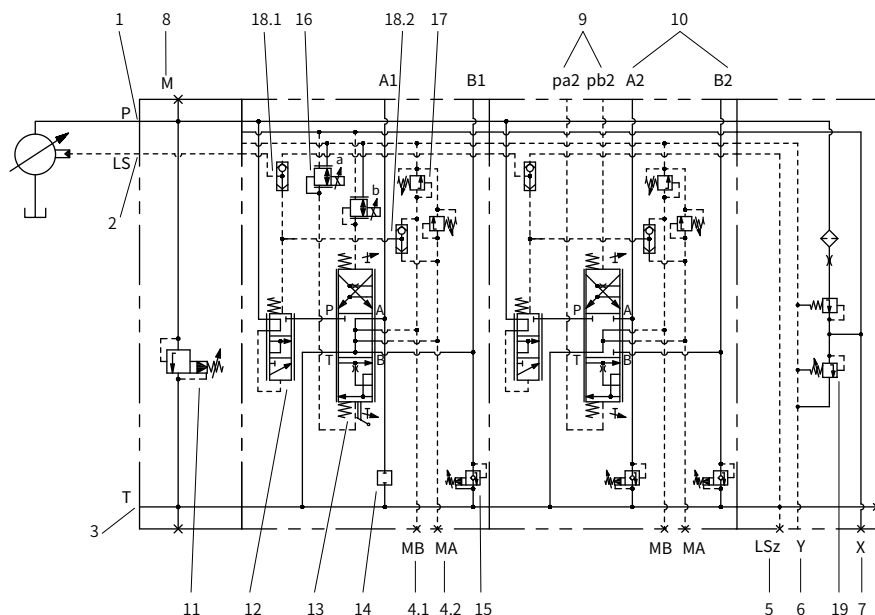
Ordering code

Basic code	HVSP12, HVSP15		
1- Inlet element	P	Open center, for fixed displacement pump system	
	J	Closed center, for variable displacement pump system	
2- Middle section	'A' side cover	M0	Mechanical, standard spring centered
		M1	Mechanical, friction detent
		H	Hydraulic
		W21	E-H operation, proportional control, 24V
	'B' side cover	1K	Hand lever
		Blank	Standard cover
3- End element	LS unload	LZ	Without LS unload function
		LA	With LS unload function
	Pilot pressure control	X	Internal pilot pressure supply
		Y	External pilot pressure supply



Exploded view (example: HVSP15)

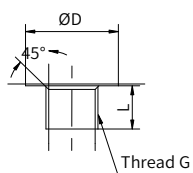
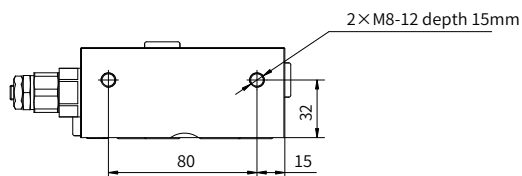
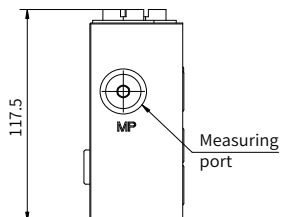
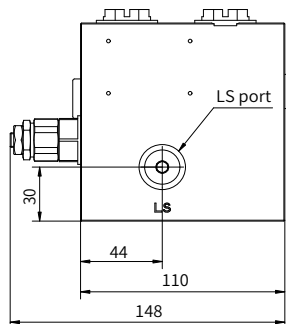
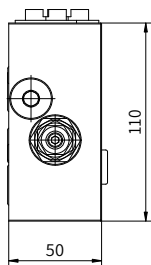
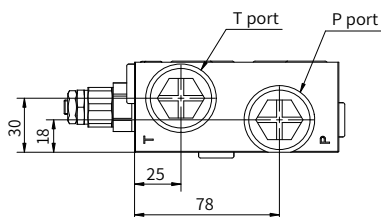
Hydraulic diagram



- | | |
|---|---|
| 1 Pump connection | 10 Work port |
| 2 Load sensing port | 11 Main pressure relief valve |
| 3 Tank connection | 12 Pressure compensator |
| 4.1 B side LS pressure measure port | 13 Spool |
| 4.2 A side LS pressure measure port | 14 Plug |
| 5 Load-signal connection for parallel-valve (plugged) | 15 Port pressure relief valve |
| 6 No back pressure connection to tank | 16 Electrical proportional reducing valve |
| 7 External pilot oil supply | 17 LS pressure relief valve |
| 8 Pump pressure measure port | 18.1 / 18.2 Shuttle valve |
| 9 Pilot port | 19 Pressure reducing and relief valve |

Inlet section — closed center

• HVSP12



Port dimension

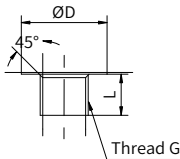
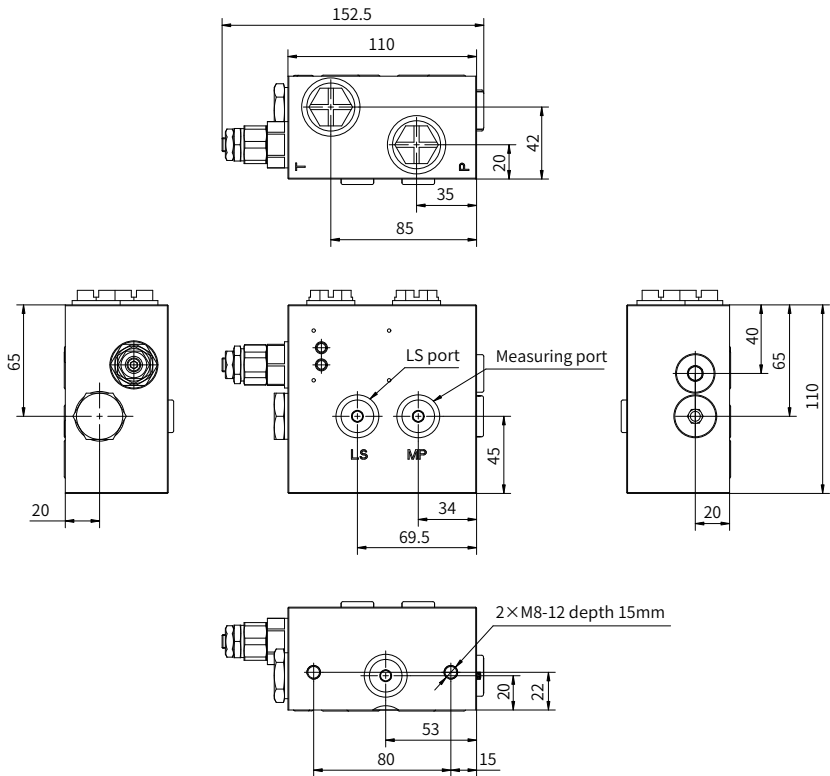
P port:	G3/4
T port:	G3/4
LS port:	G1/4
Measuring port:	G1/4

