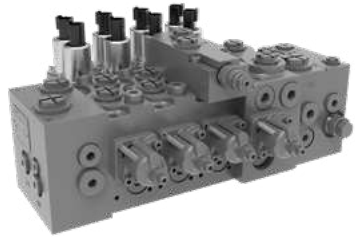
1.4.2

HVSP-F SERIES

LOAD SENSING PROPORTIONAL CONTROL VALVE

HVSP:

Nominal size:	12F	20F
Rated pressure(bar)pump side:	350	350
actuator side	420	420
Rated flow(L/min):	120	400



HVSP12F

HVSP20F

Contents

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. 12 mid-sections（HVSP12F）
  Max. 9 mid-sections（HVSP20F）

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

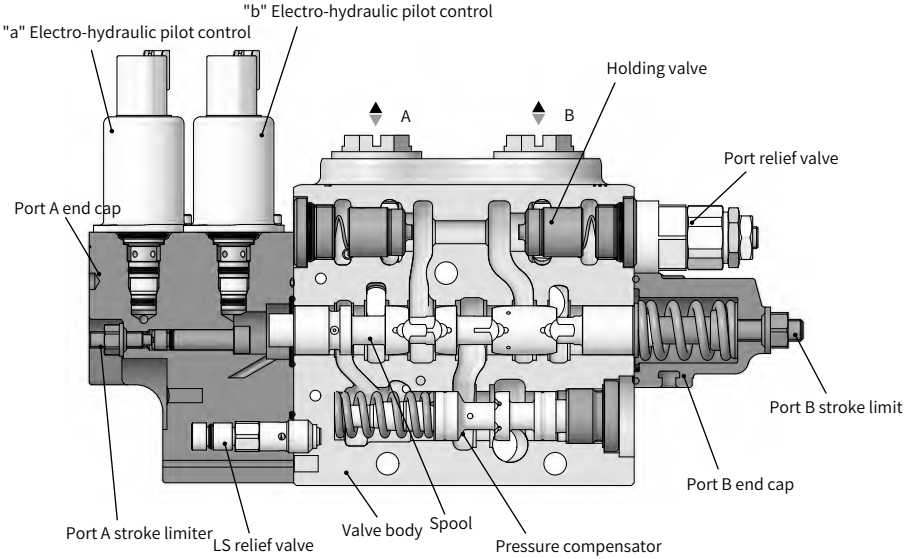
Forklift truck

Stackers

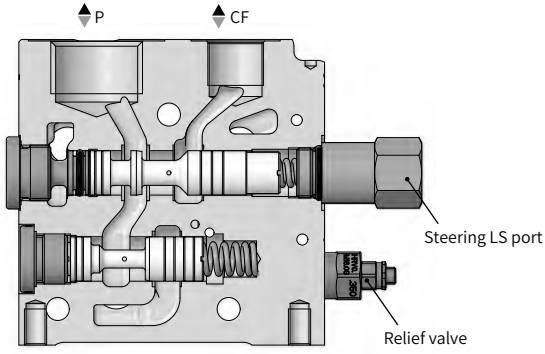
01

Section view

HVSP12F (Lifting Section):

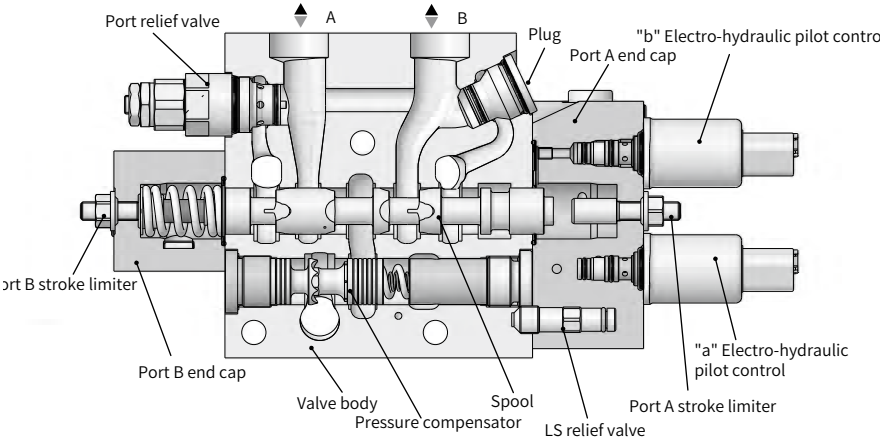


HVSP12F Priority Section

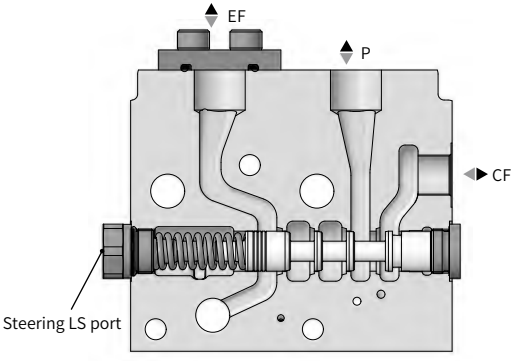


Section view

HVSP20F:



HVSP20F Priority Section



Technical data

General

Nominal Size			12F	20F
Structure	Stackable, proportional, load sensing, pre-compensated			
Type of connection	ISO BSP thread, metric thread,ISO 6162 flange interface (Please contact our company for other connection methods)			
Mass (kg)	Inlet element	Open center	6.8/5.2	17
		Closed center	4.34	13.5
	Middle section	Hydraulic operation	4.25	/
		Normal E-H operation	4.65	12.5
		Super E-H operation	4.95	13.5
	End element		3.1	8

Hydraulic

Nominal Size		12F	20F
Rated flow Q(L/min)	With load-holding function, without pressure compensator.	140	400
	Without load-holding function, with pressure compensator.	200	
	With load-holding function, with pressure compensator.	120	
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)	8.5~27.5bar
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 ~ 350bar (2175 ~ 4800psi))	50 ~ 350 bar；

Electric

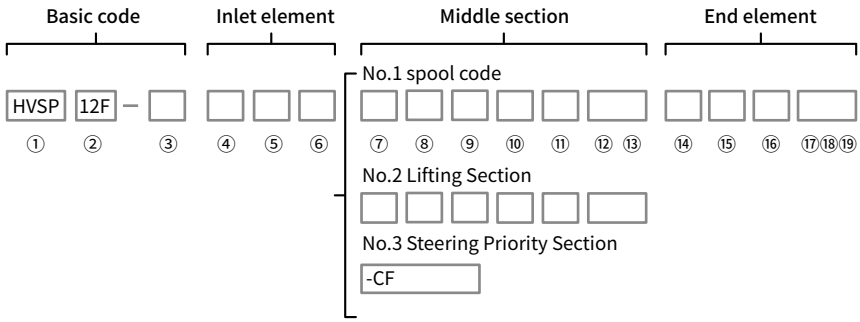
Normal E-H operation	· Electrical on/off valve: Installed on the 'A'side cover · Connection: Deutsch DT04-2P or AMP Junior-Timer · Protection class: IP67 · Supply voltage: 12 or 24VDC	· Electrical proportional valve: Installed on the 'A' side cover · Dither frequency required: 150Hz · Hysteresis: Less than 3%(at valid range) · Connection: Deutsch DT04-2P or AMP Junior-Timer · Protection class: IP67 · Reducing pressure range: 0~30 bar · Control current@24VDC: 0~750mA, @12VDC: 0~1500mA

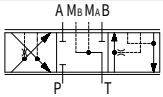
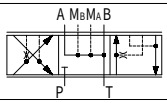
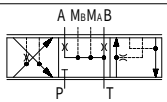
Using environment

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 v (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 β10 ⩾ 75

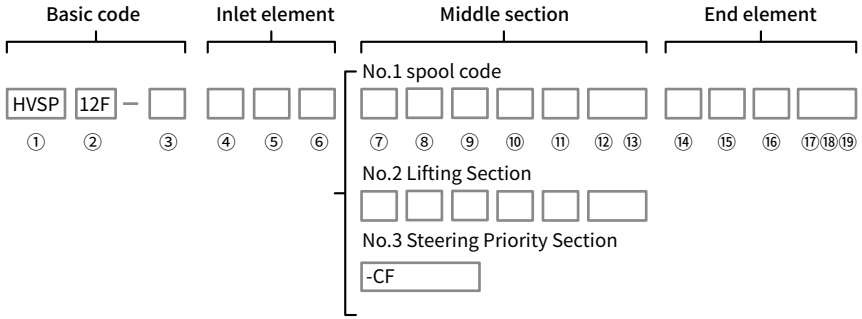
(For applications outside above mentioned parameters, please consult our sales dept.)

