Proportional Directional Valve

Model: 4WRPEH10...2X

- Size 10
- Maximum working pressure 315 bar
- Maximum working flow 100 L/min

Contents

Features

- Direct operated servo solenoid valve with control piston and valve sleeve, with servo performance
- Operated on one side, 4/4-fail-safe position in switched-off condition
- Control solenoid with built-in position feedback and integrated amplifier board (OBE), calibrated in the factory
- Electrical connection 6P+PE signal input differential amplifier with interface A1 (± 10V) or interface F1 (4... 20mA) (RS200 Ω)
- Electro-hydraulic controllers for production and testing systems
- Subplate mounting

Function description, sectional drawing

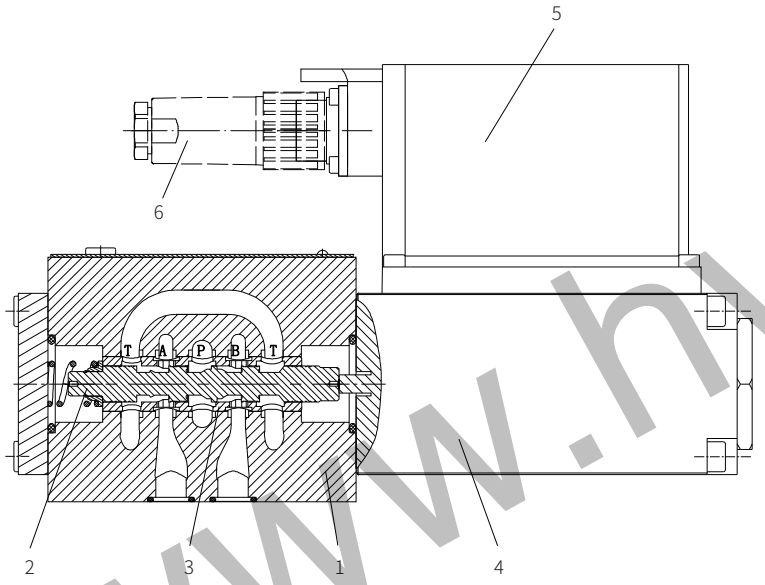
The 4WRPEH valve is high-performance servo proportional valve with zero cover structure on the valve spool and valve sleeve, and LVDT position transducer, it can regulate the directional and flow steplessly according to the input electrical signals.

The valve mainly consists of valve body (1), valve spool (2), valve sleeve (3), control solenoid with position transducer (4), and optionally integrated amplifier (5).

The valve drives the movement of the spool on one side through the proportional solenoid. The specified command value is compared with the actual position value in the integrated electronics (OBE). In case of control deviation, the stroke solenoid is activated, which adjusts the control spool against the spring due to the changed solenoid force. The stroke/control spool cross-section is regulated proportionally to the command value. When the command value presetting of 0V, the electronics adjusts the control spool against the spring to the central position. In deactivated condition, the spring is untensioned to a maximum and the valve is in fail-safe position.

When the solenoid switched off, the valve is moved to fail-safe position. And after powered on, the valve spool is pushed from the rest position to the required position according to the size of the input electrical signal to achieve free flow of oil from P to A and B to T, or P to B and A to T.

The 7-pin connector (6) is used for connecting power, analog signal input, and detection signals.



Model 4WRPEH10...-2XJ/...

Models and specifications

4WRP | E | H | 10 | | B | | | 2X | | G24 | K0 | | | |

more information in text

sealing material
No code= NBR seals
V= FKM seals
(consult for other seals)

electrical connection
A1= command value input ±10V
F1= command value input 4 to 20 mA

K0= electrical connections without plug-in connector with component plug to DIN 43563-AM6

power supply to amplifier
G24= +24V DC

2X= 20 to 29 series
(20 to 29 series installation and connection size unchanged)