Thread dimensions

G3/4:	ΦD 38	L 16
G1/4:	ΦD 24	L 12

Inlet section — open center

• HVSP12



Port dimension

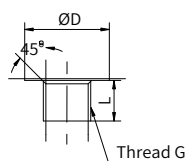
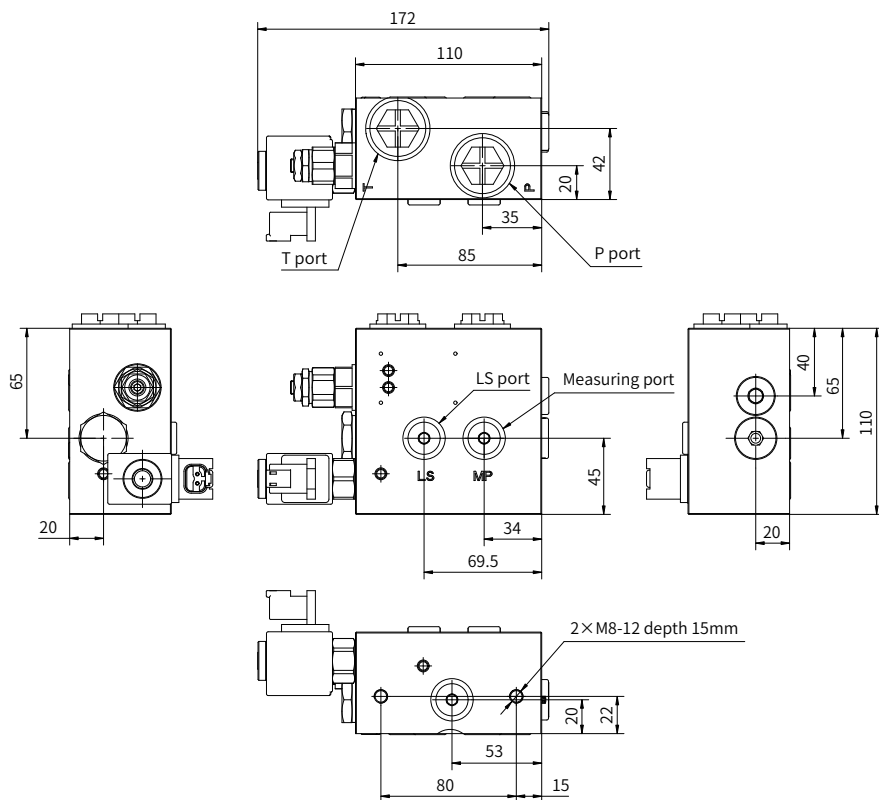
P port:	G1/2
T port:	G1/2
LS port:	G1/4
Measuring port:	G1/4

Thread dimensions

G1/2:	ΦD 30	L 15
G1/4:	ΦD 24	L 12

Inlet section — open center (With LS solenoid unloading valve)

• HVSP12



Port dimension

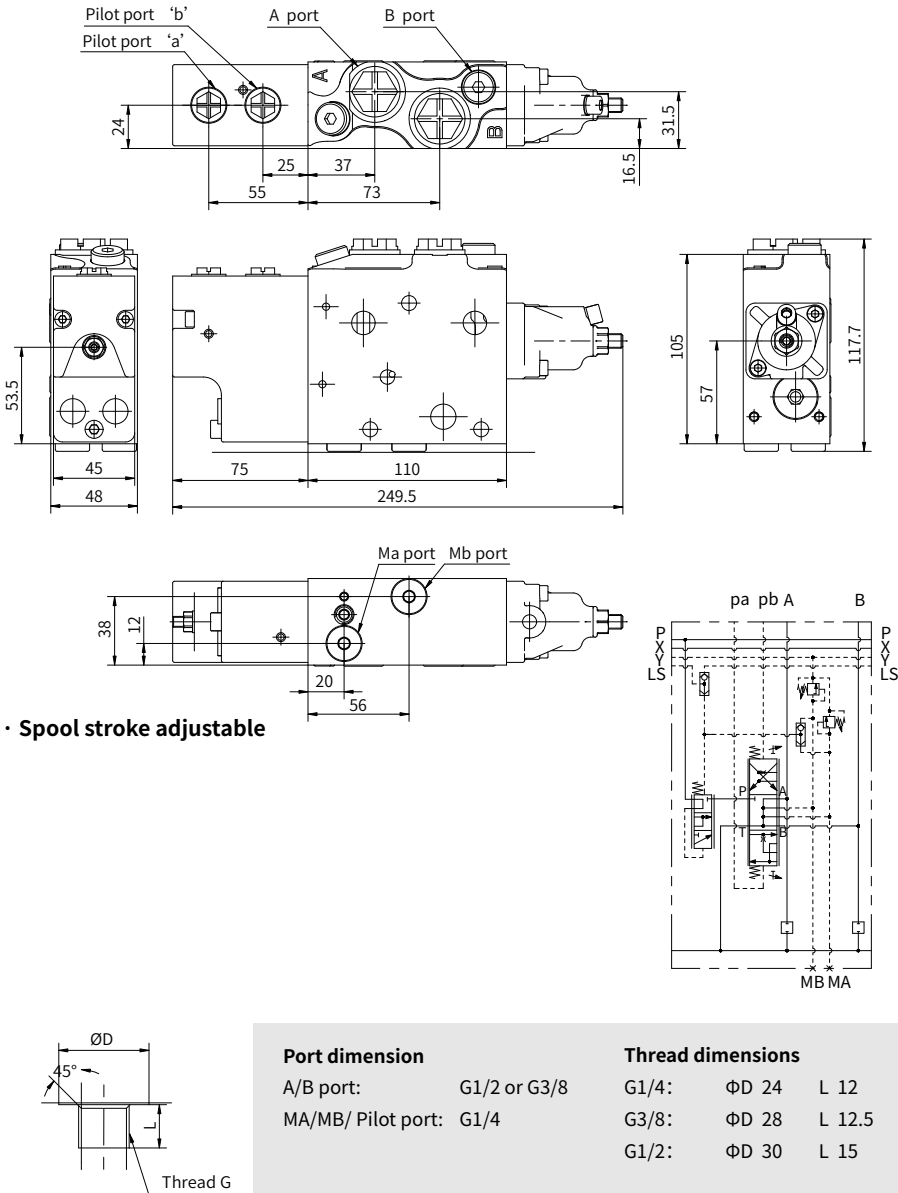
P port:	G3/4
T port:	G3/4
LS port:	G1/4
Measuring port:	G1/4