Ordering code



Basic code	① Structure	HVSP	Stackable, proportional control, load sensing, pressure compensated
	② Nominal size		12F/20F
	③ Number of blocks	..	01~09
Inlet element	④ Solenoid valve	Blank	Without solenoid valve
		G12	With 12V solenoid valve
		G24	With 24V solenoid valve
		G28	With 28V solenoid valve
	⑤ Circuit types	J	Closed center, for variable piston pump system
		p	Open center, for fixed displacement pump system
	⑥ Main relief valve	Q	Without main pressure relief valve(not for open center)
		···	With main pressure relief valve,(pressure in bar, 3-digits)
Middle section	⑦ 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
	⑧ LS relief valve	QMQ	With LS relief valve plug and LS pressure tap
		...M...	With LS relief valve and LS pressure tap (3-digit number for pressure value, unit: bar)
		...MQ	With only Port A LS relief valve and LS pressure tap (3-digit number for pressure value, unit: bar)
		QM...	With only Port B LS relief valve and LS pressure tap (3-digit number for pressure value, unit: bar)
		...R...	With LS inverse proportional remote control relief valve and LS pressure tap (3-digit number for pressure value, unit: bar)
		...L...	With LS direct proportional remote control relief valve and LS pressure tap (3-digit number for pressure value, unit: bar)
	⑨ Spool symbol	E	 =E
		J	 =J
		L	Special function
		Q	 =Q

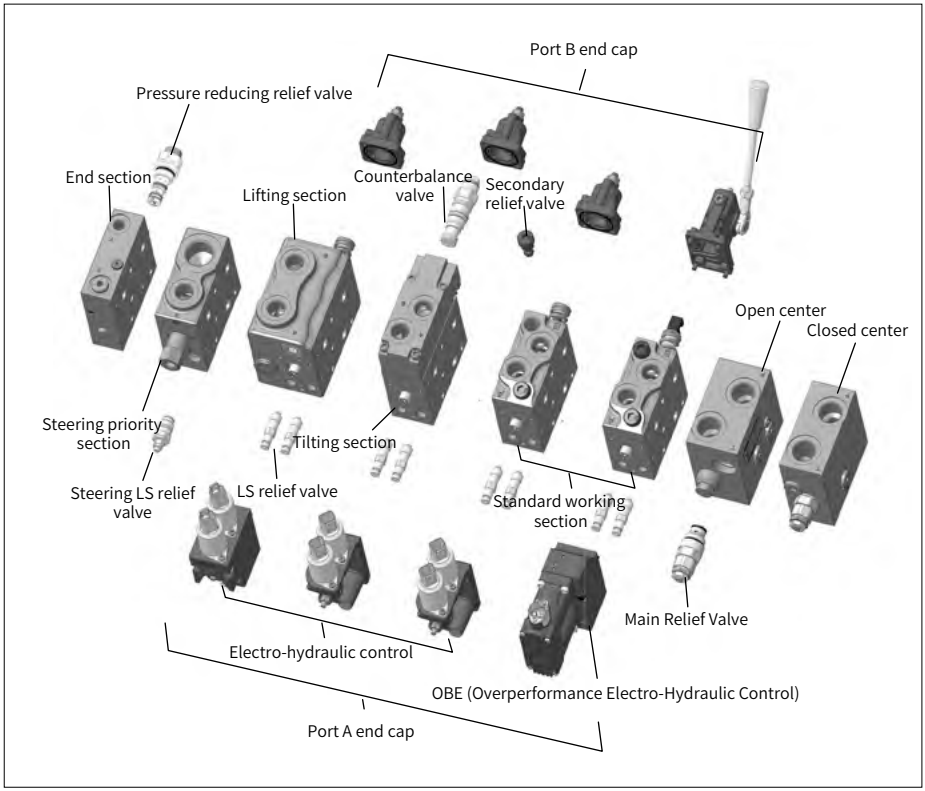
Ordering code



Mid-Section	⑩ A/BFlow Rate	Std. Sec.	...-...	Flow rate: three-digit number (L/min). Ex: 50-50, both 50 L/min		
		Lift Sec.	0-...	Max. flow: 160/200 L/min. Ex: 0-160 = 160 L/min		
	⑪ 'A' Side End Cover		M0	Mechanical, standard spring return (M1: Mechanical, friction positioning)		
			H	Hydraulic control		
			W21	Electro-hydraulic proportional control, 24V		
			W23	Electro-hydraulic proportional control, 12V		
			W41	Electro-hydraulic on-off control, 24V		
			W43	Electro-hydraulic on-off control, 12V		
			OBE	High-Performance Electro-hydraulic Control (built-in spool position sensor and amplifier)		
	⑫ 'B' Side End Cover		Blank	Standard end cover		
			1(K/L)	Operating Handle		
				Handle angle		
				K	L —**	
				60° to spool	Other (L-45°)	
			2	Without operating handle (can be retrofitted)		
	⑬ A/B Port Relief Valve		QQ	Relief valve plug (port relief valve can be retrofitted)		
			GG	Make-up valve, anti-cavitation		
			H...H...	H320H320, relief valve pressure setting indicated by a three-digit number, unit: bar		
End Section	⑭ LS Unload		LZ	Without LS unload function		
			LA	With LS unload function		
	⑮ Additional P/T Port Configuration		Blank	End section without additional P port connection		
			PT	End section with additional P port connection		
	⑯ Pilot Pressure Supply		X	Internal pilot supply		
			Y	External pilot supply		
Others	⑰ Seal Type		V	FKM (Viton)		
			N	NBR (Nitrile)		
	⑱ Design Series No.		001			
	⑲ Special Application		Blank	No special requirements	-450	Aluminum-free material
*	Other Requirements		Other requirements, please specify in writing			

Ordering code

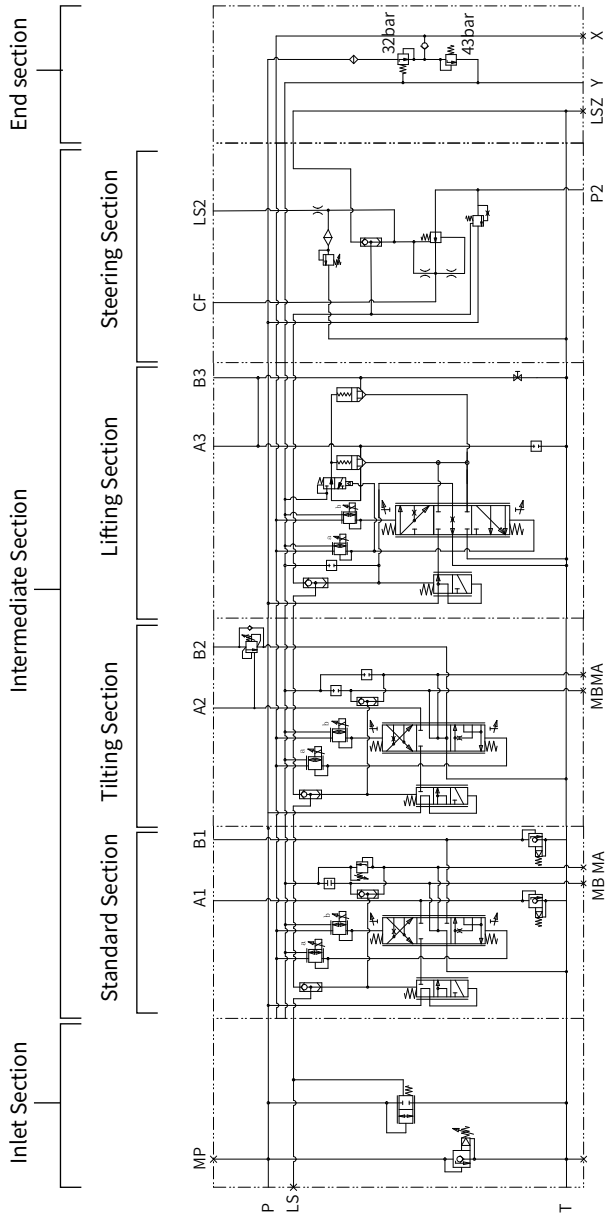
Basic Model	HVSP12F，HVSP20F		
1-Inlet Section	P		Open center, for fixed pump system
	J		Closed center, for variable pump system
2-Intermediate Section	'A' Side End Cover	M0	Mechanical, standard spring return
		M1	Mechanical, friction positioning
		H	Hydraulic control
		W21	Electro-hydraulic proportional control, 24V
	'B' Side End Cover	1K	Operating Handle
		Blank	Standard End Cover
3-End Section	LS Unload	LZ	Without LS unload function
		LA	With LS unload function
	Pilot Supply	X	Internal pilot supply
		Y	External pilot supply



Exploded View (HVSP12F Example)