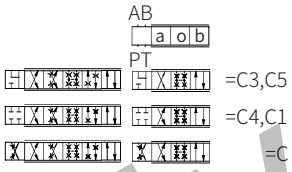
flow characteristic
L= Linear
P= Inflected characteristic curve

nominal flow rate at 70 bar differential pressure (35 bar/throttle edge)
size 10
50 = 50 L/min 100 = 100 L/min

with integrated electronics=E

control piston/valve sleeve =H
size 10 =10

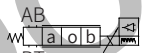
symbols
four position four-way type



=C3,C5
=C4,C1
=C

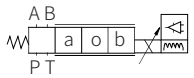
with symbols C5 and C1:
P→A:qv B→T:qv/2
P→B:qv/2 A→T:qv

Installation side of the inductive position transducer



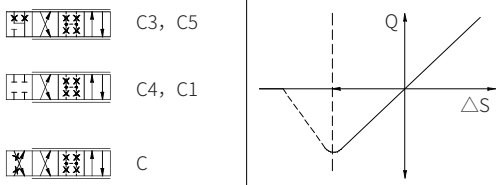
(standard)=B

Functional symbols



Linear

P: Inflection 40%



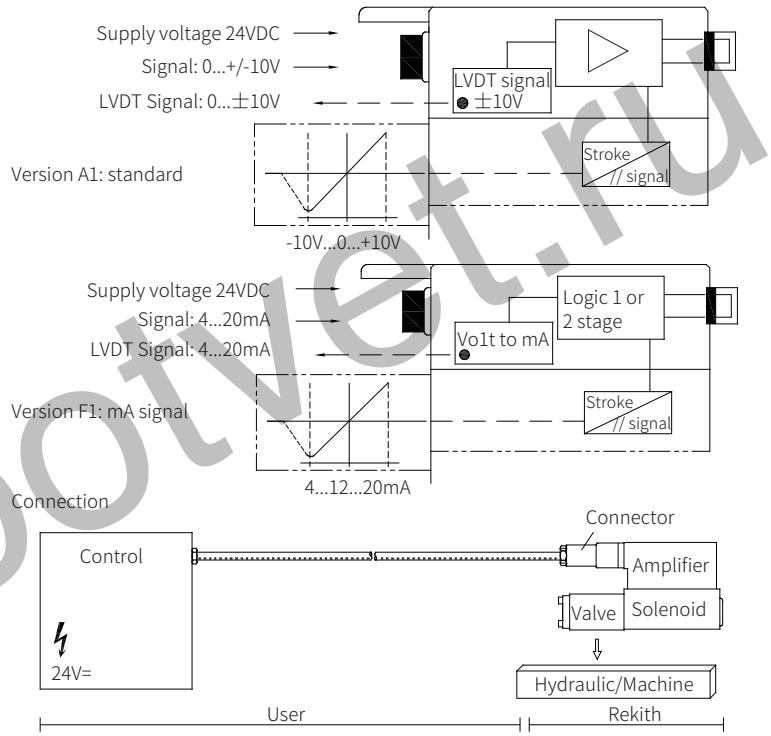
Technical parameters

Overview				
Structure			Direct operated spool valve with steel sleeve	
Actuation			Proportional solenoid valve with position controller, OBE	
Installation type			subplate mounting, porting pattern to ISO 4401 -03-02-05	
Installation position			Optional	
Environment temperature range		°C	-20 ~ +50	
weight		kg	7.1	
Vibration resistance (testing conditions)			Maximum 25g, space vibrating test in all directions (24h)	
Hydraulic (Measured when using HLP46, ϑ_{oil}=40°C ± 5°C)				
Fluid			Oil according to DIN 51524. For other oils, please consult our company	
Viscosity range	Recommended value	mm^2/s	20…100	
	Maximum allowable value	mm^2/s	10…800	
Oil temperature range		°C	-20 to +70	
The maximum allowable pollution level of oil to ISO 4406 (c)			Class 18/16/13[1)]	
Nominal flow rate (△p=35 bar/throttle edge)		L/min	50	100
Maximum working pressure		bar	Port A, B, P: 315	
			Port T: 250	
Leakage flow at 100 bar	Linear	cm^3/min	<1200	<1500
	Nonlinear	cm^3/min	<600	<600
Static/dynamic				
Hysteresis		%	⩽0.2	
Response time for signal changes 0-100%		ms	10	
Zero drift			At △T=40 °C, zero drift <1%	
Zero position adjustment			Factory setting ±1%	