Thread dimensions

G3/4:	ØD 38	L 16
G1/4:	ØD 24	L 12

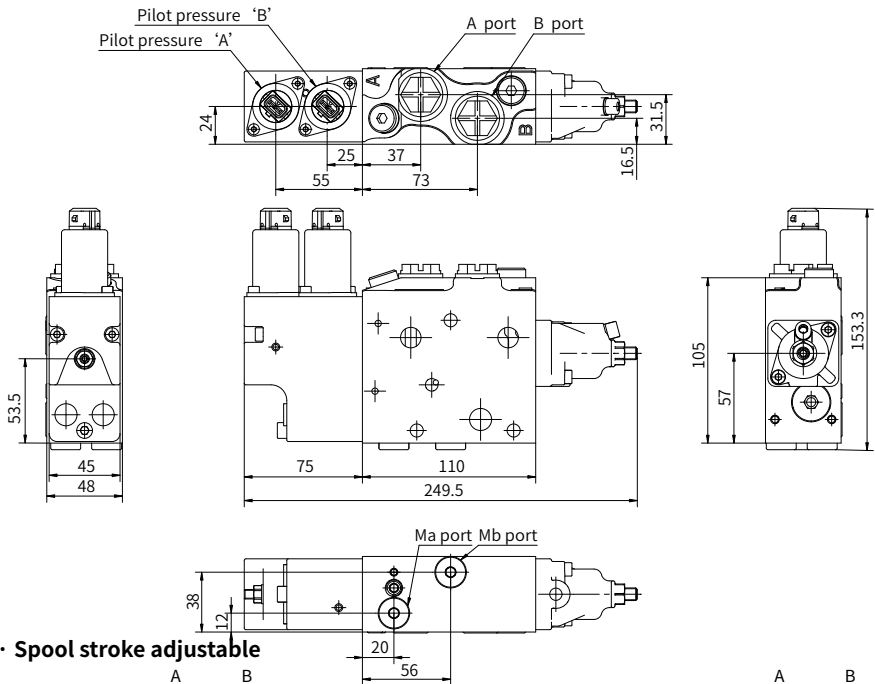
Middle section—hydraulic

• HVSP12

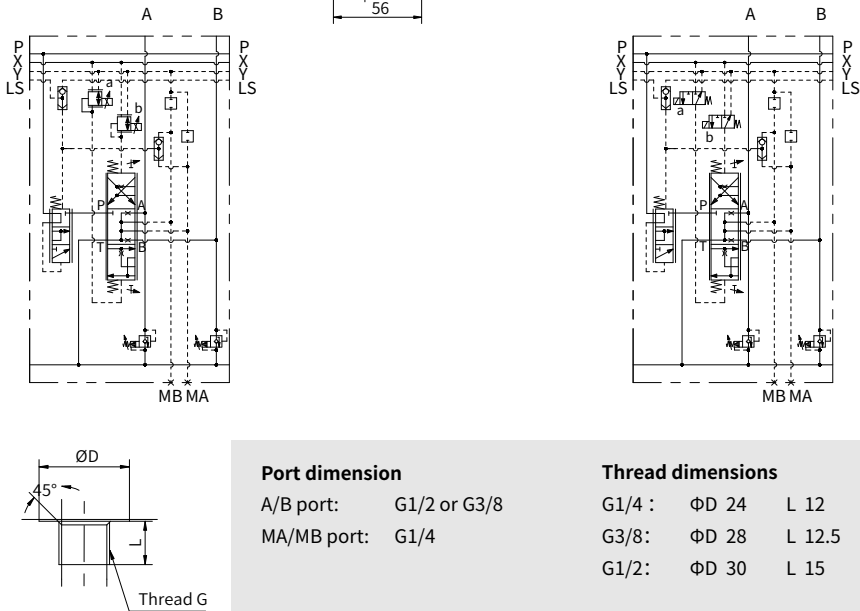


Middle section—electro-hydraulic

• HVSP12



• Spool stroke adjustable



Port dimension

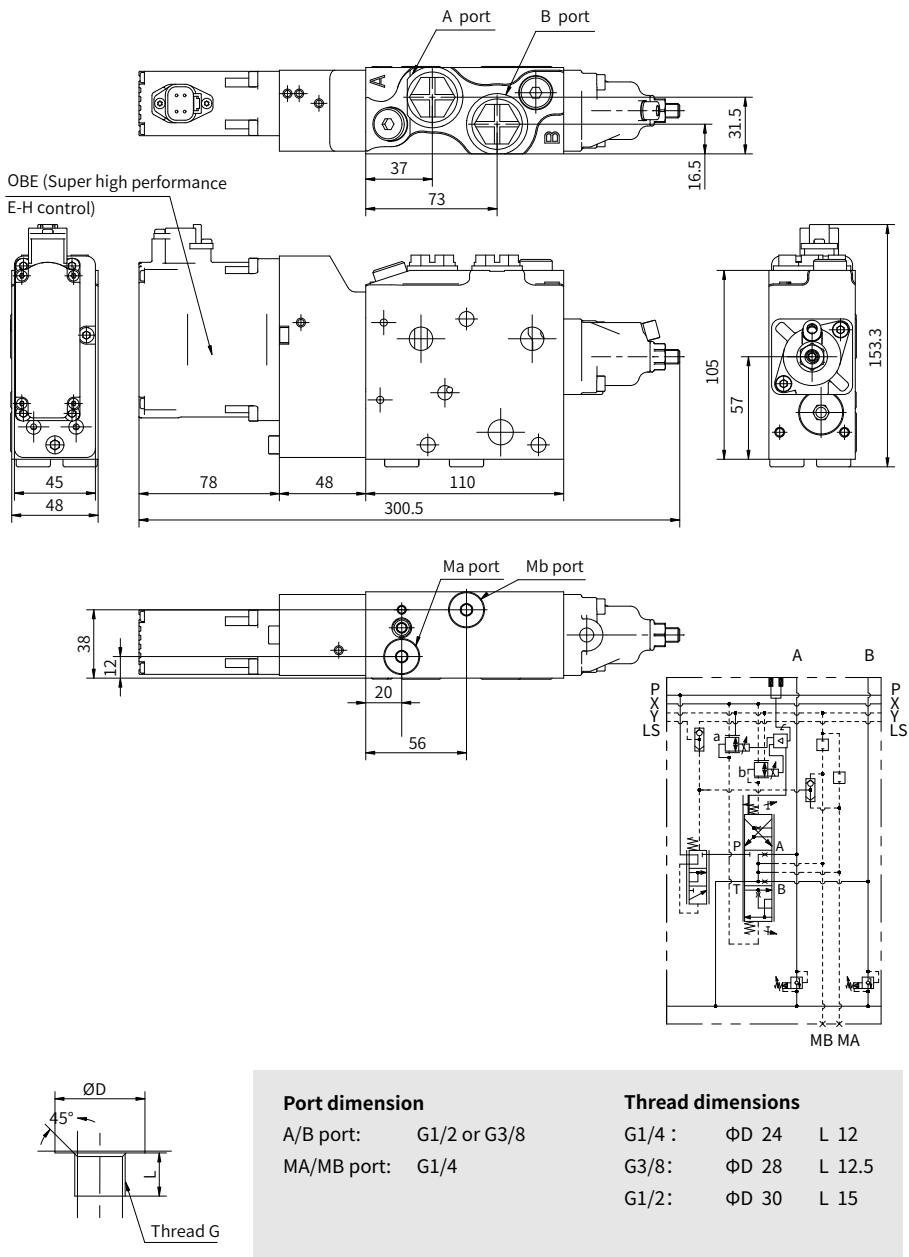
A/B port: G1/2 or G3/8
MA/MB port: G1/4

Thread dimensions

G1/4 : ØD 24 L 12
G3/8 : ØD 28 L 12.5
G1/2 : ØD 30 L 15

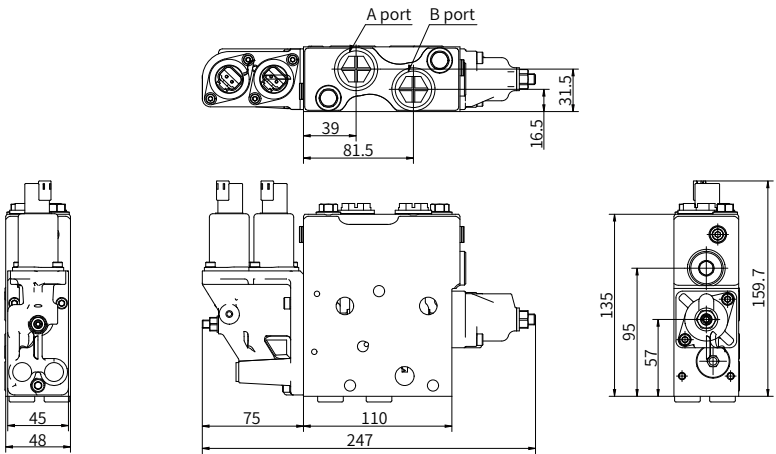
Middle section—OBE (Super high performance E-H control)

• HVSP12



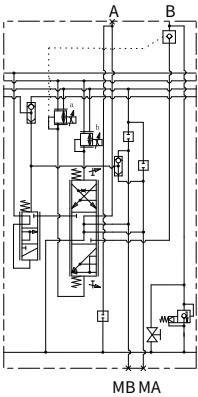
Middle section——Integrated with hydraulic lock

• HVSP12

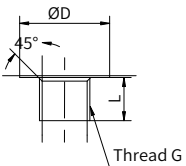
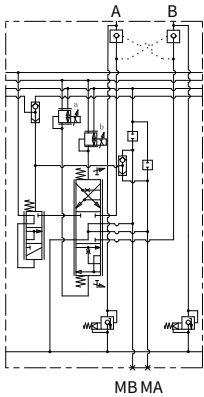
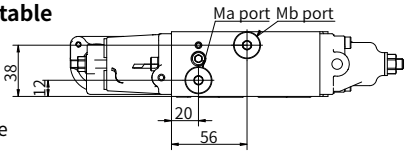