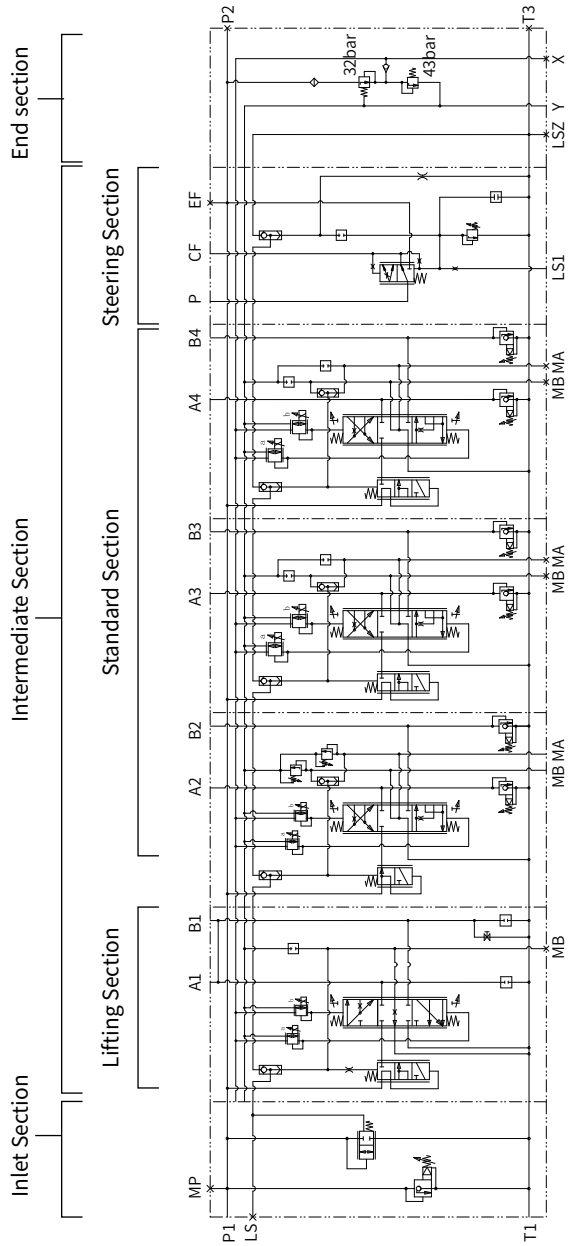
Hydraulic diagram

·HVSP12F



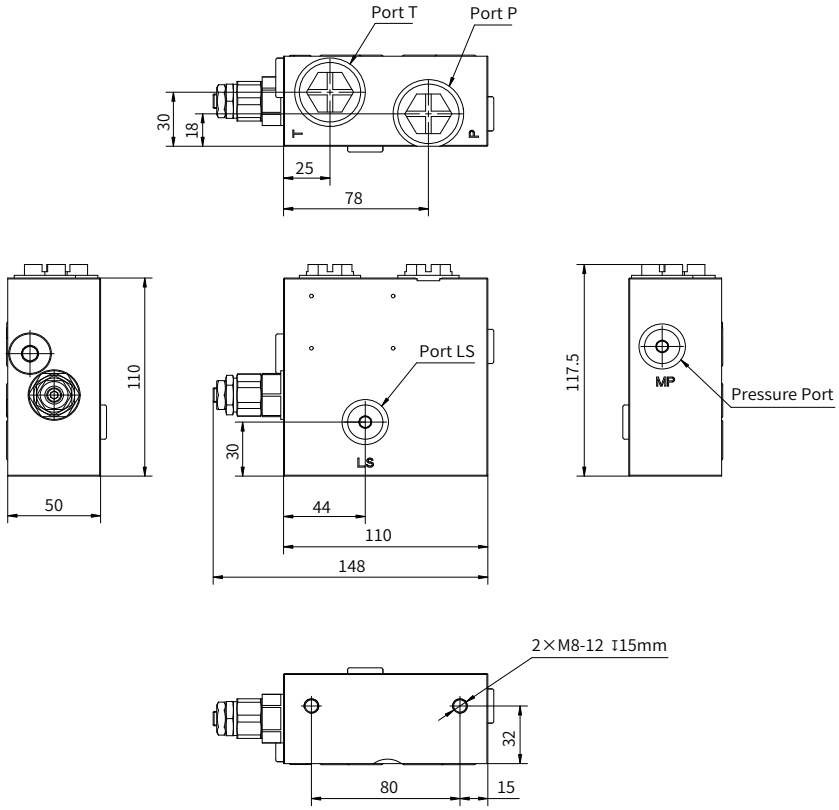
Hydraulic diagram

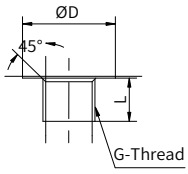
·HVSP20F



Inlet Section – Closed Center

·HVSP12F

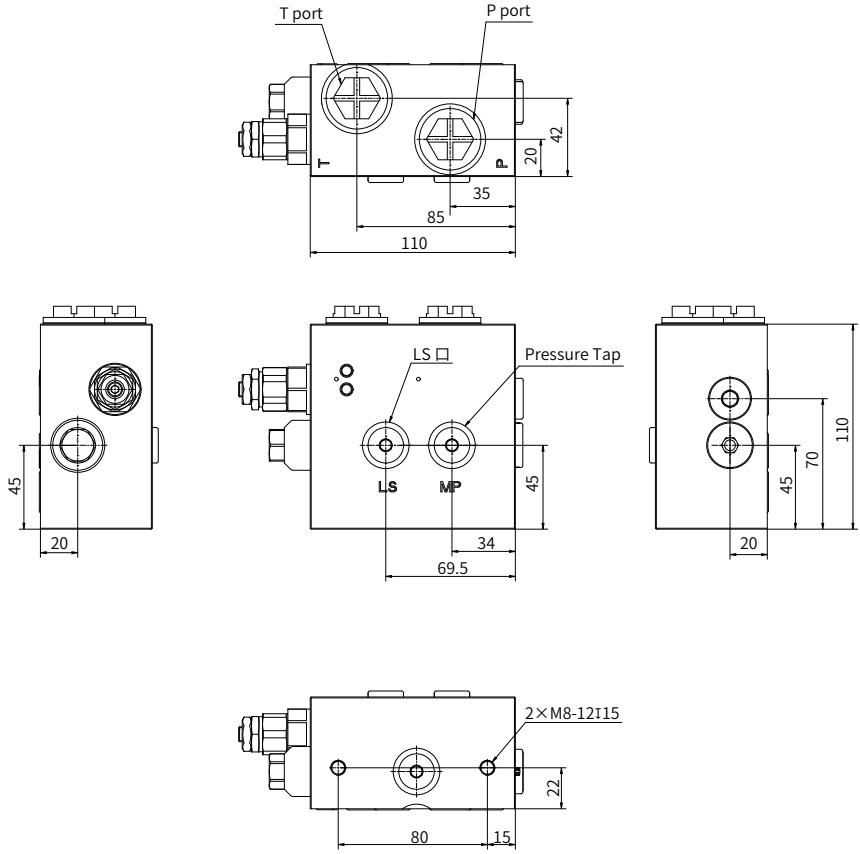


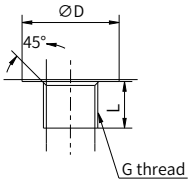


Port Size		Thread Size		
P port:	G3/4	G3/4:	∅ D 38	L 16
T port:	G3/4	G1/4:	∅ D 24	L 12
LS port :	G1/4			
Pressure Tap:	G1/4			

Inlet Section – Open Center

·HVSP12F

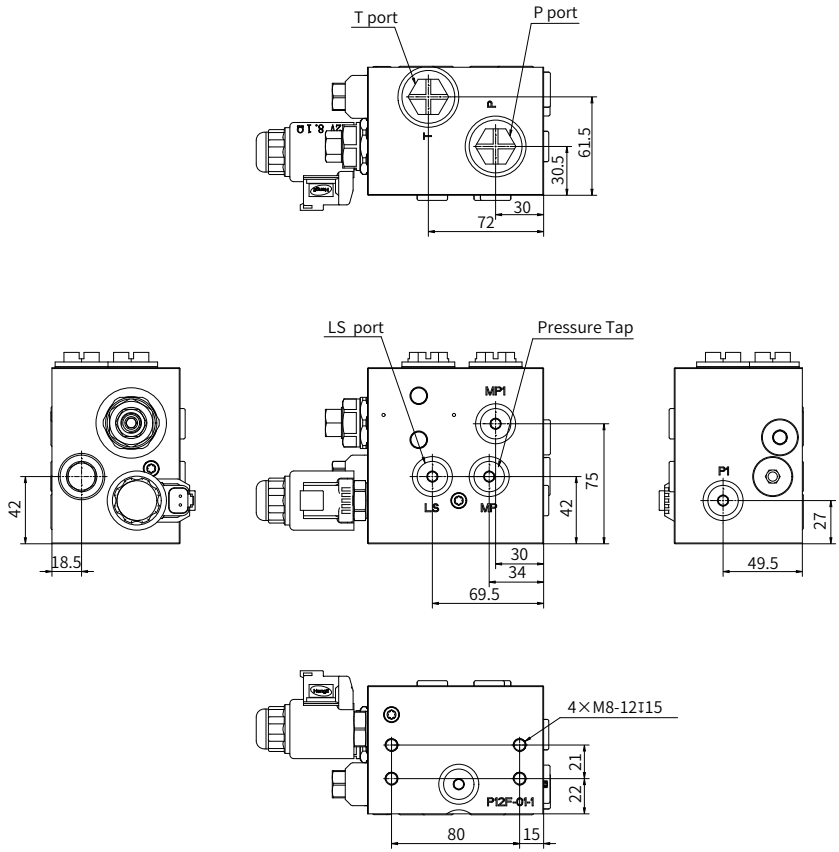


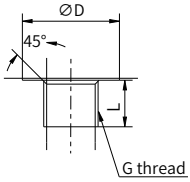


Port Size		Thread Size		
P port:	G3/4	G1/2 :	⌀ D 30	L 15
T port:	G3/4	G1/4:	⌀ D 24	L 12
LS port:	G1/4			
Pressure Tap:	G1/4			