Electrical, amplifier integrated in valve		
Power on rate	%	100ED
Protection grade		IP65 (plug installed)
Connection		Plug-in connector 6P+PE, DIN 43563
Supply voltage		24V DC_{nom}
Terminal A		Min. 21VDC/max. 40VDC
Terminal B: 0V		0V (ripple max.2)
External fuse	A_F	2.5
Input, version "A1"		Analog differential signal input, Ri=100k Ω
Terminal D(U_E)		0...±10V
Terminal E		0V
Input, version "F1"		Load, R_{sh}=200 Ω
Terminal D(I_{D-E})		4...12...20mA
Terminal E(I_{D-E})		Current loop I_{D-E} feedback
Test signal, version "A1"		LVDT
Terminal F(UI_{test})		0….±10V
Terminal C		Reference 0V
Test signal, version "F1"		LVDT signal 4... (12).. 20 mA 200 ...500Ω
Terminal F(I_{F-C})		4... (12)... 20 mA (output current)
Terminal C(I_{F-C})		Current loop I_{F-C} feedback
Adjustment		Calibrate at the factory and see the characteristic curve of the valve

The oil must meet the cleanliness degree requested by the components in the hydraulic system. Effective oil filtration can prevent failure and increase the service life of the components.

Electrical connections



Technical data for the cable:

Version: - Multi-core wire
- Litz wire structure, extra fine wire according to VDE 0295, class 6
- Protective earthing conductor, green-yellow
- Cu shielding braid

Wire number: - determined by the valve model, plug model, and signal arrangement

Line Ø: - 0.75 mm^2 to 20 m of length
- 1.0 mm^2 to 40 m of length

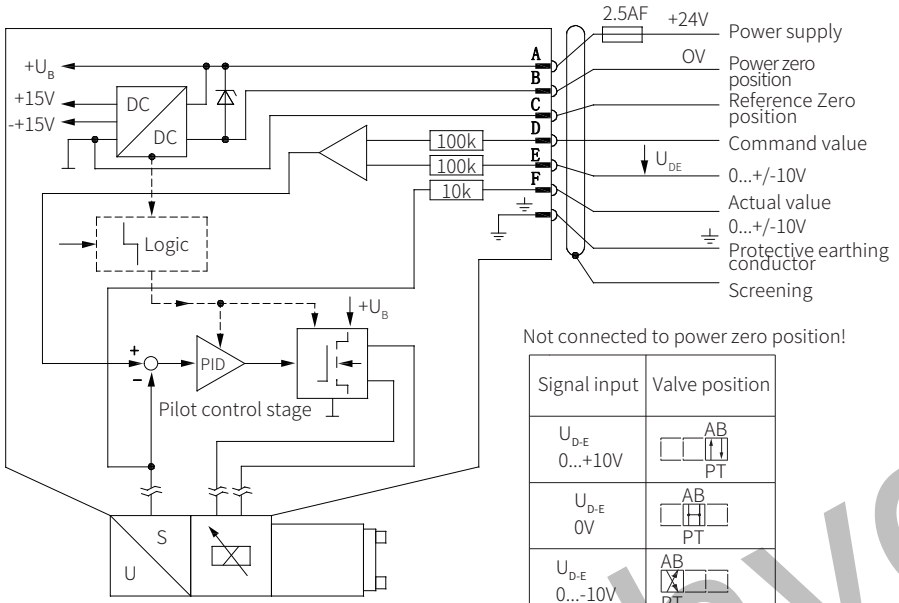
OuterØ: - 9.4...11.8mm
- 12.7...13.5mm

Note:

Supply voltage 24 V DC_{nom}
if the value falls below 18V, an internal fast switch-off is effected which can be compared with "Release OFF"
Additionally for version F1:
I_{D-E} ⩾ 3mA - valve is active
I_{D-E} ⩽ 2mA - valve is deactivated
Electric signals taken out via control electronics (e.g. actual value) may not be used for the switch-off of safety-relevant machine functions. (See the European standard "Safety requirements for fluid power systems and their components - Hydraulics", EN 982.)