• Spool stroke adjustable

☐ Unidirectional hydraulic pressure



☐ two-way hydraulic lock



Port dimension

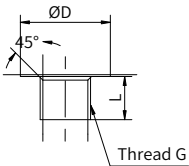
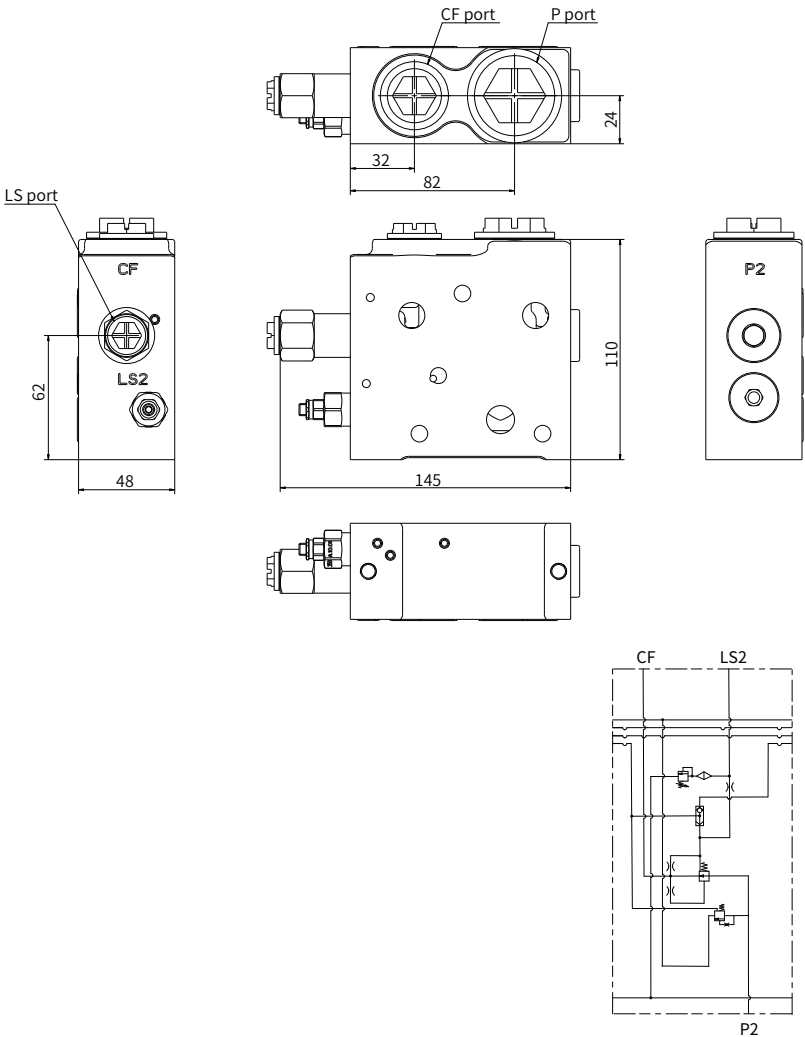
A/B port: G1/2 或 G3/8
MA/MB port: G1/4

Thread dimensions

G1/4 : ΦD 24 L 12
G3/8 : ΦD 28 L 12.5
G1/2 : ΦD 30 L 15

Middle section——Integrated with steering priority

• HVSP12F



Port dimension

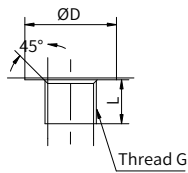
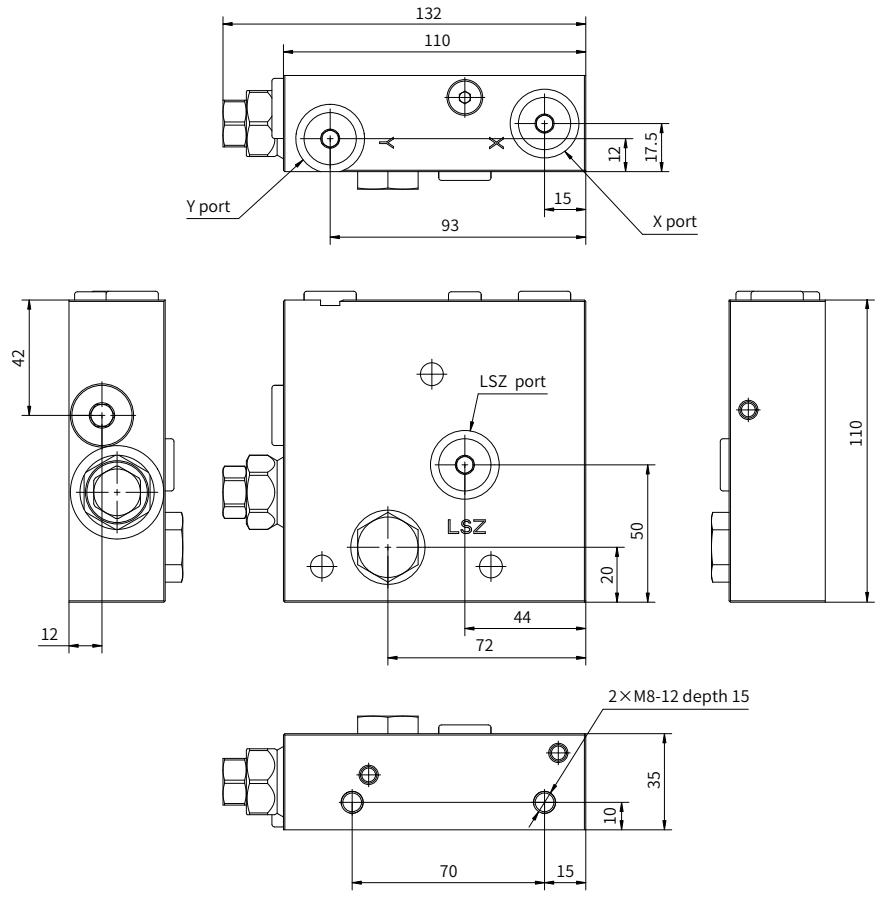
CFport:	G1/2
P port:	G1
LS port:	G1/4

Thread dimensions

G1/4 :	$\varnothing D$ 24	L 12
G1/2:	$\varnothing D$ 30	L 15
G1:	$\varnothing D$ 47	L 19

Endlet section assembly (without additional P port)

• HVSP12



Port dimension

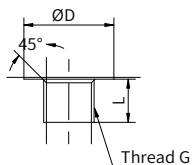
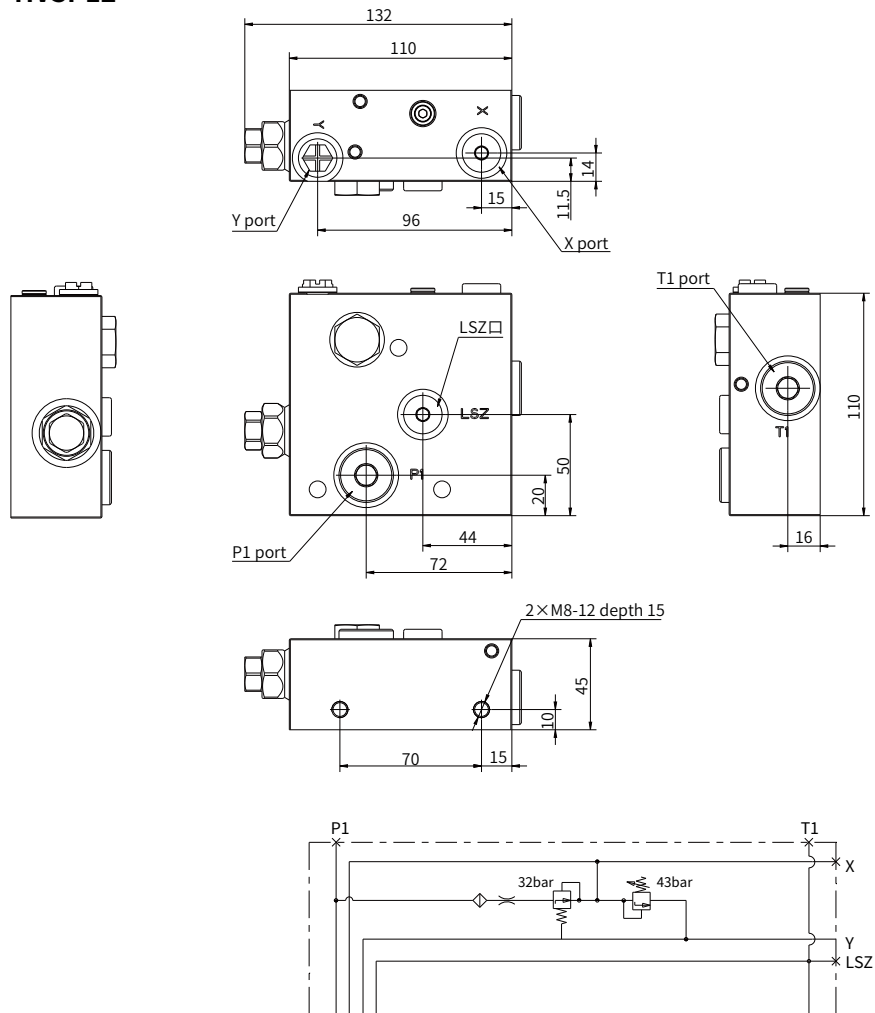
Y port: G1/4
X port: G1/4
LSZ port: G1/4

