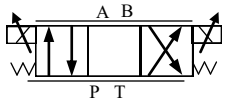
FluidHaus

Proportional Directional Valve, NG6-NG32 (D03-D10)
Series: VSP, VSPE, VSPEF

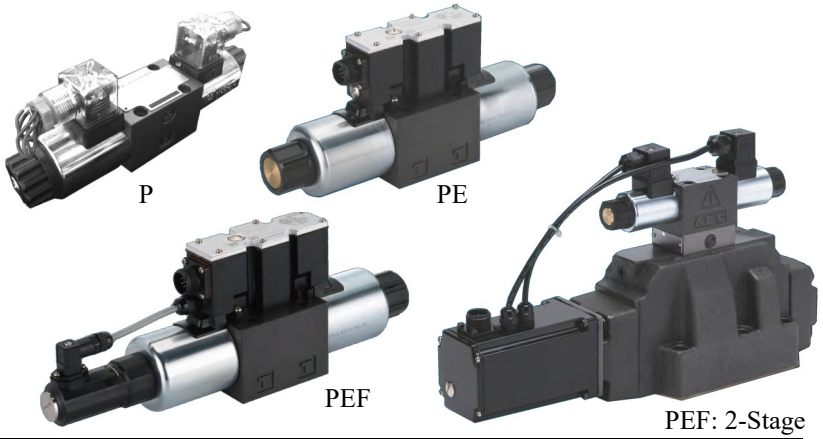
0-350 Bar (0-5075 PSI) 0-1600 lpm (0-421 gpm)



Features

- Proportional directional control valves with variable spool position/output flow from an analog variable input signal. Either +/-10VDC or 4-20ma input available.
- Proportional coil direct spool drive type
- Standard subplate mounting pattern
- High precision control for position or speed/flow of an actuator
- Available without electronics (P) for PWM driven coil or separate driver card.
- On-board electronics (PE) for "plug and play" ease of set-up

Spool position feedback (PEF) for fast response, and higher precision control.

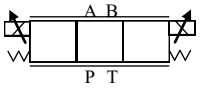
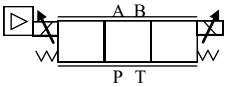
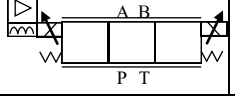


PEF: 2-Stage

Ordering Details

V	Valve
S	Subplate Mount
PEF	Type (ref. page 6-8 for wiring diagrams)
16-	Size (mounting pattern) (page 3-5 for dimensions)
C	Spool Configuration
200-	Spool Flow at Δp=10bar (145psi)
24-	Supply Power: 24 = 24VDC
D7-	Electrical Connection
10-	Command Signal: 10 = +/- 10VDC, 4 = 4-20ma (blank for VSP valves)
II-	Pilot Supply Options
1	Series

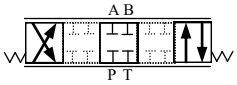
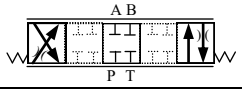
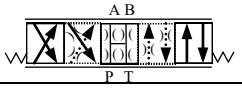
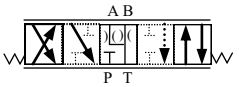
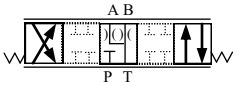
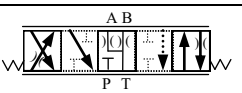
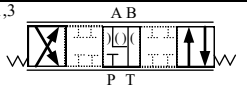
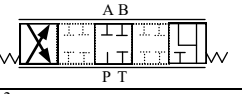
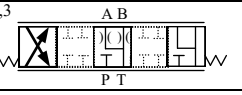
Code	Size
6	NG6 (D03)
10	NG10 (D05)
10H	NG10 (D05) 2-Stage
16	NG16 (D07)
25	NG25 (D08)
32	NG32 (D10)

Code	Type	Symbol	Available Sizes
P	Proportional (ref. page 6 for amplifier card, purchase separately)		6.10, 10H, 16, 25, 32
PE	Proportional with on-board electronics		6, 10
PEF	Proportional with on-board electronics and position feedback		6, 10, 10H, 16, 25, 32

Size	Type	P	PE	PEF
6	Code/lpm	7, 15, 26	7, 15, 26	8, 16, 32
10	Code/lpm	30, 60	30, 60	25, 50, 75
10H	Code/lpm	50, 85	-	25, 50, 100
16	Code/lpm	100, 150	-	125, 200
25	Code/lpm	220, 325	-	220, 300
32	Code/lpm	360, 520	-	400, 600

Code	Valve Type	Description
D	P	3 Pin, DIN 46350
D7	PE, PEF	DIN type DF31, 7-Pin round connector

Size 10H, 16, 25, 32 Two Stage Valves Pilot Valve Supply	
Code	**Supply**
II	Internal pilot, Internal drain (Standard)
EI	External pilot, Internal drain
IE	Internal pilot, External drain
EE	External pilot, External drain

3 Position	Available on Valve Type	Available on Size
C 	P, PE, PEF	6, 10, 10H, 16, 25, 32
C2[1] 	P, PE, PEF	6, 10, 10H, 16, 25, 32
O 	PE, PEF	6, 10
N[2] 	P, PE, PEF	6, 10
N[3] 	PEF	10H, 16, 25, 32
N2[1] 	P, PE, PEF	6, 10
N2[1,3] 	PEF	10H, 16, 25, 32
R[1] 	PEF	10H, 16, 25, 32
RN[1,3] 	PEF	10H, 16, 25, 32

[1] B to T and P to B are half flow to aid in linear input signal for 2:1 ratio cylinders
[2] A and B to T in center position is open 3% of spool travel
[3] A and B to T in center position is open 2% of spool travel

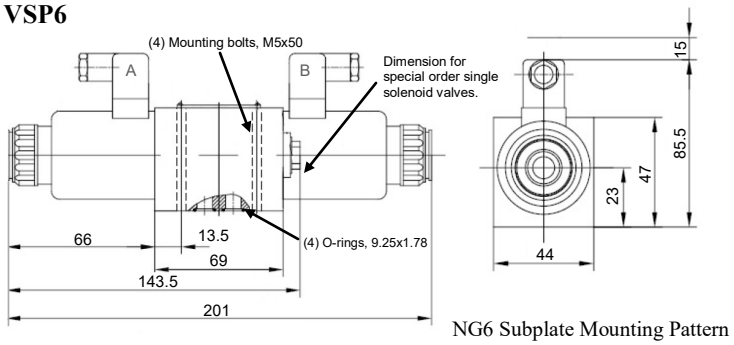
Example Part Number: VSPEF16-C200-24-D9-10-II-1