Inlet Section – Open Center (with LS Solenoid Unload Valve)

·HVSP12F

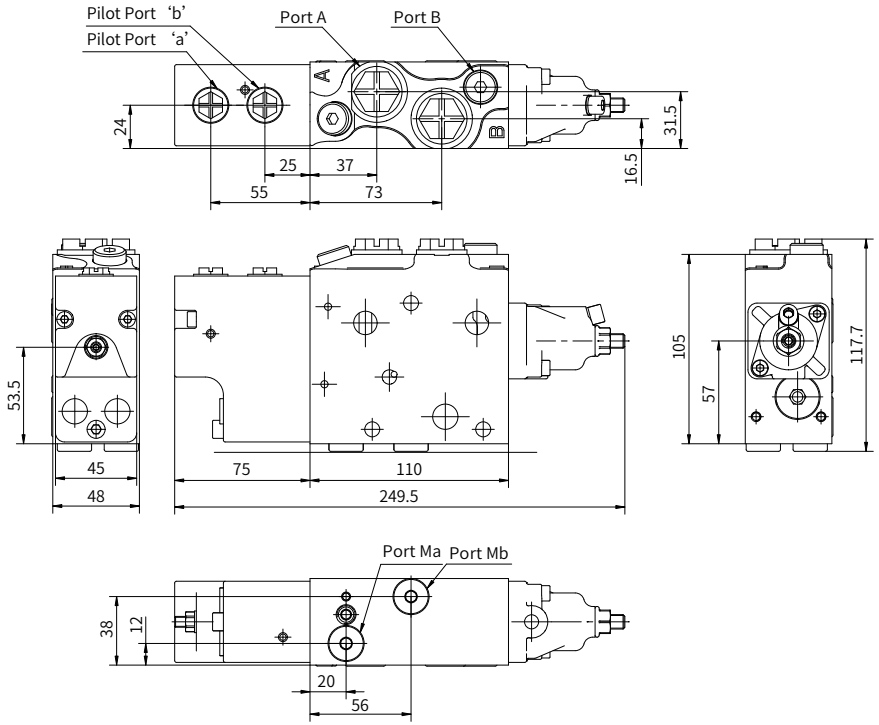


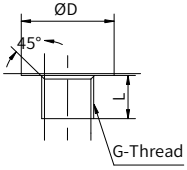


Port Size		Thread Size		
P port：	G3/4	G3/4:	∅ D 38	L 16
T port:	G3/4	G1/4:	∅ D 24	L 12
LS port：	G1/4			
Pressure Tap:	G1/4			

Intermediate Section – Hydraulic Control

·HVSP12F

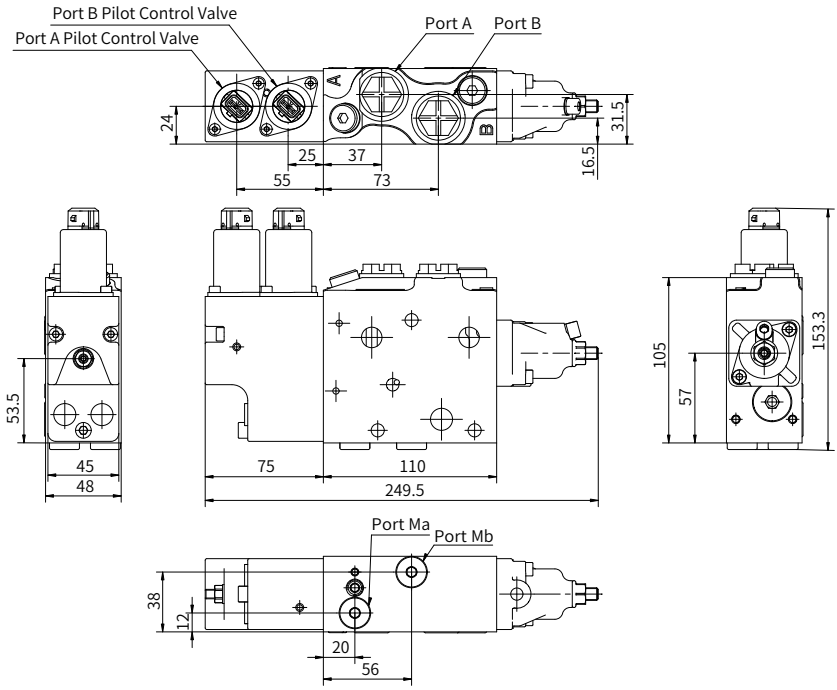


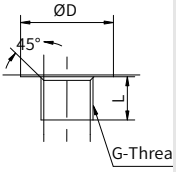


Port Size		Thread Size		
A/B port:	G1/2 or G3/8	G1/4：	Ø D 24	L 12
MA/MB/Pilot Port:	G1/4	G3/8:	Ø D 28	L 12.5
		G1/2:	Ø D 30	L 15

Intermediate Section – Electro-hydraulic Control

·HVSP12F





Port Size

A/B port: G1/2 or G3/8

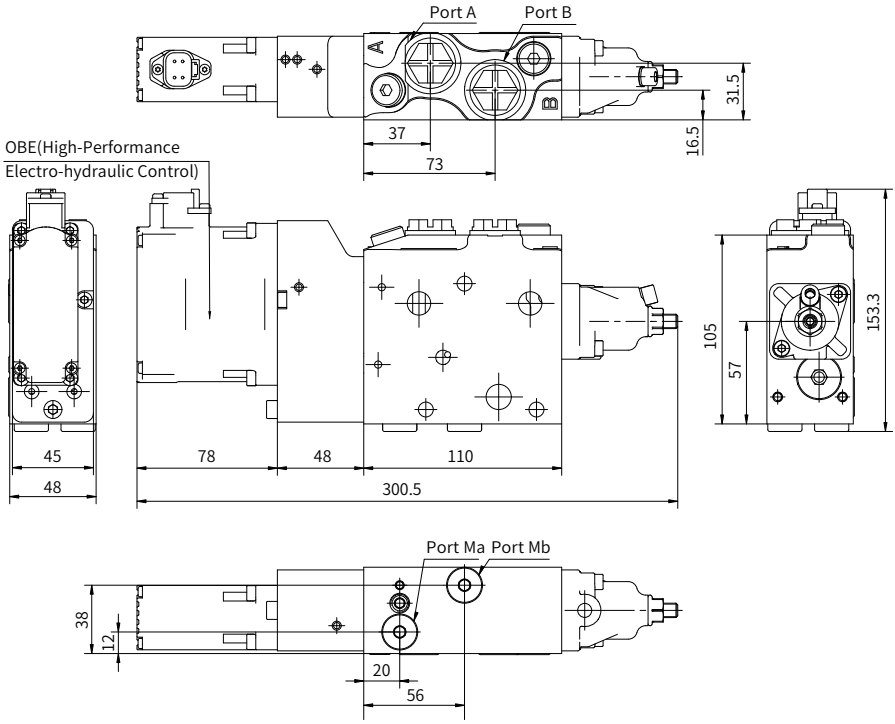
MA/MB port: G1/4

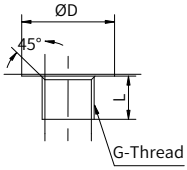
Thread Size

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

Intermediate Section – OBE

·HVSP12F





Port Size

A/B port: G1/2 or G3/8

MA/MB port: : G1/4

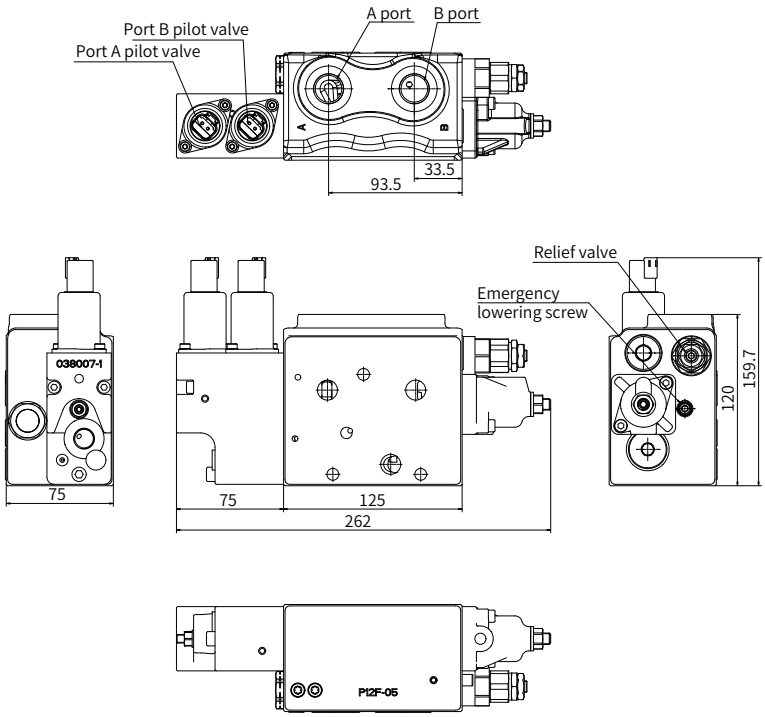
Thread Size

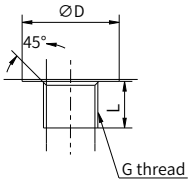
G1/4 :	Ø D 24	L 12
G3/8:	Ø D 28	L 12.5
G1/2:	Ø D 30	L 15