Built in amplifier

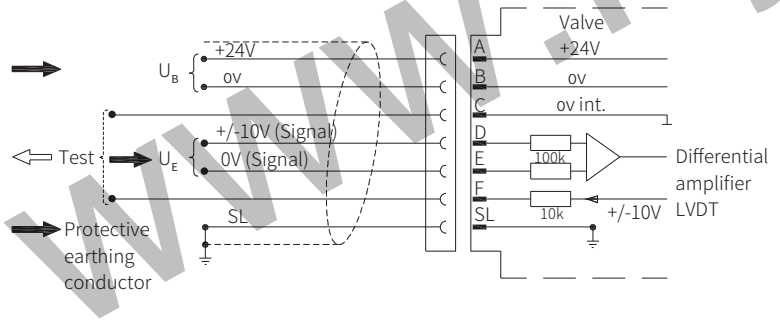
Circuit block diagram/wiring diagram
Model A1: U_{D-E} 0...±10V



Not connected to power zero position!

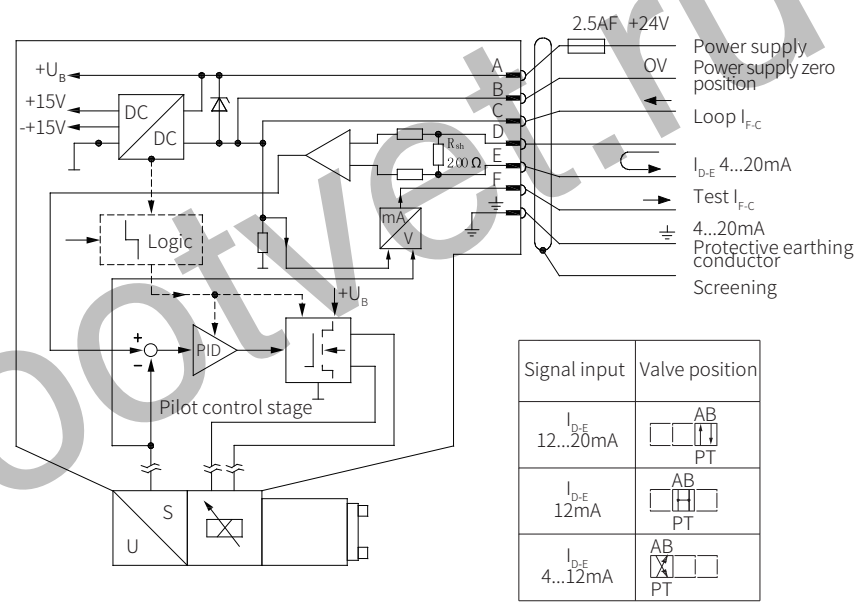
Signal input	Valve position
U_{D-E} 0...+10V	AB PT
U_{D-E} 0V	AB PT
U_{D-E} 0...-10V	AB PT

Terminal identification 6P+PE
Model A1: U_{D-E} 0...±10V



Built in amplifier

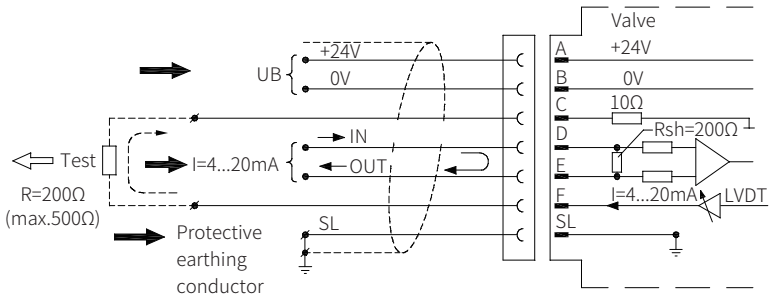
Circuit block diagram/wiring diagram
Model F1: I_{D-E} 4...20mA