Technical Specifications

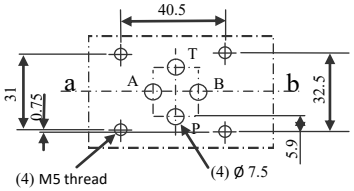
General			VSP						VSPE		VSPEF					
		Size	6	10	10H	16	25	32	6	10	6	10	10H	16	25	32
Installation			Optional, horizontal recommended													
Ambient Temperature		ºC	-20 to +50													
Weight		Kg	2.0	6.6	7.8	13.4	18.2	42.2	2.2	6.8	2.4	6.5	8.7	11.2	16.8	31.5
Hydraulic																
Max. operating pressure	A, B, P Ports	bar	315			350			315		315			350		
	T Port	bar	210		Ref. pilot valve				210		210		Ref. pilot valve			
Pilot Oil Vol. req. for 100% spool shift		cm^3	-		1.7	4.6	10	26.5	-		-		1.7	4.6	10	26.5
Pilot Oil flow at X and Y port		lpm	-		3.5	5.5	7	15.9	-		-		4.1	8.5	11.7	13
Pilot valve supply pressure required		bar	-		100-315	100-350			-		-		25-315			
Pilot Valve Max Pressure	Port T, internal pilot	bar	-		3				-		-		<10			
	Port T, External pilot	bar	-		315	250	250	150	-		-		315	250	250	250
	Port Y	bar	-		3				-		-		<10			
Nominal flow at at Δp=10bar (145psi)		lpm	7, 15 , 26,	30, 60	50, 85	100, 150	220. 325	360. 520	7, 15 , 26,	30, 60	8, 16, 32	25, 50, 75	25, 50, 100	125, 180	220, 350	400, 600
Max. flow		lpm	42	75	170	460	870	1600	42	75	80	180	170	460	870	1600
Fluid			Mineral based oil													
Fluid Temperature		ºC	-20 to +80													
Fluid viscosity range		mm^2/s	20 to 380													
Fluid Cleanliness			ISO 4406 class 20/18/15													
Fluid Cleanliness Pilot Valve			-		ISO 4406 class 17/15/12				-		-		ISO 4406 class 17/15/12			
Hysteresis		%	≤5		≤6				≤5		≤0.1		≤ 1			
Reversal Error		%	≤1		-				≤1		≤0.05		-			
Response Sensitivity		%	≤0.5		-				≤0.5		≤0.05		≤ 0.5			
Electrical																
Supply voltage		VDC	24 (35 max., 21 min,)													
Command Voltage			Ref. page 6 for controller options						+/-10VDC or 4-20ma							
Max current per Solenoid		Amps	2.5		1.5				2.5		3					
Solenoid Coil Resistance	Cold value at 20 ºC	Ω	2		4.8				2		2.7	3.7	2			
	Max. hot temp.	Ω	3		7.2				3		4.05	5.55	3			
Duty		%	100													
Max. Coil temp		ºC	150													
Valve Protection to DIN40050			IP65													
Amplifier current consumption	Max. continuous	A	-						1.8		<2					
	Max. impulse	A	-						3		3					
Electrical Connector			3 Pin, DIN 46350						DIN type DF31, 7-Pin round connector							