01

Lifting Section – Electro-hydraulic Control

· HVSP12F





Port Size

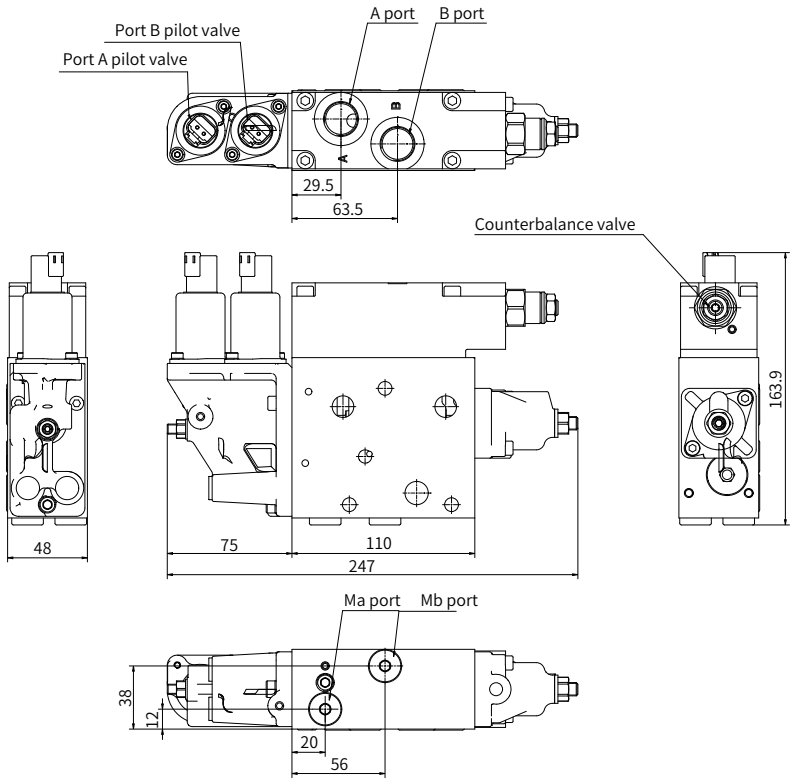
A/B port: G1/2 or G3/4

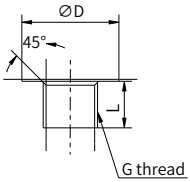
Thread Size

G1/4 :	∅ D 24	L 12
G3/4 :	∅ D 38	L 16
G1/2:	∅ D 30	L 15

Tilting Section – Electro-hydraulic Control

·HVSP12F





Port Size

A/B port: G1/2

MA/MB port: G1/4

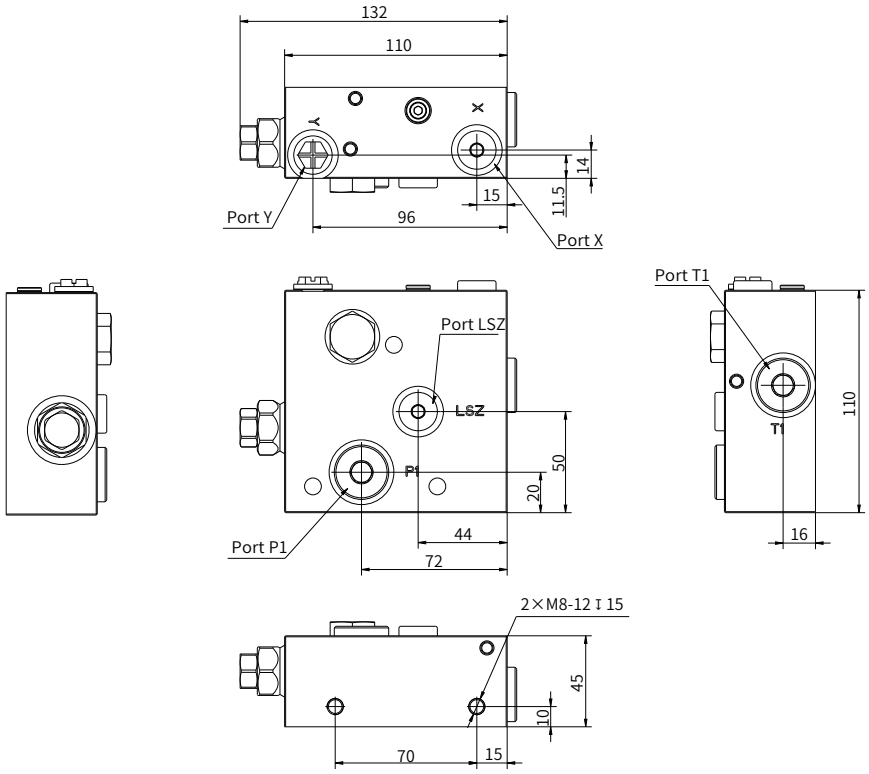
Thread Size

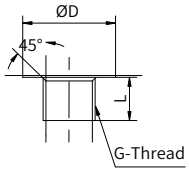
G1/4 : ∅ D 24 L 12

G1/2: ∅ D 30 L 15

End Section (Without Additional P Port)

·HVSP12F

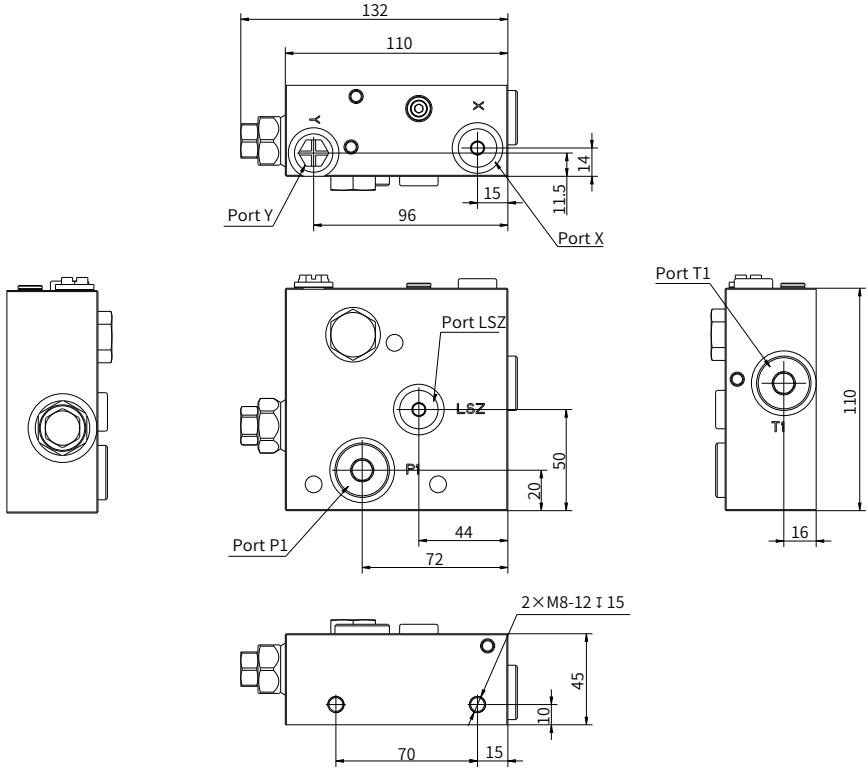


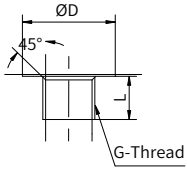


Port Size		Thread Size		
Y port:	G1/4	G1/4:	Ø D 24	L 12
X port:	G1/4	G1/2:	Ø D 30	L 15
LSZ port:	G1/4			
P1 port:	G1/2			
T1 port:	G1/2			

End Section (With Additional P Port)

·HVSP12F





Port Size		Thread Size		
Y port:	G1/4	G1/4:	Ø D 24	L 12
X port:	G1/4	G1/2:	Ø D 30	L 15
LSZ port:	G1/4			
P1 port:	G1/2			
T1 port:	G1/2			

Preferred spool flow

· HVSP12F

· Symmetrical Type

Pressure Compensator Type 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

· Asymmetrical Type

Please consult company technical sales.