Signal input	Valve position
I_{D-E} 12...20mA	AB PT
I_{D-E} 12mA	AB PT
I_{D-E} 4...12mA	AB PT

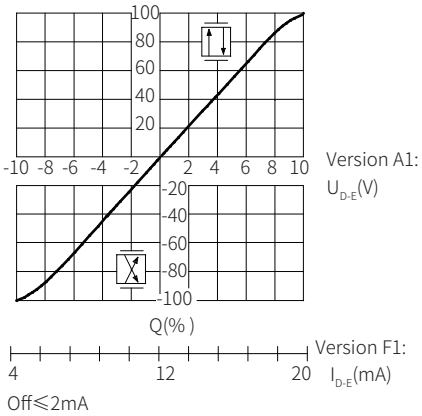
IDE⩽2m A, Valve shut-off

Terminal identification 6P+PE
Model F1: I_{D-E} 4...20mA



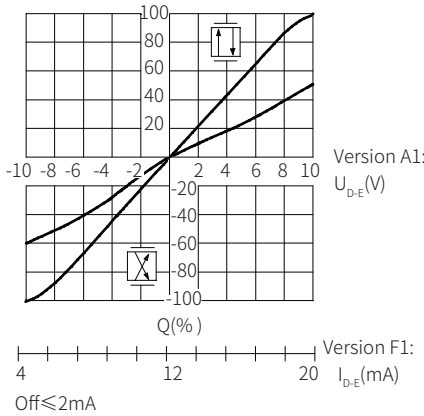
Flow-signal function $q_v=f(U_{D-E})$, $q_v=f(I_{D-E})$