Dimensions (mm) : VSP without electronics

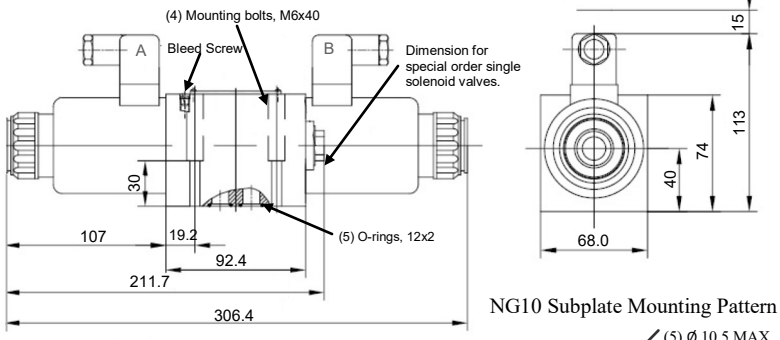
VSP6



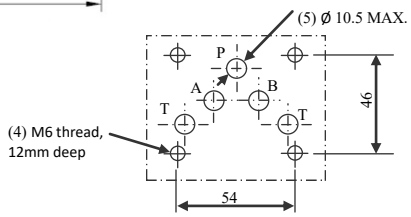
NG6 Subplate Mounting Pattern



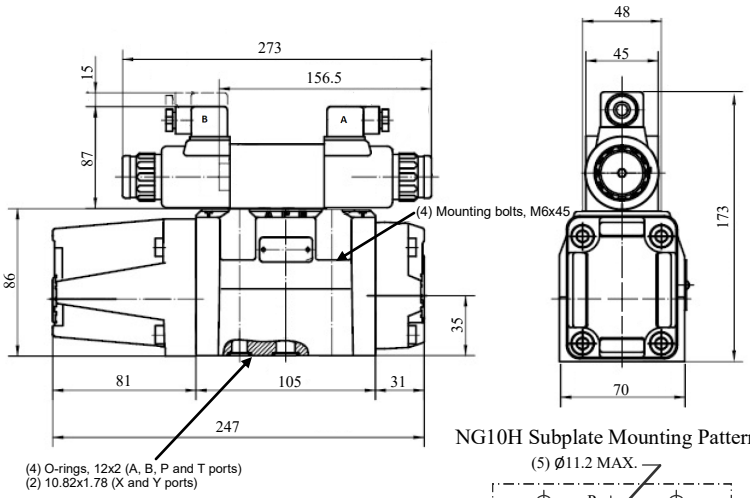
VSP10



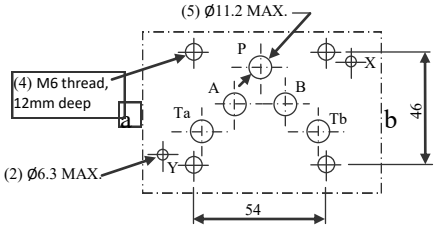
NG10 Subplate Mounting Pattern



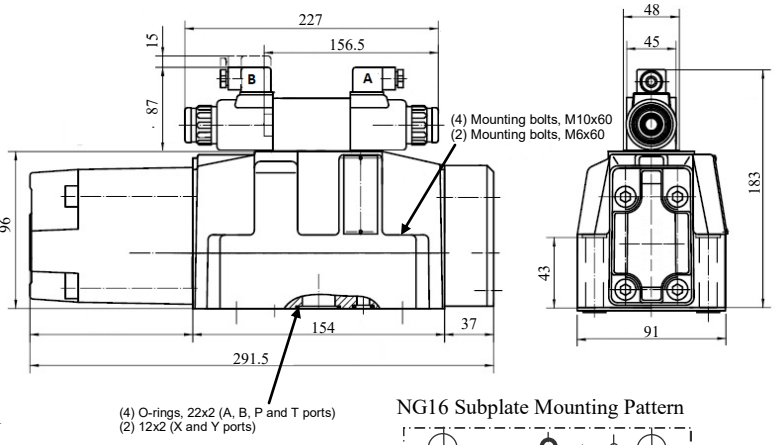
VSP10H



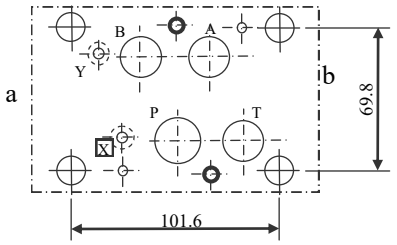
NG10H Subplate Mounting Pattern



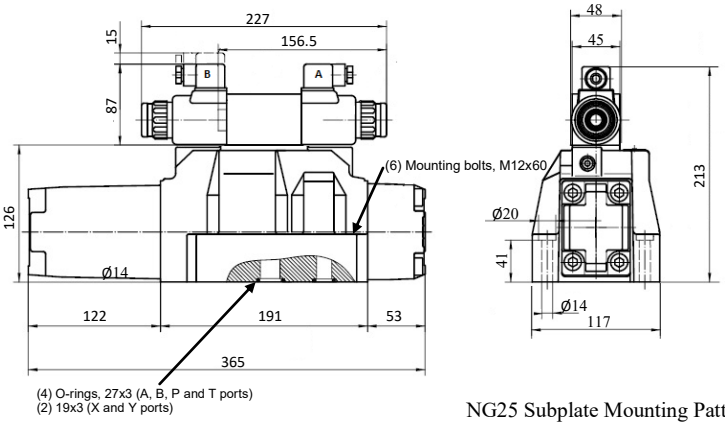
VSP16



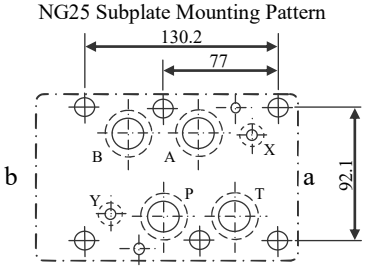
NG16 Subplate Mounting Pattern



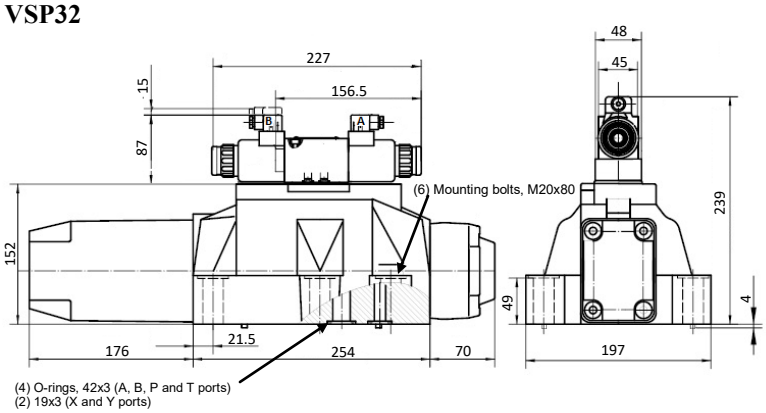
VSP25



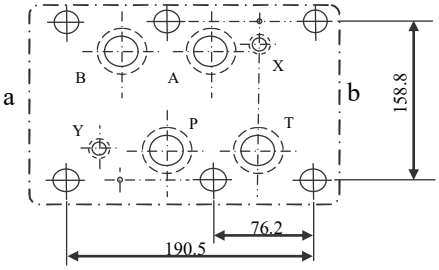
NG25 Subplate Mounting Pattern



VSP32



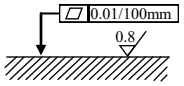
NG25 Subplate Mounting Pattern



Note:

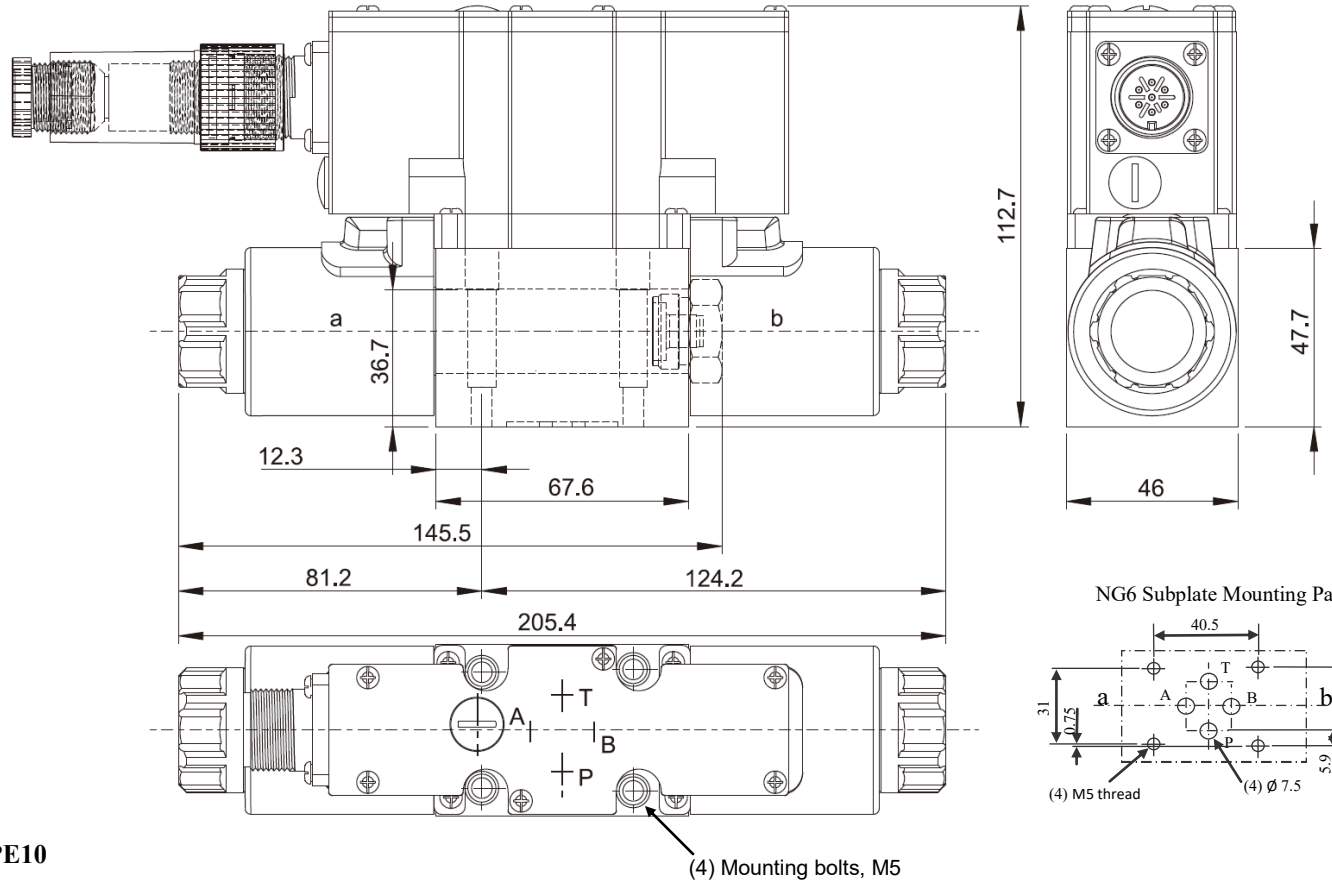
X = External Pilot Pressure
Y = External Pilot Drain