Example:

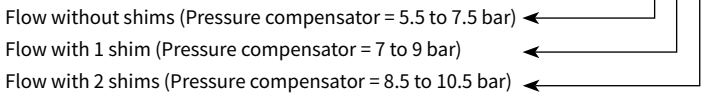
* Pressure Compensator: S
* Required Flow Value: Qac= 72 L/min

Solution:

→ 60 L/min spool + 2 shims = 76 L/min

→ Set to 72 L/min via stroke limiter

Pressure Compensator	**Flow (L/min)**
S	76-76
	68-68
	60-60



· Lifting Section Optional

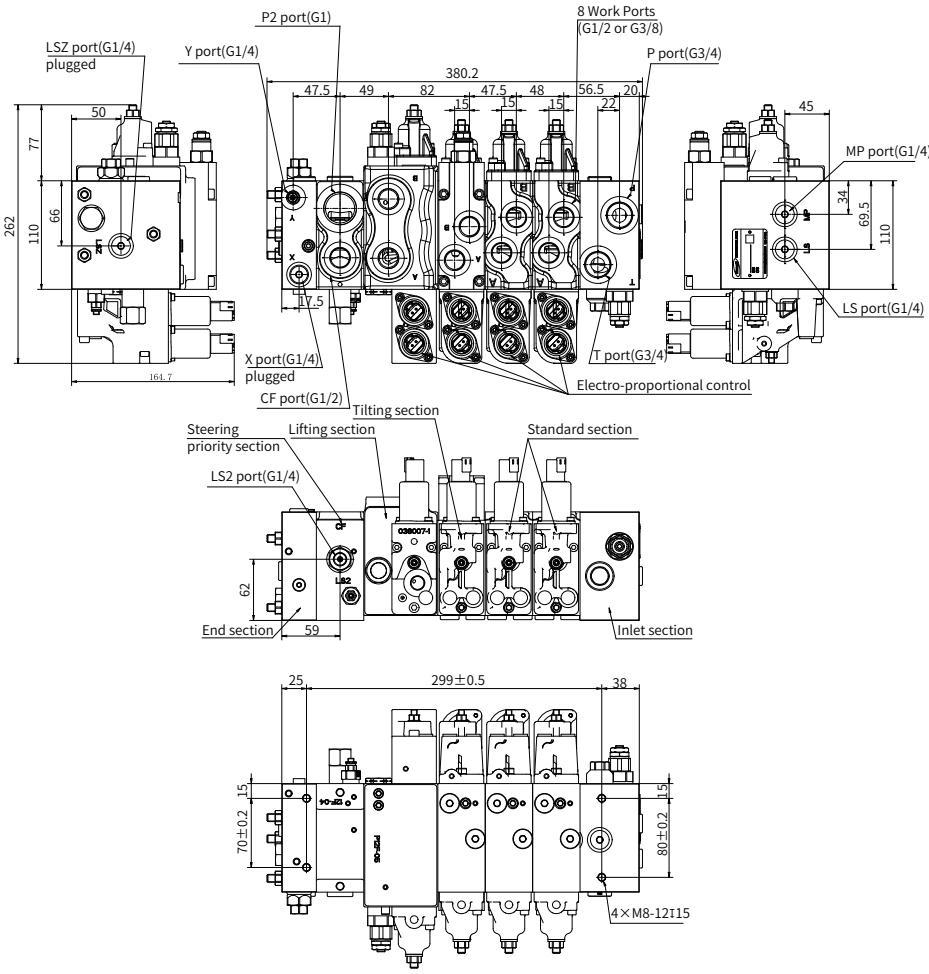
Pressure Compensator Type Flow (L/min)

Max. flow 200 L/min

T	0-160	0-200

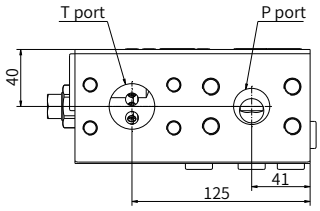
Unit dimensions

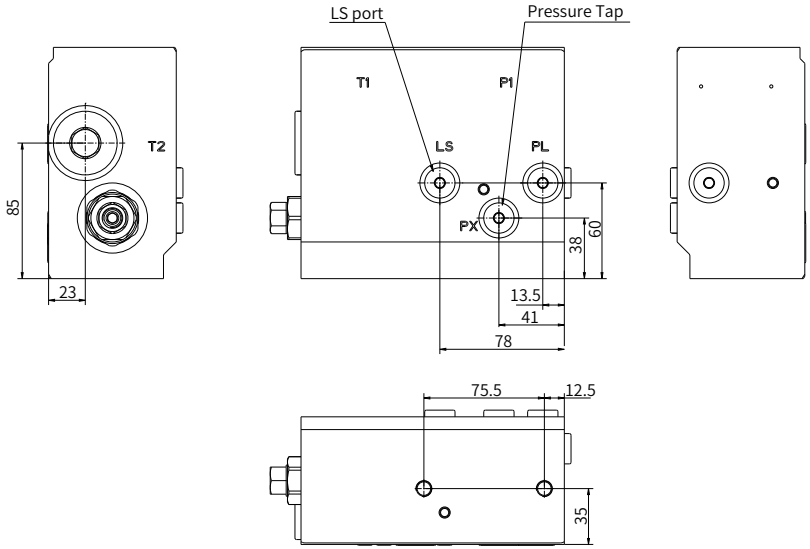
·HVSP12F

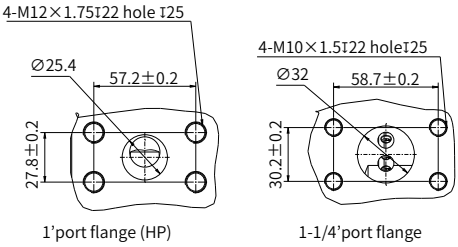


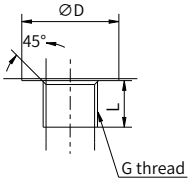
Inlet Section – Closed Center

·HVSP20F





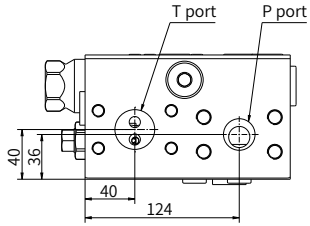


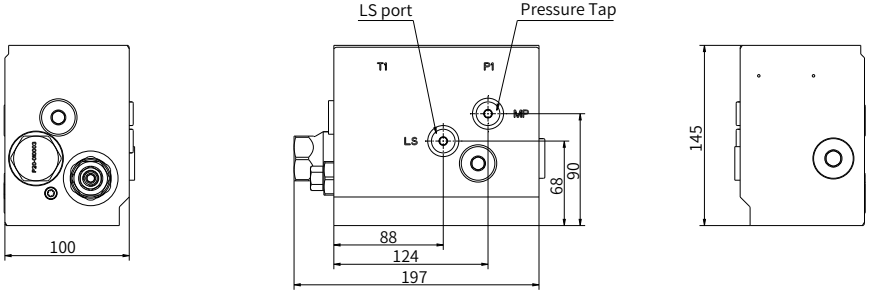


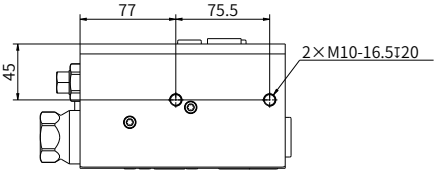
Port Size		Thread Size			
P port:	1'	G1/4:	∅ D 24	L 12	
T port:	1-1/4'				
LS port:	G1/4				

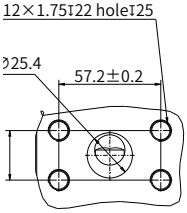
Inlet Section – Open Center

·HVSP20F

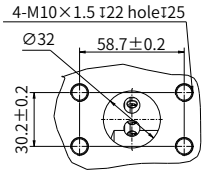




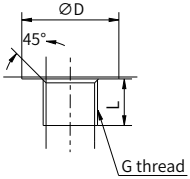




1'port flange (HP)



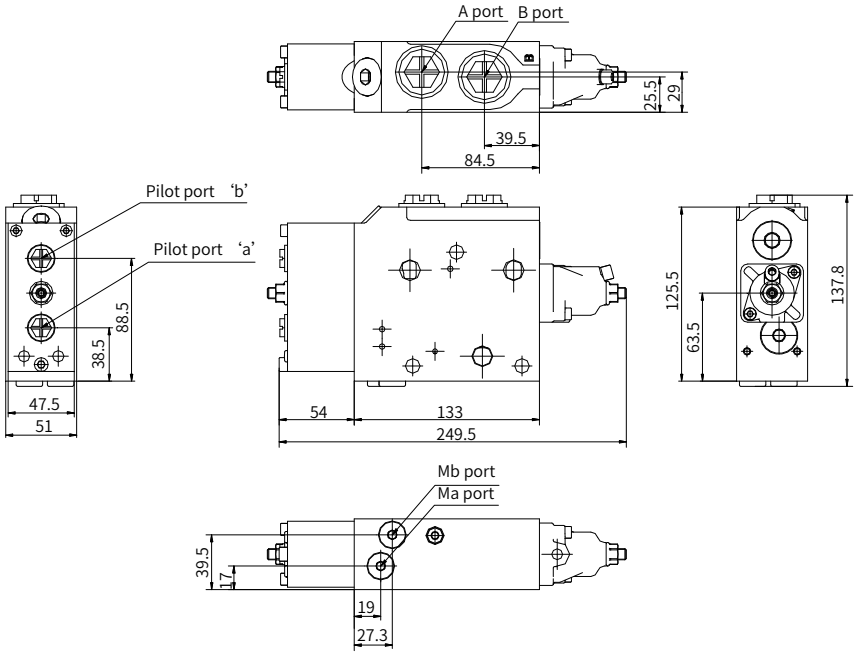
1-1/4'port flange

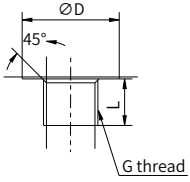


Port Size		Thread Size			
P port:	1'	G1/4:	⌀ D 24	L 12	
T port:	1-1/4'				
LS port :	G1/4				