Thread dimensions

G1/4: $\varnothing D$ 24 L 12

Endlet section assembly (with additional P port)

• HVSP12



Port dimension

Y port:	G1/4
X port:	G1/4
LSZ port:	G1/4
P1 port:	G1/2
T1 □:	G1/2

Thread dimensions

G1/4:	ΦD 24	L 12
G1/2:	ΦD 30	L 15

Preferred spool flow

• HVSP12

• Symmetry spool

Pressure compensator	Flow(L/min)						
S	100-100	76-76	54-54	33-33	22-22	14-14	07-07
	90-90	68-68	47-47	29-29	19-19	12-12	06-06
	80-80	60-60	40-40	25-25	15-15	10-10	05-05
C	120-120	90-90	60-60	40-40	25-25	15-15	10-10
T	100-100	76-76	54-54	33-33	22-22	14-14	07-07

• Asymmetry spool

Please consult the company's technology sales.

Example:

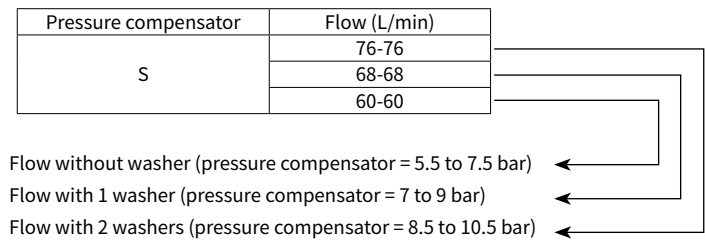
* Pressure compensator: S

* Command flow value: Qac= 72 L/min

Solution:

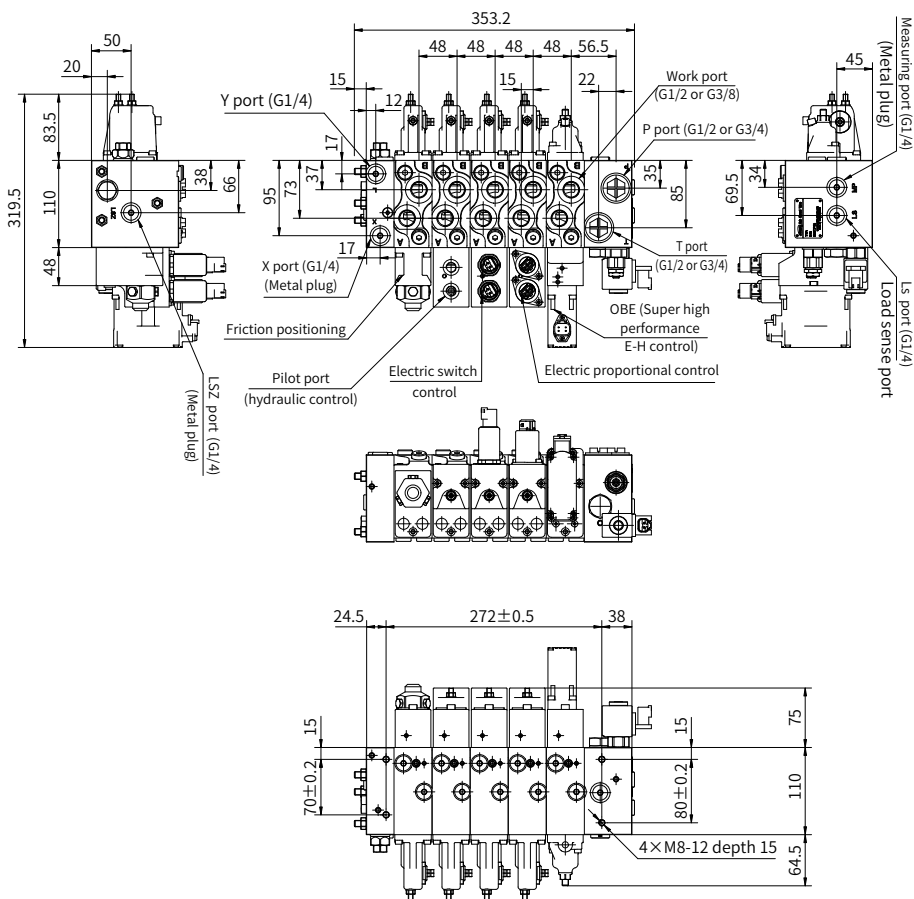
→ 60 L/min spool + 2 washers = 76 L/min

→ Set 72 L/min via stroke limitation



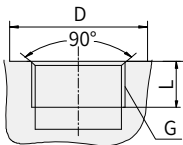
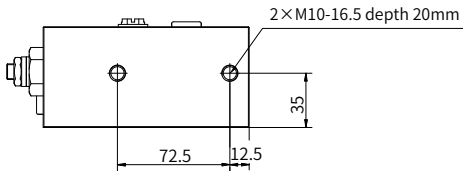
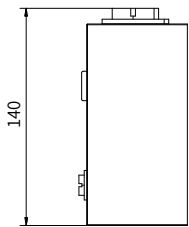
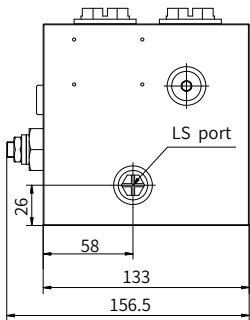
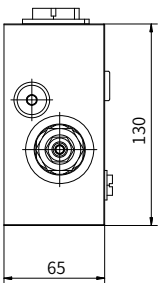
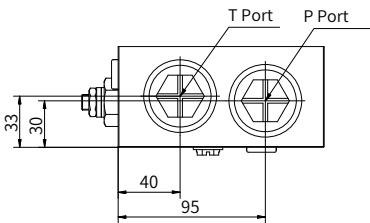
Unit dimensions