Mating surface recommendation:

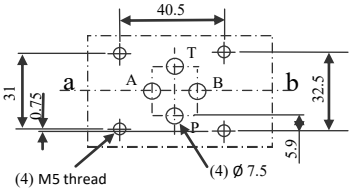


Dimensions (mm): VSPE with on-board electronics

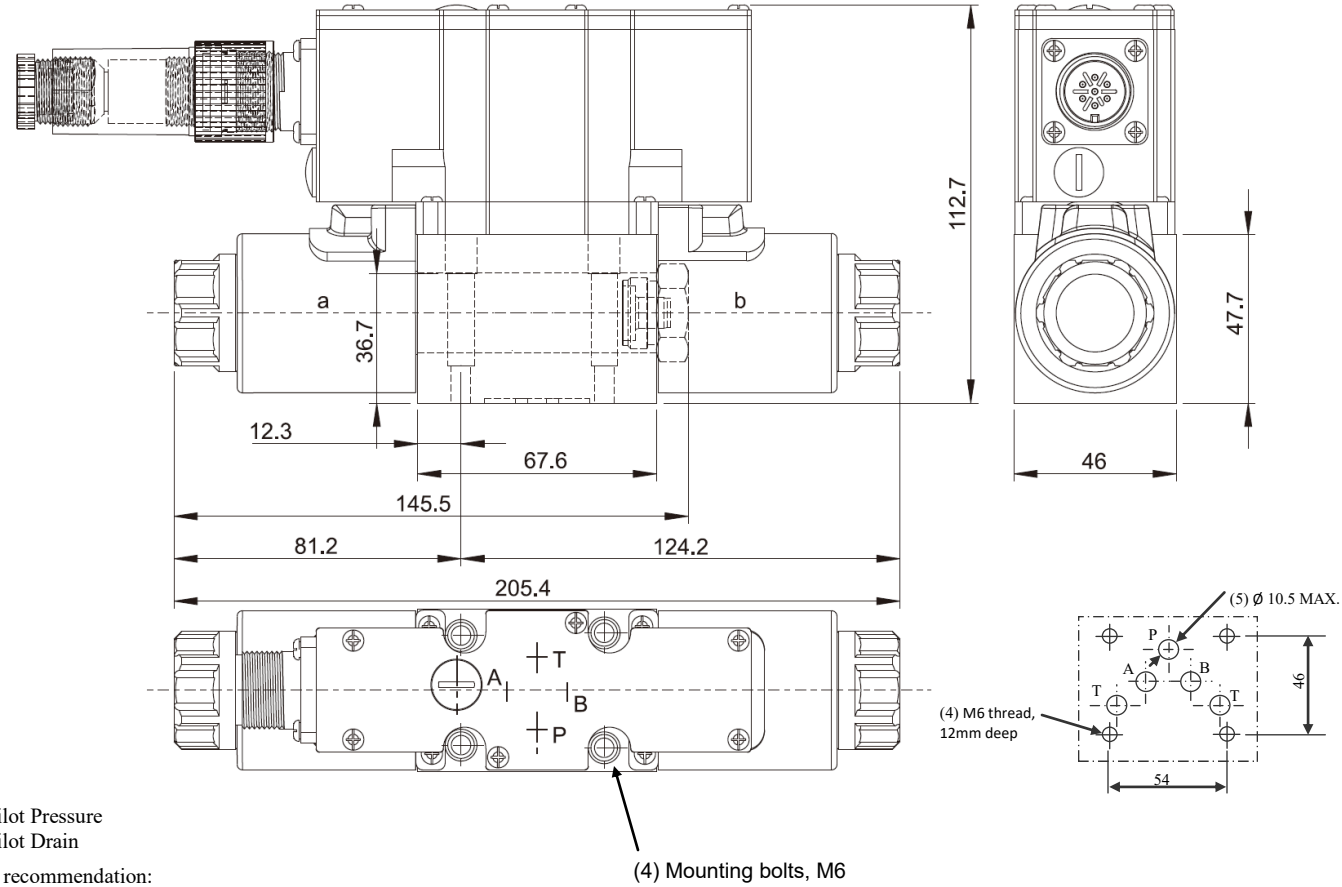
VSPE6



NG6 Subplate Mounting Pattern



VSPE10



Note:

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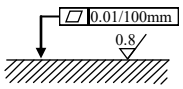
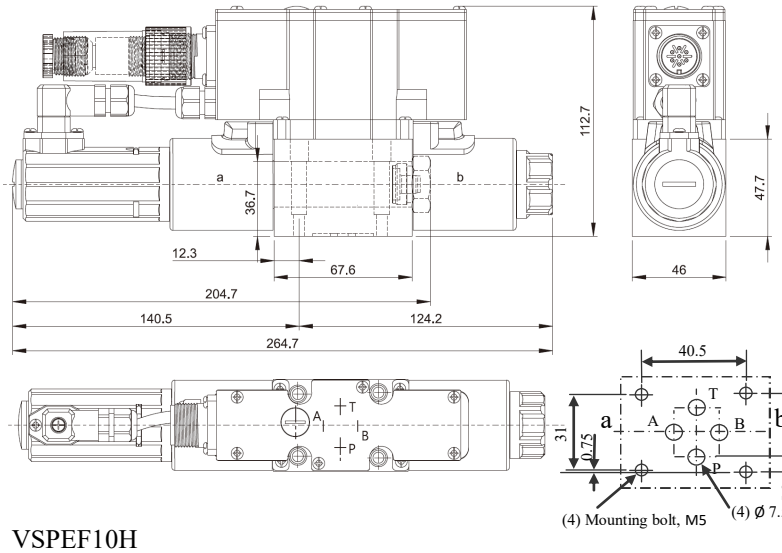
Y = External Pilot Drain