Intermediate Section – Hydraulic Control

·HVSP20F

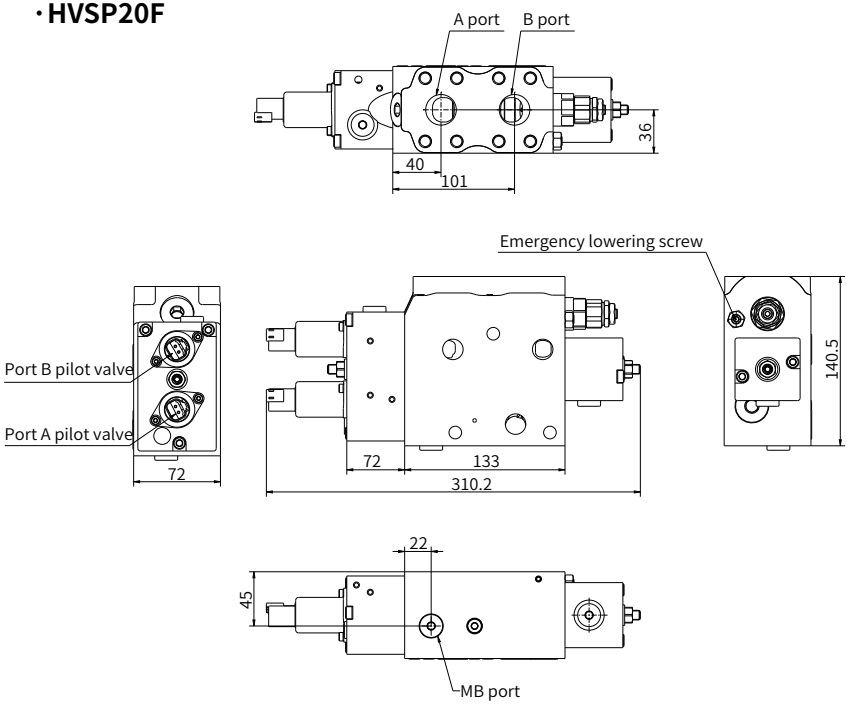


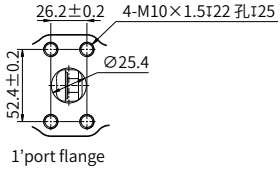


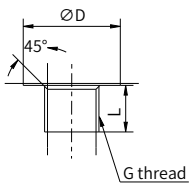
Port Size	Thread Size
A/Bport: G3/4	G3/4: ∅ D 38 L 16
Pilot Port/MA/MB port: G1/4	G1/4: ∅ D 24 L 12

Intermediate Section – Electro-hydraulic Control

·HVSP20F



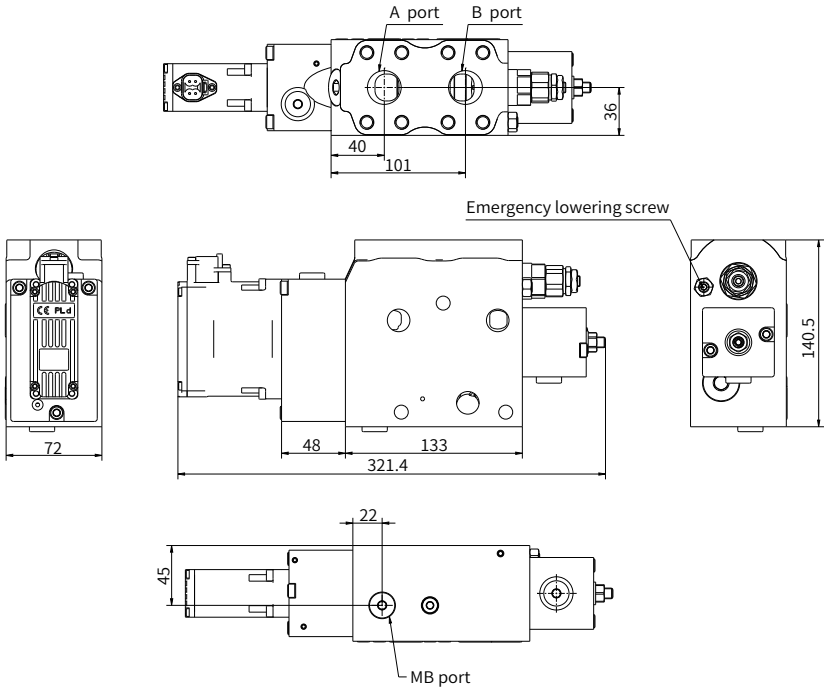


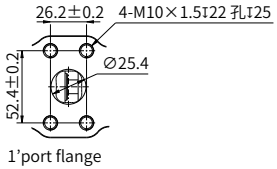


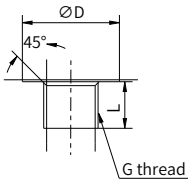
Port Size	Thread Size
MA/MB port: G1/4	G1/4: Ø D 24 L 12

Intermediate Section – OBE(Lifting Section)

·HVSP20F



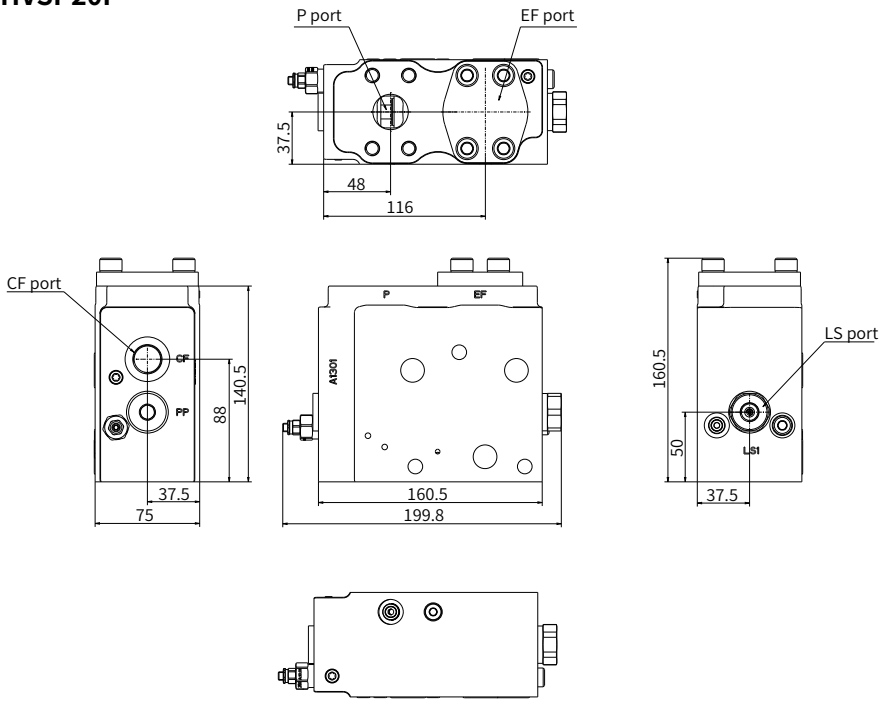


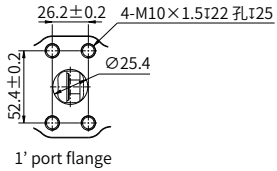


Port Size	Thread Size
MA/MB port: G1/4	G1/4: Ø D 24 L 12

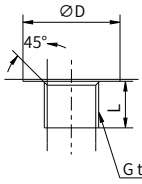
Intermediate Section – Integrated Steering Priority

·HVSP20F





1' port flange



Port Size		Thread Size		
CF port:	G1/2	G1/4：	Ø D 25	L 12
P port:	1'	G1/2:	Ø D 32	L 15
LS port:	G1/4			
EF port:	1'			

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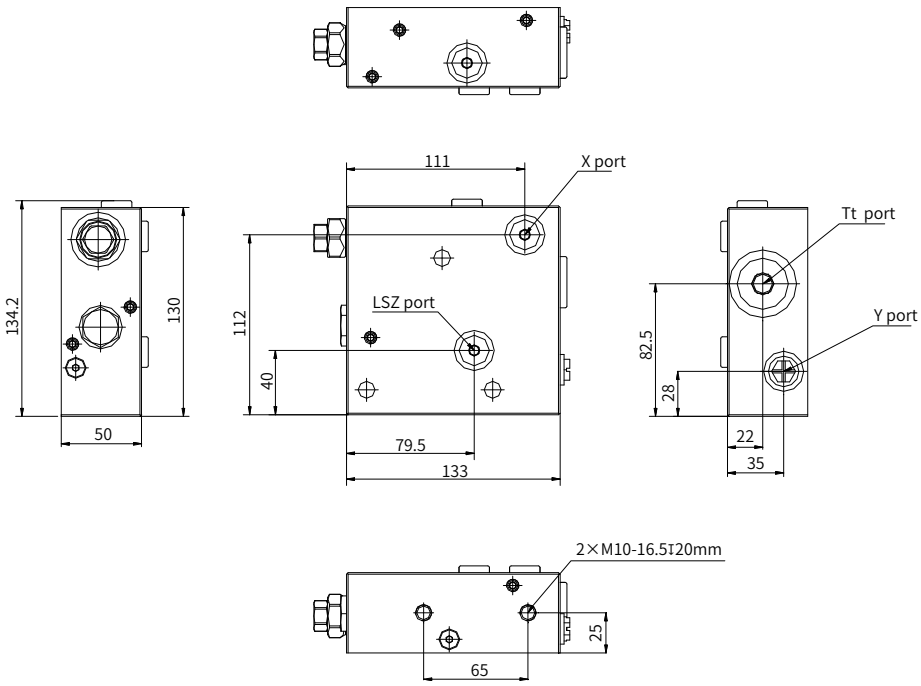
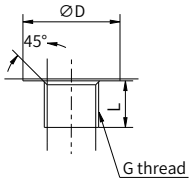
End Section (Without Additional P Port)

