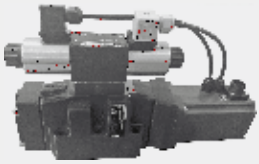
6.13

Pilot operated proportional directional valves

Type 4WRKE...L3X

NG 10 to 35
Up to 350 bar
Up to 3000L/min



Contents

Features

- Pilot operated 2-stage proportional directional valve
- Valve for the control of the size and direction of a fow
- For subplate mounting, porting pattern to DIN 24 340 form A
- Spring centred main spool
- Integrated control electronics

Function and configuration

· Proportional directional valve:
type 4WRKE...L3X...

The type 4WRKE valves are 2-stage proportional directional control valves. They control the size and direction of a flow.
The main stage is closed loop position controlled so that the spool position is also independent of flow forces at larger flows.

Structure

The valves basically consists of the pilot control valve (1), housing (8), main spool (7), covers (5 and 6), centering spring (4), inductive position transducer (9) and the pressure reducing valve (3).

Function

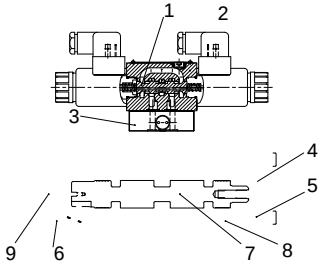
— If no input signal is being applied then the main spool (7) is held in the centere position by the centering spring (4). The two control chambers in the covers (5 and 6) are connected via the valve spool (2) to tank.
— The main spool (7) is connected to suitable control electronics via the inductive position transducer (9). The positional change of the main spool (7) as well as the alteration of the command value at the summation point of the amplifer produces a differential voltage.
With the command value/actual value comparison a possible control deviation is recognised via the electronics and an electrical current is applied to the proportional solenoid of the pilot valve (1).
The current induces, within the solenoid, a force which is passed on to the solenoid pin which in turn actuates the control spool. The flow which is provided via the control cross sections causes the main spool to move.

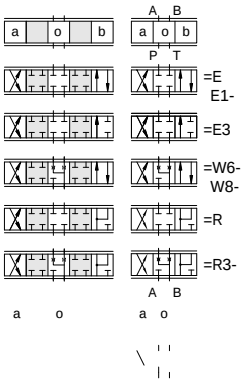
· Pilot control valve :
type 4WRAP 6 W7...-L3X/G24...(1st stage)

The pilot control valve is a direct operated proportional valve. The control edge geometrics were designed and optimised for the use as a pilot control valve for the proportional directional valves type 4WRKE.
The proportional solenoids are pressure tight, oil-immersed DC solenoids with removable coil. They convert an electrical current proportionally into a mechanical force. An increase in the current strength causes an appropriately higher solenoid force.

Structure

The pilot control valve basically consists of the housing (1), proportional solenoids (2 and 3), valve spool (4) and springs (5 and 6).
In the de-energised condition both actuator ports are connected to tank. If one of the two solenoids (2 or 3) is energised, then the solenoid force moves the valve spool (4) against the spring (6 or 5). Once the overlap area is overcome, the connection to tank of one of the two actuator ports is blocked and the connection to the pressure chamber is established. There is flow from P to the control chamberof the main stage.



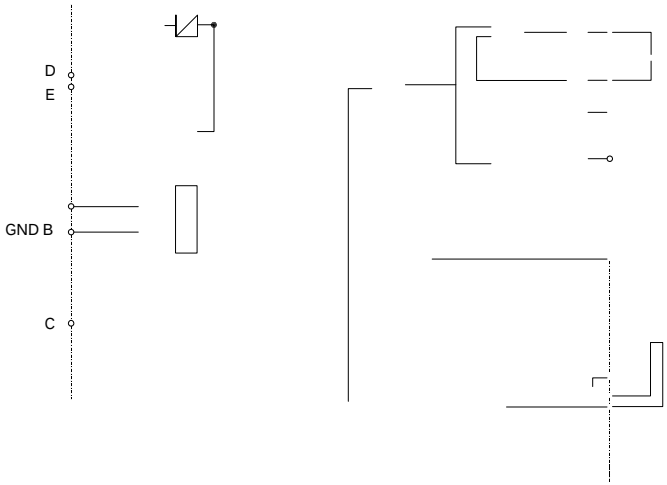

A B
a o b
a o b
P T
=E
E1-
=E3
=W6-
W8-
=R
=R3-
A B
a o
a o

Technical data

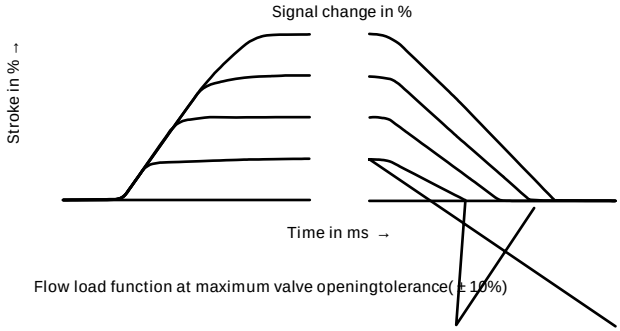
General								
Nominal size			10	16	25	27	32	35
Installation and commissioning guidelines			Optional, preferably horizontal					
Storage temperature range			– 20 to + 80					
Ambient temperature range			– 20 to + 50					
Weight		kg	8.7	11.2	16.8	20	37.2	72