Mating surface recommendation:

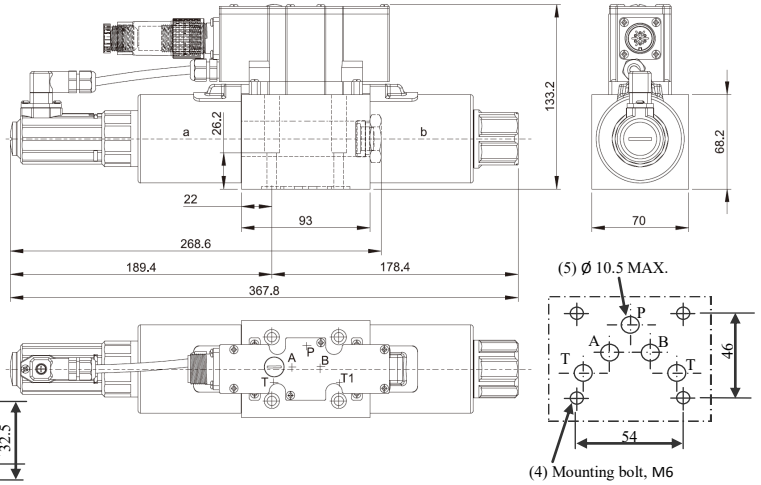


Dimensions (mm): VSPEF with on-board electronics and position feedback

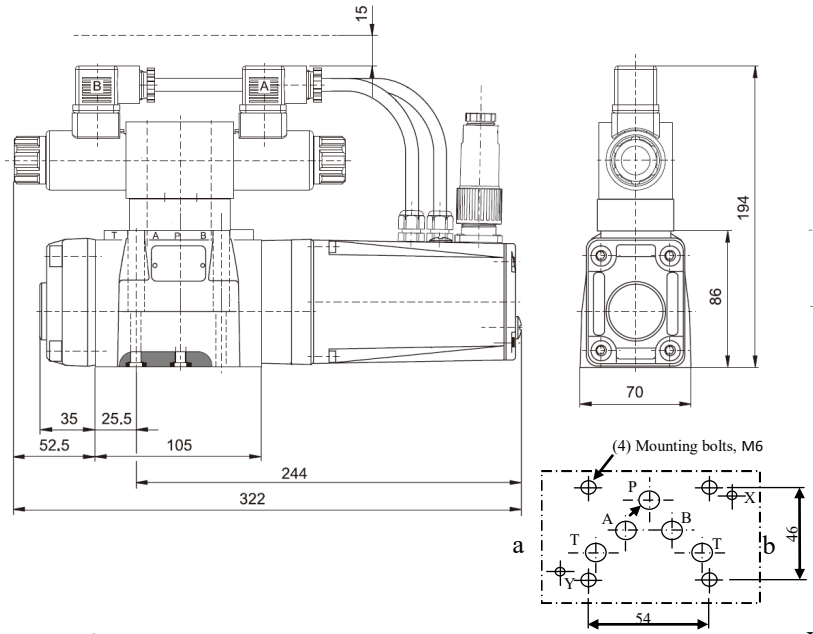
VSPEF6



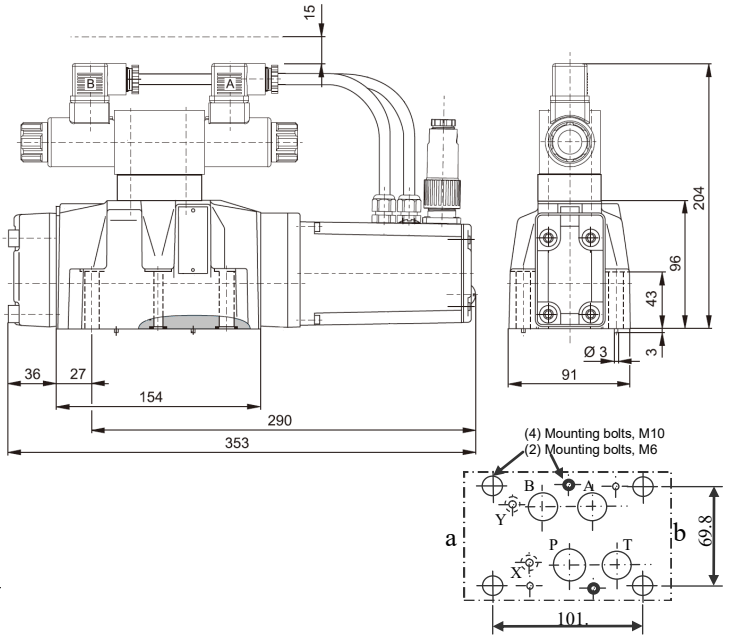
VSPEF10



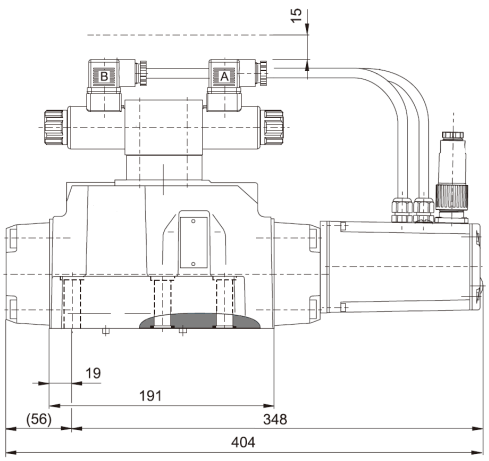
VSPEF10H



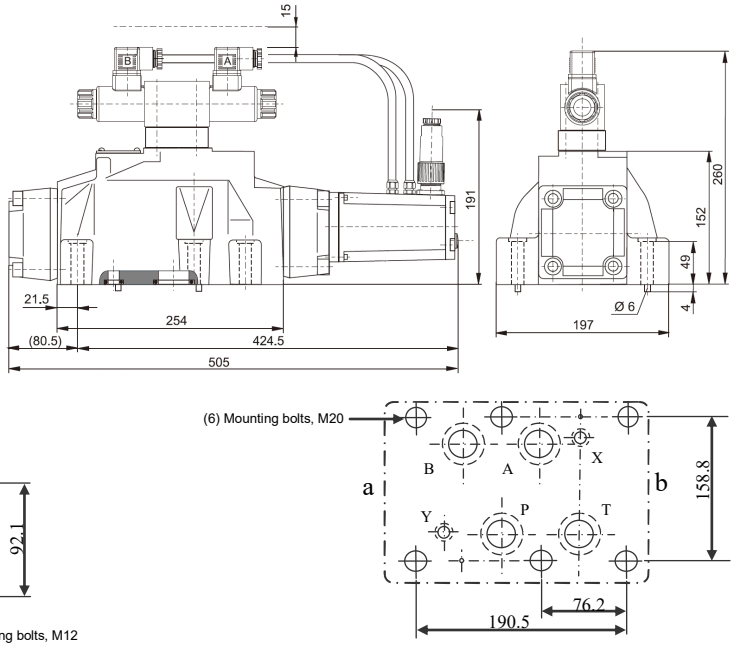
VSPEF16



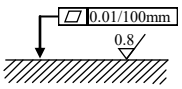
VSPEF25

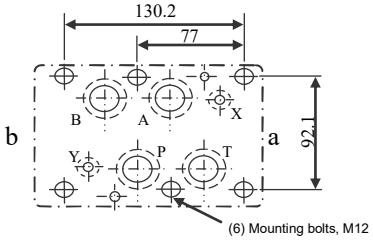