·HVSP20F

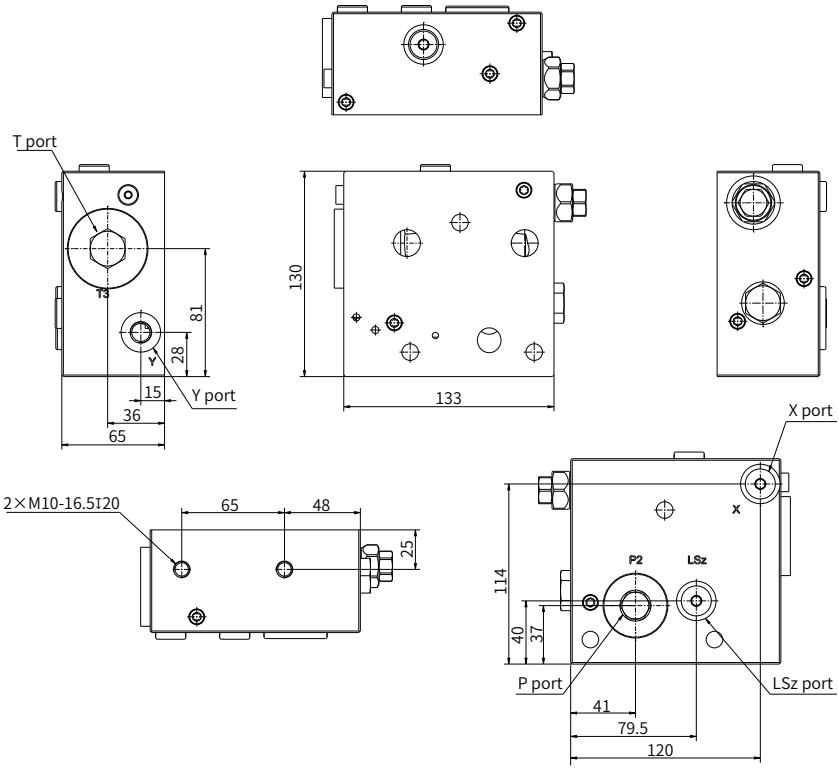


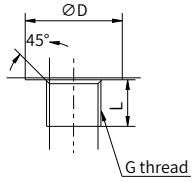


Port Size		Thread Size		
Tt port:	G3/4	G3/4:	∅ D 38	L 16
Y port:	G1/4	G1/4:	∅ D 24	L 12
X port:	G1/4			
LSZ port:	G1/4			

End Section (With Additional P Port)

·HVSP20F





Port Size		Thread Size			
P1 port:	G3/4	G3/4:	⌀ D 38	L 16	
T3 port:	G1 1/4	G1/4:	⌀ D 24	L 12	
Y port:	G1/4	G1 1/4 :	⌀ D 58	L 21.5	
X port:	G1/4				
LSZ port:	G1/4				

Preferred spool flow

· HVSP20F

· Symmetrical Type

Pressure Compensator Type 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		

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· Asymmetrical Type

Pressure Compensator Type 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:

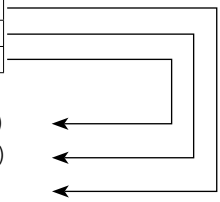
* Pressure Compensator: S
* Required Flow Value Qac= 145 L/min

Solution:

→ 110L/min spool + 2 shims =150L/min

→ Set to 145 L/min via stroke limiter

Pressure Compensator	**Flow (L/min)**
S	150-150
	130-130
	110-110



Flow without shims (Pressure compensator = 6 to 9 bar)
Flow with 1 shim (Pressure compensator = 7.5 to 10 bar)
Flow with 2 shims (Pressure compensator = 9 to 12 bar)

· Lifting Section Optional

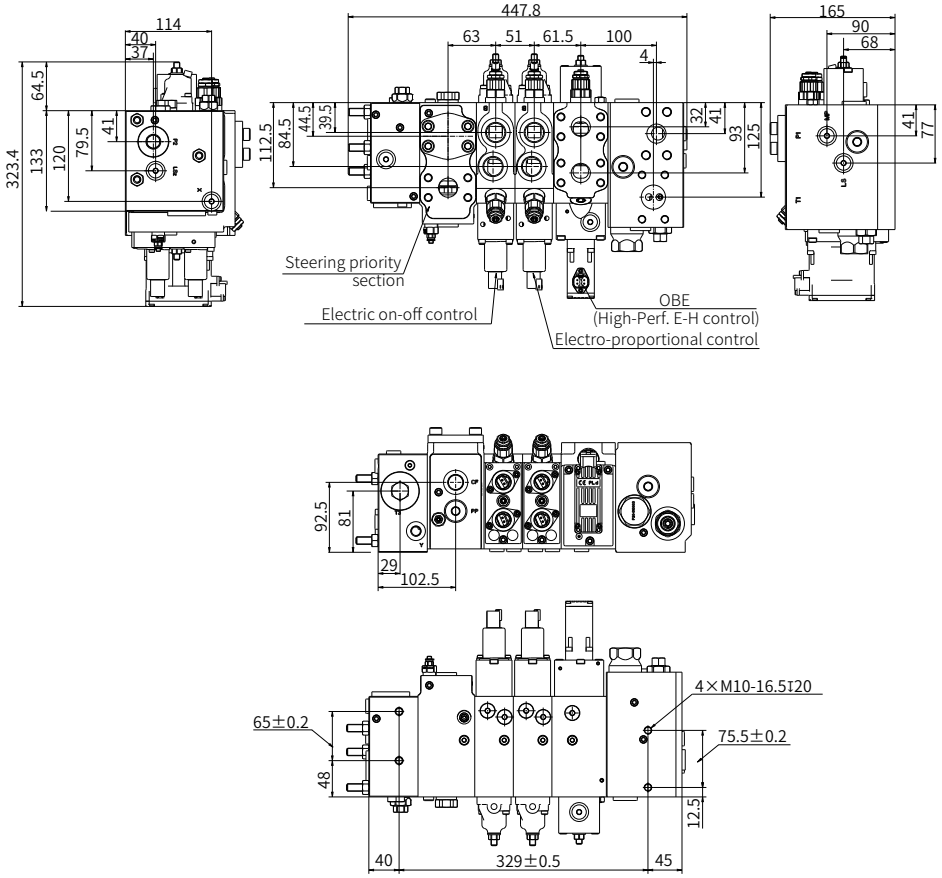
Pressure Compensator Type Flow (L/min)

Max. flow 400 L/min

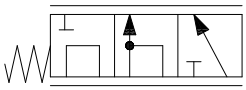
S	0-400	0-200

Unit dimensions

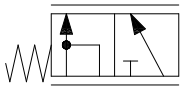
·HVSP20F



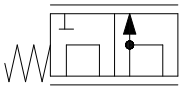
Pressure compensator type



Code 'S'
With pressure compensator
With load holding function

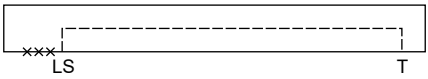


Code 'T'
With pressure compensator
Without load holding function

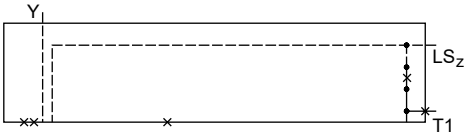


Code 'C'
Without pressure compensator
With load holding function

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

By comparing the input value from the control element (potentiometer, operating handle, or host computer) with the feedback value from the built-in high-precision Hall effect position sensor, this closed-loop control system enables the spool displacement control accuracy to approach the performance level of a servo valve.

Technical Parameters

Hydraulic Parameters:

Maximum Pressure: 35 bar

Minimum Pressure: 12 bar

Maximum Back Pressure: 1.5 bar

Pilot Flow Rate: 0.2 L/min

Oil Filtration: 18/15 (ISO 4406)

Electrical Parameters:

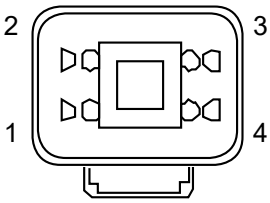
Supply Voltage: 10-30 VDC

Maximum Current: 750 mA

Protection Rating: IP67

Communication Protocol: CANopen or J1939

Terminal Definition (Front View)



D/C0

1. Power Supply Positive
2. CANL
3. CANH
4. Power Supply Negative