Hydraulic(measured at p=100bar,with HLP46 at $_{oil}$=40°C ±5°C)										
Operating pressure	-Pilot control valve	Pilot oil supply	bar	25 to 315					
	-Main valve	Ports P, A, B	bar	Up to 315	Up to 350	Up to 350	Up to 210	Up to 350	Up to 350
Return pressure	Port T (Pilot oil drain)	Internal	bar	Static < 10					
		External	bar	Up to 315	Up to 250	Up to 250	Up to 210	Up to 250	Up to 250
	Port Y		bar	Static < 10					
Nominal flow q_{vnom} ± 10% at Δp=10bar (Δp = valve pressure differential)			L/min	25 50	- 125	- 220	- -	- 440	- -
				100	180	350	500	600	1000
Flow of main valve (max. permissible)			L/min	170	460	870	1000	1600	3000
Pilot oil flow at port X or Y with a step form of input signal from 0 to 100 % (315 bar)			L/min	4.1	8.5	11.7	11.7	13	13
Pressure fluid				Mineral oil(HL,HLP)to DIN 51 524 Phosphate ester (HFD-R)					
Pressure fluid temperature range				10 to 80, preferably 40 to 50					
Viscosity range			mm^2/s	20 to 380, preferably 30 to 45					
Degree of contamination	Maximum permissible degree of contamination of the pressure fluid is to NAS 1638.			A filter with a minimum retention rate of βx = 75 is recommended					
	Pilot control valve		Class 7	x = 5					
	Main valve		Class 9	x = 7					
Hysteresis			%	≤ 1					
Response sensitivity			%	≤ 0.5					

Electrical		
Voltage type		DC
Electrical connection		Plug-in connector to DIN EN175 201-804
Power, max.	W	72 (average = 24W)
Control electronics		Integrated into the valve


D
E
GND B
C

Characteristic curves (measured with HLP46, ϑ_{oil}=40 ± 5)



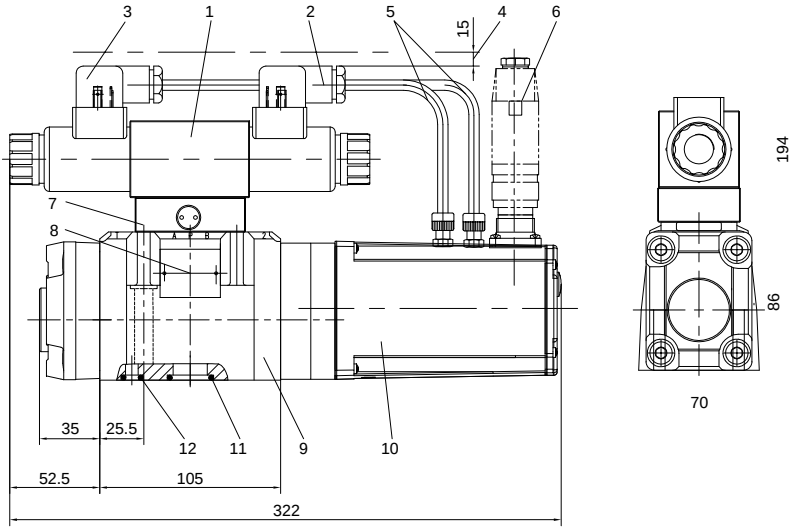
Flow load function at maximum valve openingtolerance(± 10%)

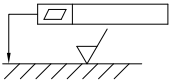
Valve pressure di erential in bar →

Signal change in %
Stroke in % →
Time in ms →
Flow load function at maximum valve openingtolerance(± 10%)
Flow in % →
Valve pressure di erential in bar →

Characteristic curves (measured with HLP46, ϑ_{oil} =40 ± 5)

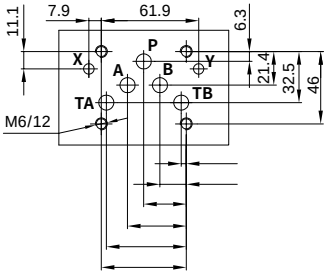
Flow load function at maximum valve openingtolerance(± 10%)





Required surface finish of mating piece

Machined valve mounting surface



Machined valve
mounting surface

1 Pilot control valve
2 Plug-in connector "A"
3 Plug-in connector "B"
4 Space required to remove the plug-in connector
5 Cable
6 Plug-in connector
7 Pressure reducing valve
8 Name plate
9 Main valve
10 Integrated control electronics
11 R-ring 34.52 × 3.53 × 3.53, ports A, B, P, T
12 R-ring 19 × 3 × 3, ports X and Y
14 Locating pin

Valve mounting screws:
6- M12 × 60 GB/T 70.1-10.9;
M_A =100 Nm