• HVSP12



Inlet section — closed center

• HVSP15



Port dimension

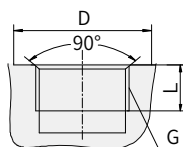
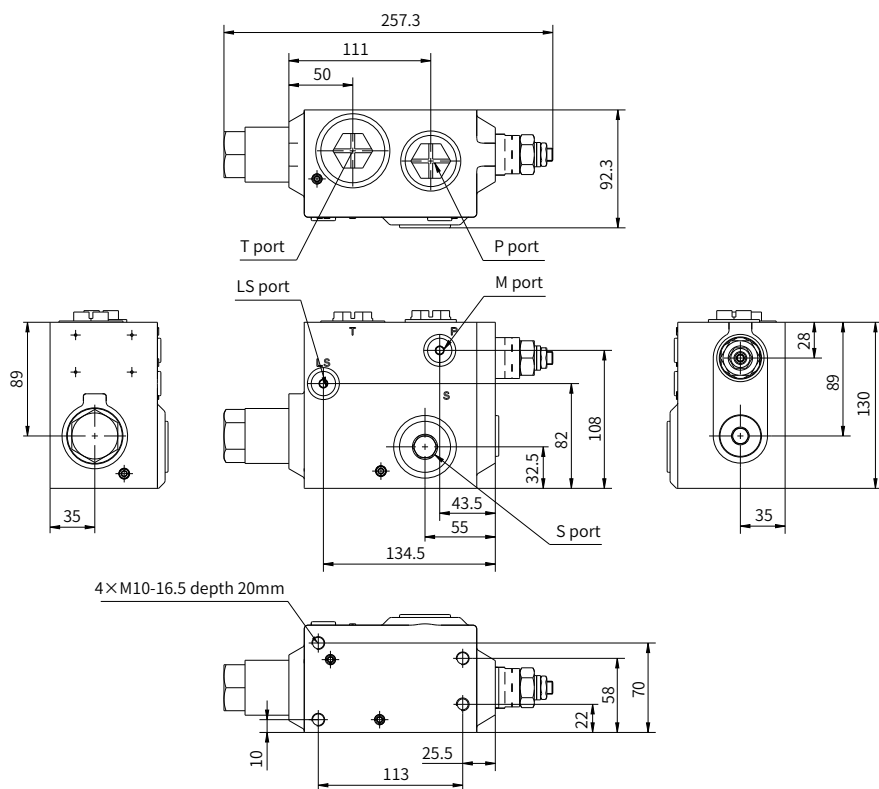
P port: G1
T port: G1
LS port: G1/4

Thread dimensions

G1: ΦD 47 L 19
G1/4: ΦD 24 L 12

Inlet section — open center

• HVSP15



Port dimension

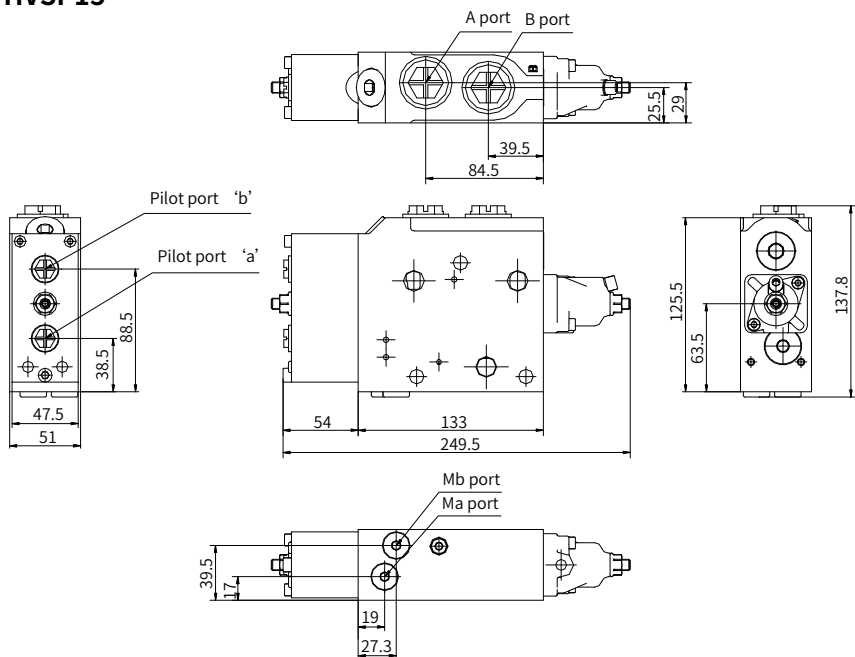
P port:	G1
T port:	G1 1/4
LS port:	G1/4
S port:	G1

Thread dimensions

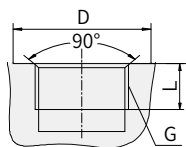
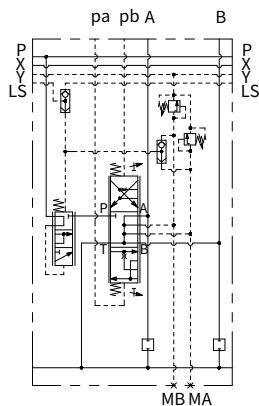
G1 1/4:	ΦD 58	L 21.5
G1:	ΦD 47	L 19
G1/4:	ΦD 24	L 12

Middle section—hydraulic

• HVSP15



• Spool stroke adjustable



Port dimension

A/B port: G3/4

Pilot port/Ma/Mb port: G1/4

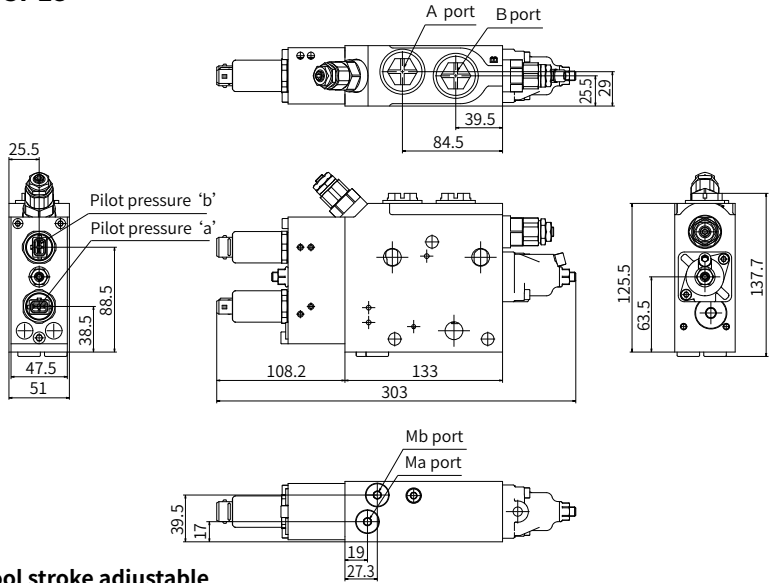
Thread dimensions

G3/4: ΦD 38 L 16

G1/4: ΦD 24 L 12

Middle section—electro-hydraulic

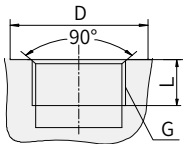
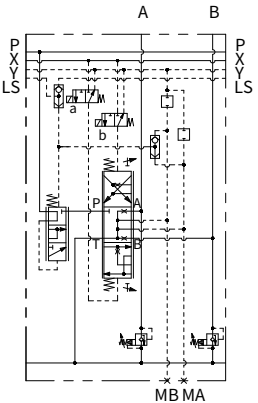
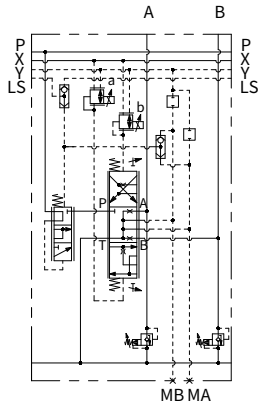
• HVSP15