VSPEF32



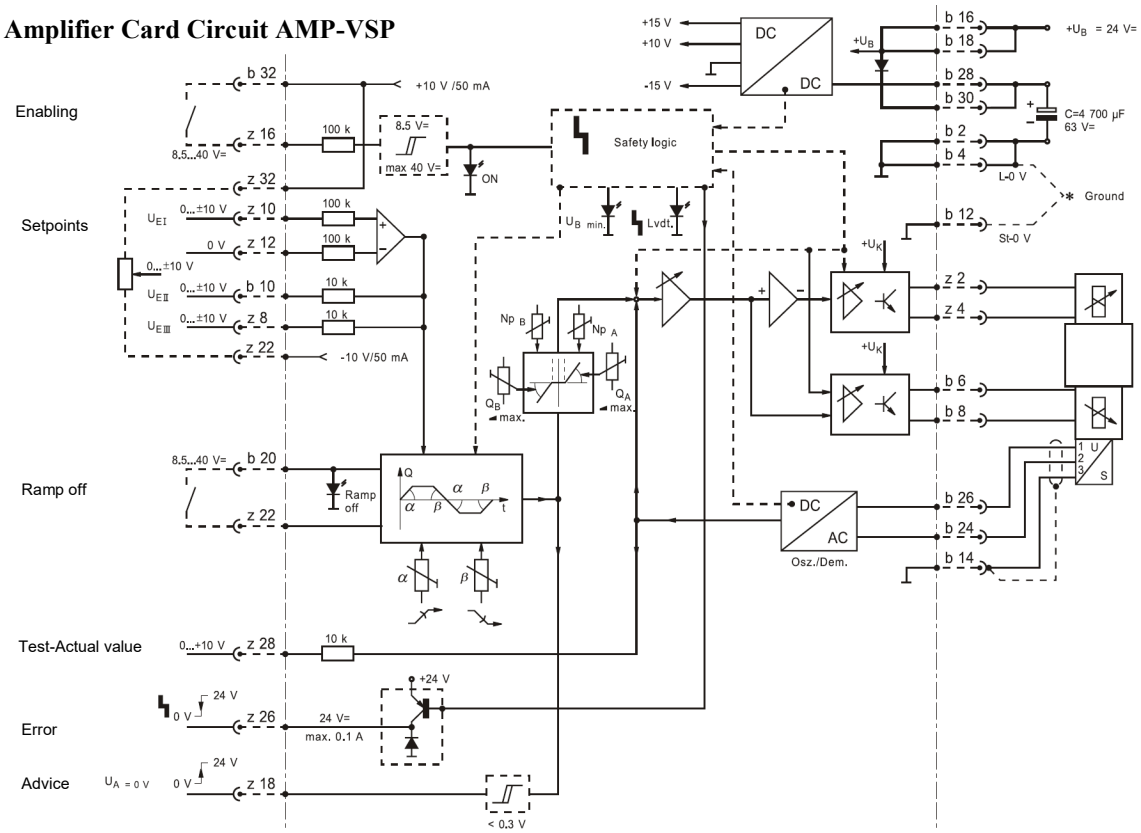
Note:
X = External Pilot Pressure
Y = External Pilot Drain
Mating surface recommendation:



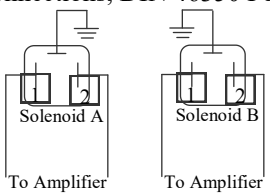


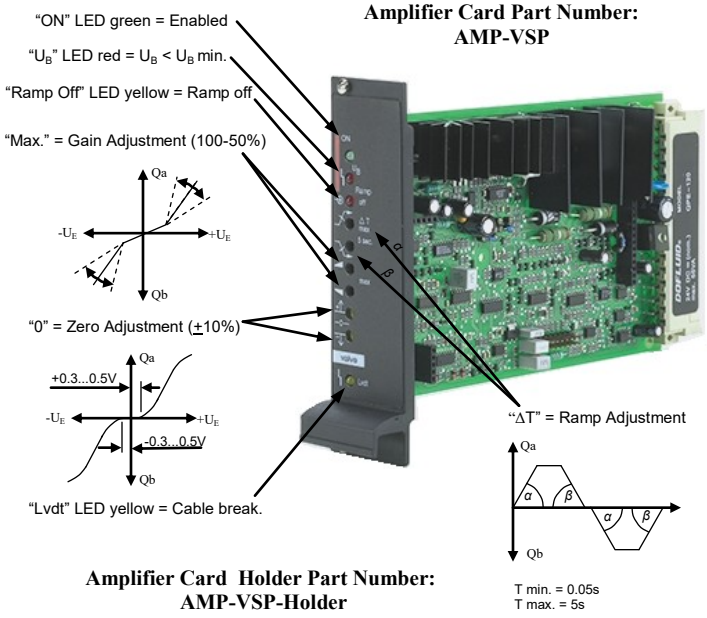
Electrical, VSP valve electrical connection and amplifier card (ordered separately)

Amplifier Card Circuit AMP-VSP



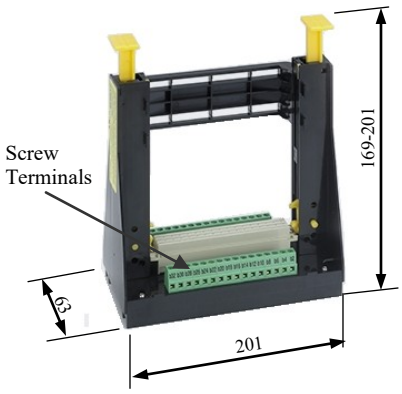
VSP Valve Electrical Connections, DIN 46350 Form A