L: Linear 1:1



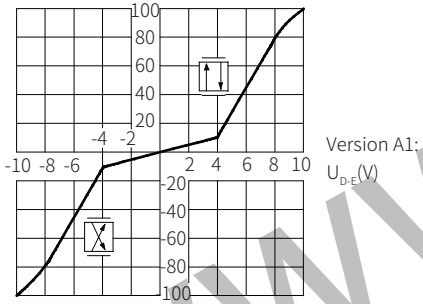
Off≤2mA

L: Linear 2:1

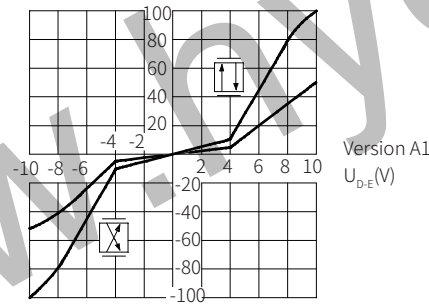


Off≤2mA

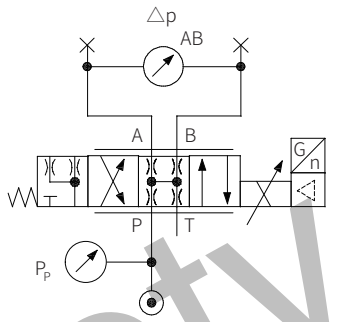
P: Inflection at 40%, 1:1

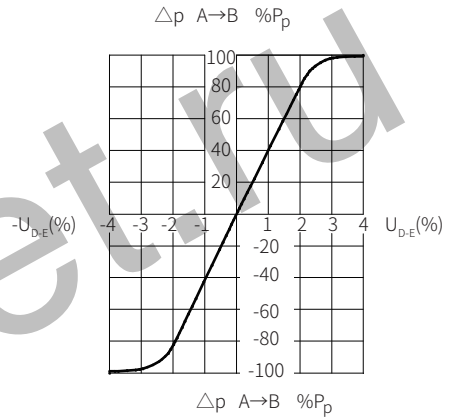


P: Inflection at 40%, 2:1

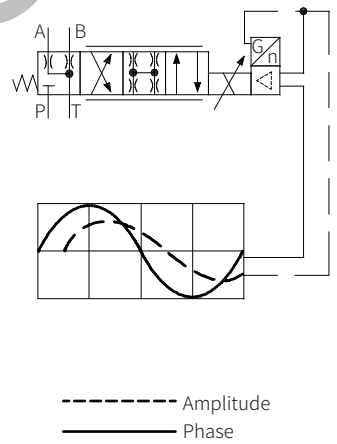


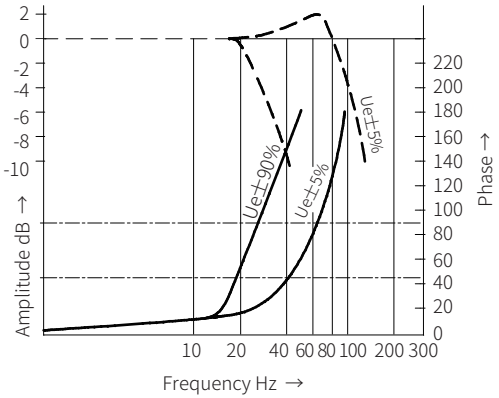
Pressure gain curve

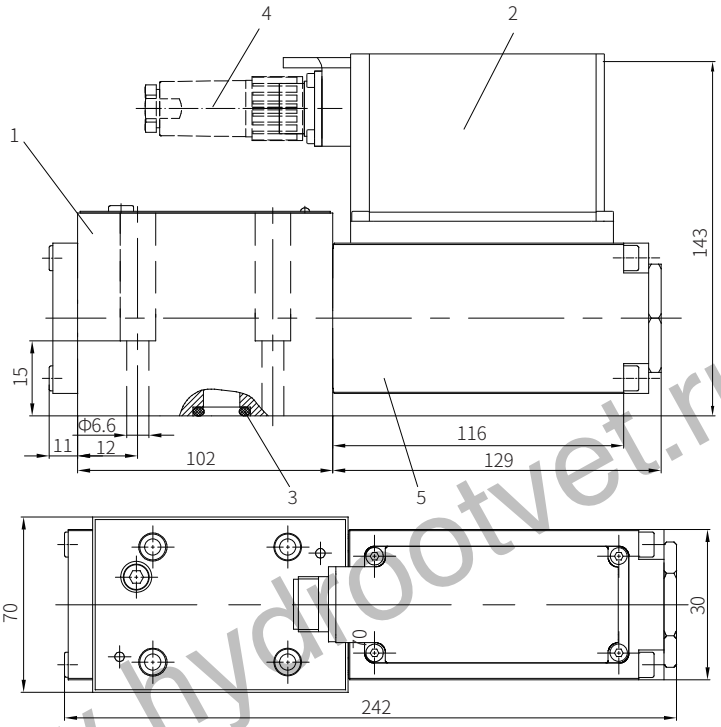


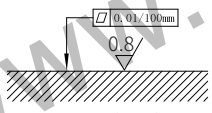


Bode diagram



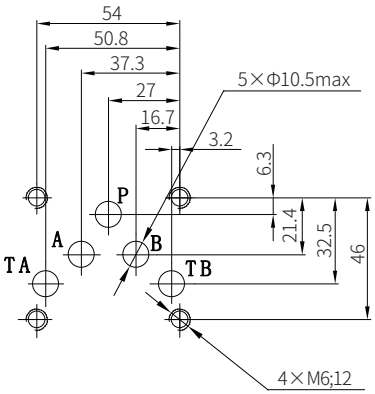






Required surface finishing of mating components

1 Valve body
2 Integrated amplifier (OBE)
3 O-ring 12x2 (for ports P, A, B, T)
4 Connector
5 Control solenoid with position transducer



Valve fixing screw
M6x40-10.9 grade GB/T70.1-2000
Tightening torque M_A=13.7Nm