• Spool stroke adjustable

☐ E-H proportional control
W21 24V; W23 12V

☐ E-H on/off control
W41 24V; W43 12V



Port dimension

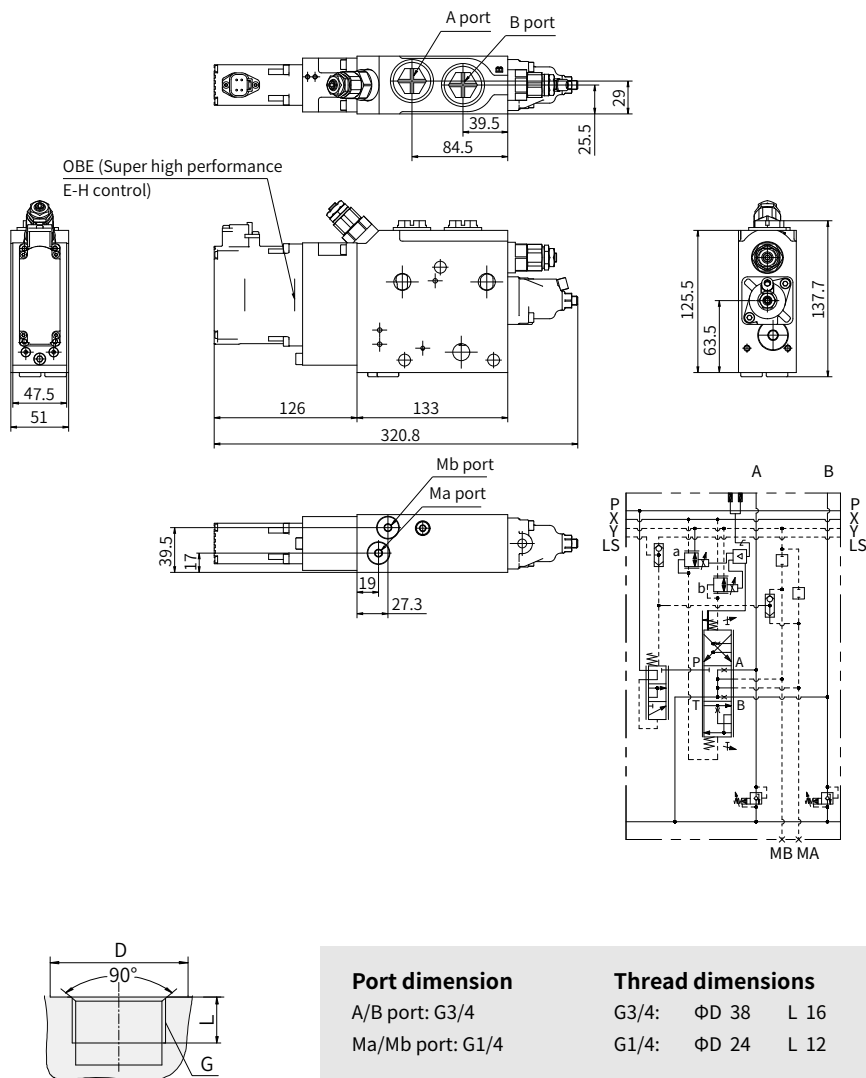
A/B port: G3/4
Ma/Mb port: G1/4

Thread dimensions

G3/4: ΦD 38 L 16
G1/4: ΦD 24 L 12

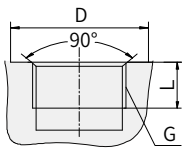
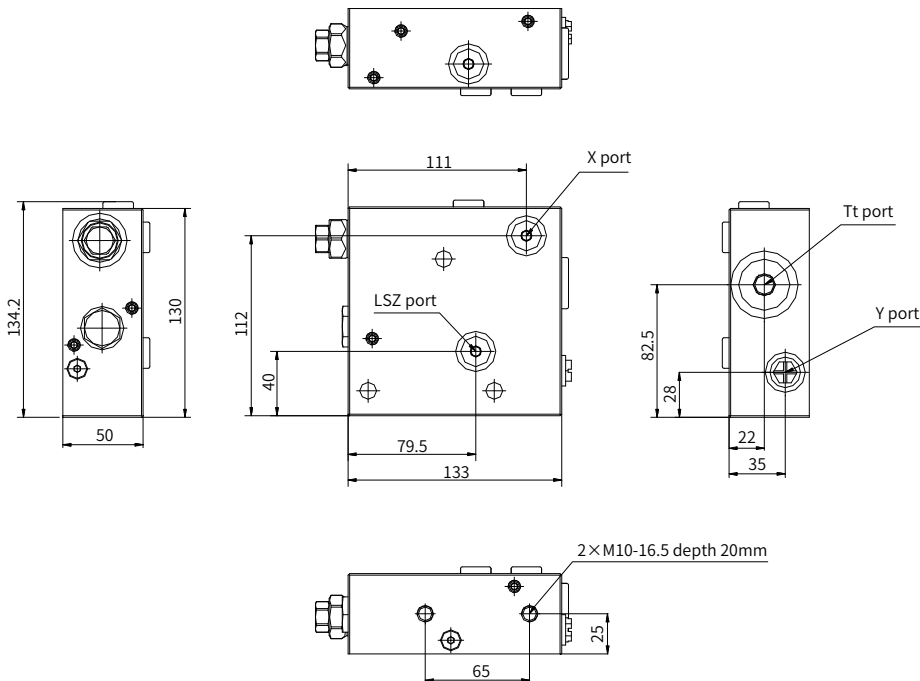
Middle section—OBE (Super high performance E-H control)

• HVSP15



Endlet section assembly (without additional P port)

• HVSP15



Port dimension

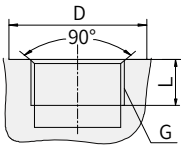
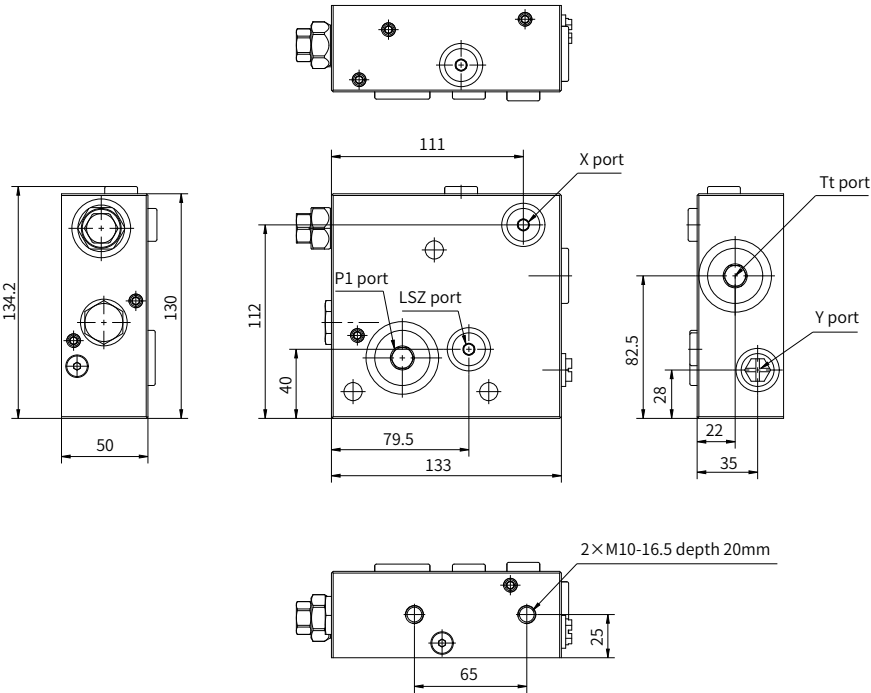
Tt port: G3/4
Y port: G1/4
X port: G1/4
LSZ port: G1/4

Thread dimensions

G3/4: ΦD 38 L 16
G1/4: ΦD 24 L 12

Endlet section assembly (with additional P port)

• HVSP15



Port dimension

P1 port: G3/4
Tt Port: G3/4
Y Port: G1/4
X Port: G1/4
LSZ Port: G1/4

Thread dimensions

G3/4: ΦD 38 L 16
G1/4: ΦD 24 L 12

Preferred spool flow

• HVSP15

• Symmetry spool

Pressure compensator	Flow(L/min)						
S	150-150	120-120	080-080	050-050	032-032	023-023	
	140-140	130-130	100-100	070-070	045-045	028-028	020-020
	120-120	110-110	085-085	060-060	040-040	025-025	017-017
C	200-200	175-175	145-145	110-110	080-080	045-045	028-028
T	190-190	160-160	100-100	065-065	040-040		

• Asymmetry spool

Pressure compensator	Flow(L/min)				
S	150-120	120-180	080-050	050-032	023-014
	130-110	100-070	070-045	045-028	020-012
	110-085	085-060	060-040	040-025	017-010
C	175-145	145-110	110-080	080-045	
T	190-160	160-100	100-065	065-040	028-017

Example:

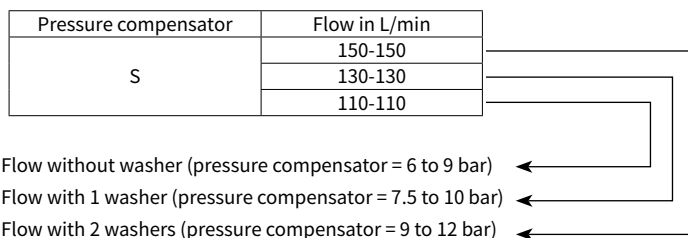
* Pressure compensator: S

* Command flow value: $Q_{ac} = 145 \text{ L/min}$

Solution:

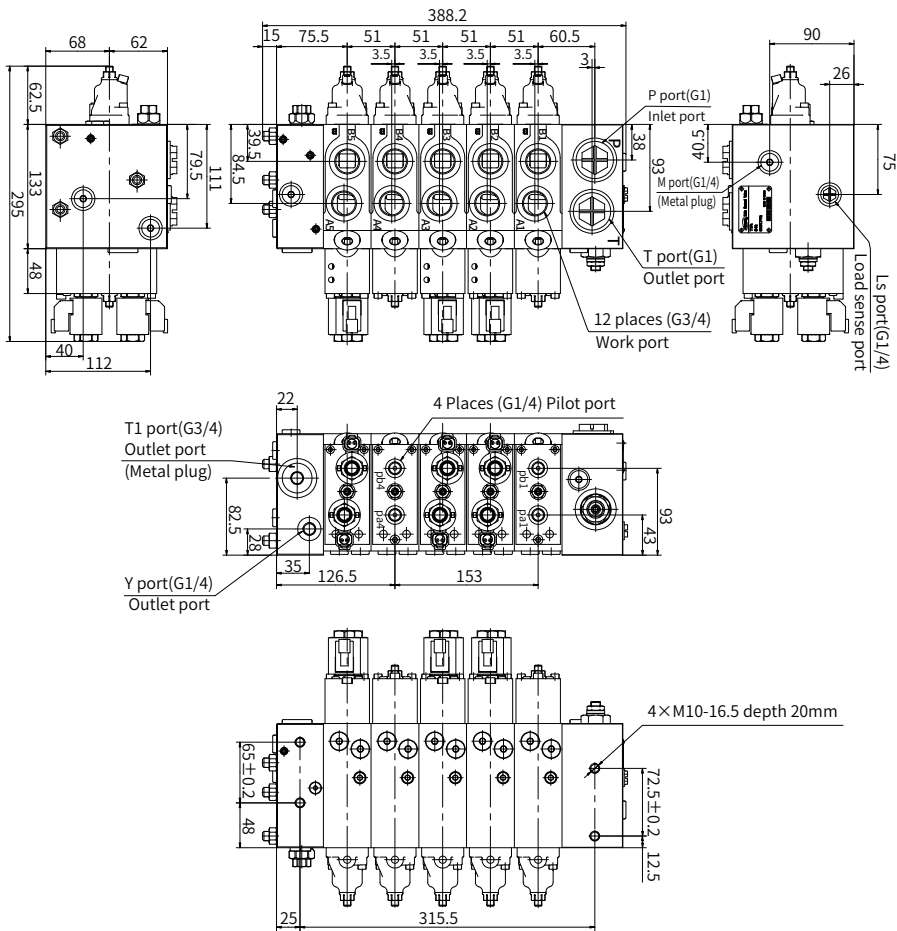
→ 110 L/min spool + 2 washers = 150 L/min

→ Set 145 L/min via stroke limitation

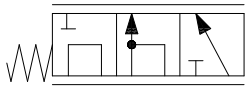


Unit dimensions

• HVSP15

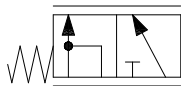


Pressure compensator type



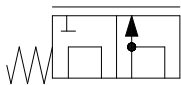
Code 'S'

With pressure compensator
With load holding function



Code 'T'

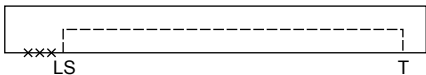
With pressure compensator
Without load holding function



Code 'C'

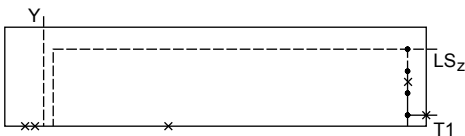
Without pressure compensator
With load holding function

End elements option



End element with LS unloading

Ordering code: LA



End element without LS unloading

Ordering code: LZ

Short description

Supply of tandem switched LS signals

On-board electronics: OBE

The internal closed loop position control configuration of the OBE control cover makes the valve spool achieve the desired position with accuracy levels approaching the performance of a servo- valve, by continuously comparing the set-point of a remote control device (potentiometer, joystick , machine management system) with the feedback signal generated by a high precision hall effect position transducer.

Choice between different types of control:

- 1 - Analog control (0 – 5V), with following auxiliary signals available:
 - spool position feedback
 - 5V for external potentiometer or joystick
- 2 - CANbus control (J1939 or CANopen protocols)



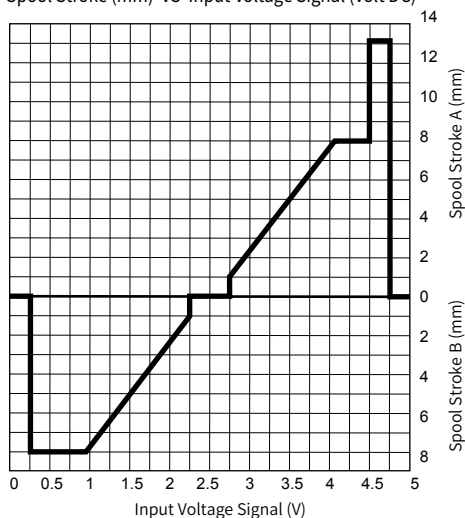
SPOOL STROKE A

When the input voltage signal fed to the MLT-FD5 actuator is maintained within 2.25 and 2.75V, the directional valve spool is at rest (Neutral Dead Band). When $V_{in} = 2.75V$, the spool steps up from NEUTRAL to MINIMUM FLOW control position. A linear ramp from MIN. to MAX. spool stroke will follow by increasing V_{in} from 2.75 to 4.1V. At $V_{in} = 4.50V$, the spool is brought into its FLOAT POSITION, if present. By decreasing the input voltage from 4.1 to 2.75V, the spool stroke is linearly reduced and after the oil flow is fully shut-off, a step-down from MINIMUM FLOW to NEUTRAL position takes place.

SPOOL STROKE B

Same as for STROKE A, by varying V_{in} from 2.25 to 0.9V, the spool will go from NEUTRAL to MAX. STROKE in the opposite direction.

Spool Stroke (mm) VS Input Voltage Signal (Volt DC)



ALARM / FAIL - SAFE MODE

An input voltage variation beyond the calibration range ($<0.25V$ or $>4.75V$) will bring the system into an ALARM mode, urging the spool to return to its NEUTRAL position until V_{in} is brought back to its nominal control range.

On-board electronics: OBE

Technical data

Hydraulic specifications:

Max. supply pressure: 35 bar

Min. supply pressure: 12bar

Max. back pressure: 1.5bar

Pilot flow requirement: 0.2 L/min

Filtration: 18/15(ISO 4406)

Electrical specifications:

Operating voltage: 10-30VDC

Max. current consumption: 750mA

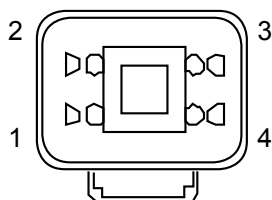
Analog input impedance: >40kOhm

Analog input signal: 0-5 V

Protection class: IP67

01

Connector pinout (Front view)



D/A0

1. + Power Supply
2. Do not Connect
3. Control Signal
4. - Power Supply (GND)

D/A5

1. + Power Supply
2. + 5V Aux. Supply voltage
3. Control Signal
4. - Power Supply (GND)

D/AF

1. + Power Supply
2. Sensor Feedback Output
3. Control Signal
4. - Power Supply (GND)

D/C0

1. + Power Supply
2. CANL
3. CANH
4. - Power Supply (GND)

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