Amplifier Card Part Number: AMP-VSP

Amplifier Card Holder Part Number: AMP-VSP-Holder



Amplifier Card Specifications

Dimensions	100mm x 160mm x 35mm	
Plug Connector	DIN 41612 –F 32	
Ambient temperature range	0ºC ~ +700ºC , storage temp. –20ºC to +70ºC	
Power supply U_B to b16/b18 and b2/b4	24VDC nominal supply voltage (21 min. to 40V max.) Rectified AC voltage U_{rms}=21~28V (single phase, full-wave rectified)	
Smoothing capacitor b28/b30 –b2/b4	4700 µF, 63V (ELKO) at ripple > 10%	
Solenoid	2.7A/25W	3.7A/50W
Power Consumption	max. 35W	max. 60W
Current Rating	max. 1.5A	Max. 2.5A
Solenoid Output (square wave, pulse modulated) b6-b8/z2-z4	Imax. = 2.7A	Imax. = 3.7A
Input signal (setpoint)	0~ ±10V summing optionally to b10, z8. z10, z12, z14/b14; Ri=10kΩ	
Signal Source	Potentiometer R≥1kΩ Supply +10V b32 (50mA), -10V z22 (50mA) or external source	
Actual value feedback	Osci b26 = 10.2Vrms/7.8kHz Test point z28* = 0~ ±10V	
Enable, Output stage	At z16, U=8.5 ~ 40V; e.g. 10V from z32 via bridge LED (green) on front plate lights up	
Ramp off	At b20, U=8.5~40V (or connect to b22)	
Cable length and cross sections	Solenoid cable: <20m with 1.5mm² 20m-50m with 2.5mm² Position Transducer: max. 50m at 100 pF/m Supply and capacitor 1.5mm²	
Short circuit proof output	Output stage to solenoid, Signal to position sensor, Potentiometer supply	
Special features	Open circuit supervision for actual value cable Position control with PID Clocked output stage Rapid energizing and de-energizing for fast response Ramps with quadrant recognition Deadband compensation in valve center position, adj, ±0.5V Disconnectable ramp	
Fault indication -Open circuit of actual value cable -U_B too low -±15V stabilization	Z26: Switching output No fault +24V (max. 100mA) Fault 0V	
Caution: Power zero b2 and control zero b12 must be bridged Power supply distance connected directly to valve DIN plug <1m At greater distances connect control zero separately to ground		

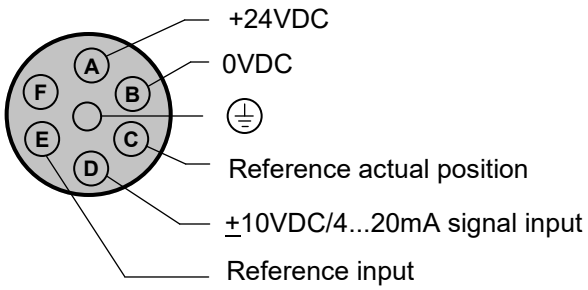
*Values for potentiometer in end position (cw) and for "zero potentiometer" in zero position

Electrical, VSPE on-board electronics

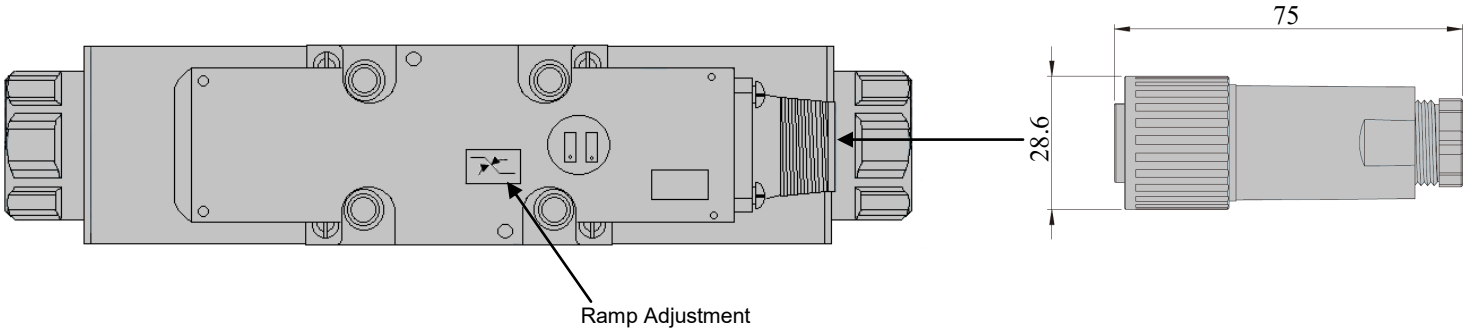
Pin D: 0 to +10VDC or 12 to 20mA causes flow from P to A and B to T port
0 to –10VDC or 12 to 4mA causes flow from P to B and A to T port

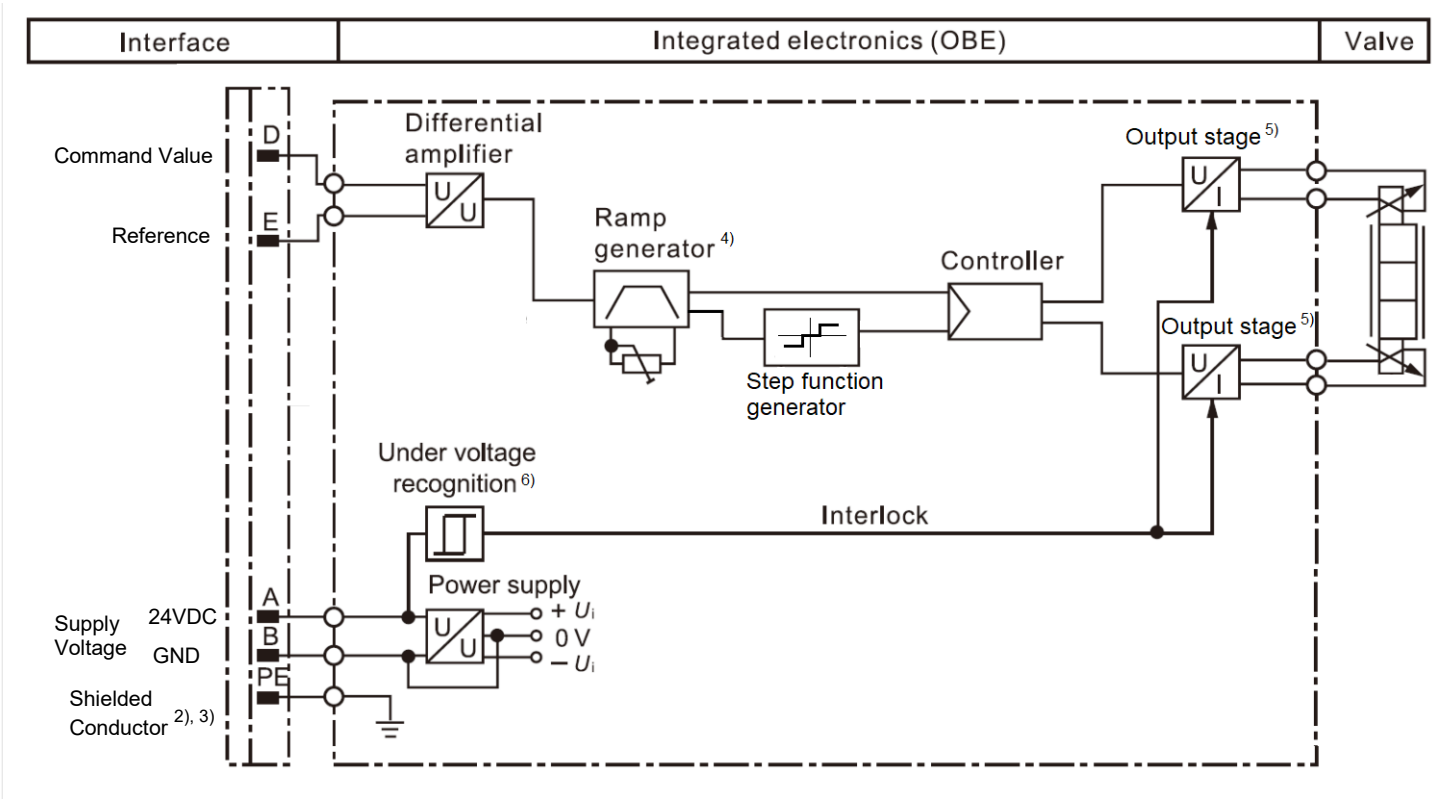
Pin C and F: Do not connect.

Connection Cable recommendation: <25m length, 5 x 0.75mm^2
<50m length, 5 x 1.0mm^2
External diameter 6.5 to 11mm
Connect shield to PE on the supply side only



Electrical Connector, 7-Pin
Part Number: D7



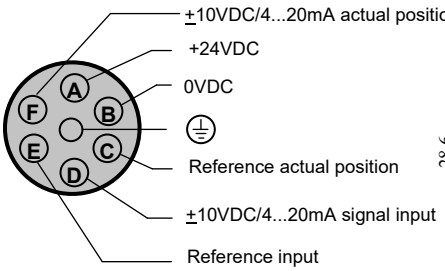


2) PE is connected to the valve housing
3) Protective conductor screwed to the valve housing and cover
4) Ramp can be externally adjusted from 0 to 2.5sec on T_{up} or T_{down}
5) Output stages current regulated
6) Low Voltage detection is not carried out for VSPE10

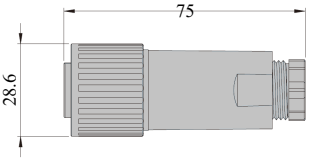
Electrical, VSPEF on-board electronics and feedback

Pin D: 0 to +10VDC or 12 to 20mA causes flow from P to A and B to T port
0 to –10VDC or 12 to 4mA causes flow from P to B and A to T port
Pin C: Reference contact, R>50KΩ for +/-10VDC and R>100Ω for 4 to 20mA
Pin F: Actual spool position from LVDT. Value should mirror input at Pin D

Connection Cable recommendation:
<25m length, 5 x 0.75mm^2
<50m length, 5 x 1.0mm^2
External diameter 6.5 to 11mm
Connect shield to PE on the supply side only

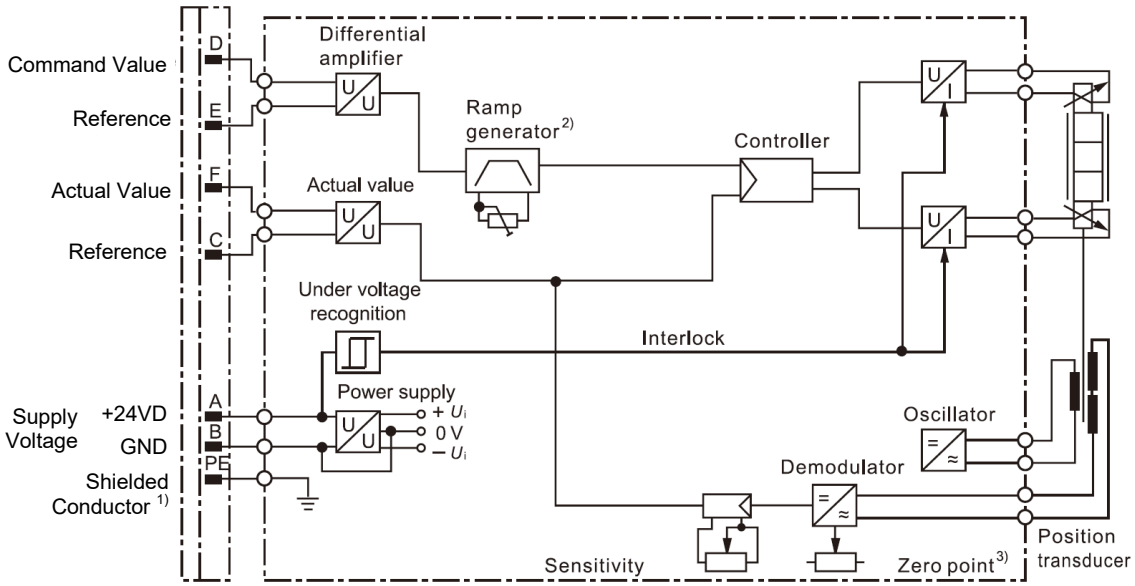


Electrical Connector, 7-Pin
Part Number: D7

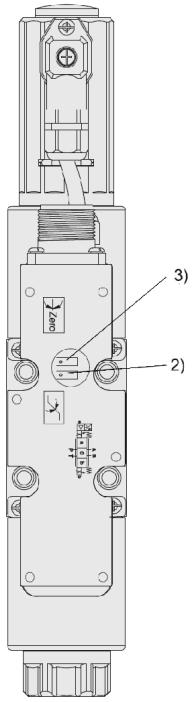


VSPEF6/10 electronic circuit

Interface	Integrated electronics (OBE)	Valve



Valve Top View



1) PE is connected to the valve housing
2) Ramp can be externally adjusted from 0 to 2.5sec on T_{up} or T_{down}
3) Zero Point is externally adjustable

VSPEF10H/16/25/32 electronic circuit