2-Way Proportional Flow Control Valve

Model: 2FRE...4X

ГИДРООТВЕТ
доступная гидравлика

- Size 10, 16
- Maximum working pressure 315bar
- Maximum working flow 160 L/min

Contents

Features

- With pressure compensation for the pressure compensated control a flow
- Operation by proportional solenoid
- With electrical position feedback of control throttler
- The position transducer coil is axially adjusted to make the zero position adjustment of the throttle port easy (electrical, hydraulic) without the need to adjust the electronics
- Minimum sample variation of valve 2FRE and proportional amplifiers

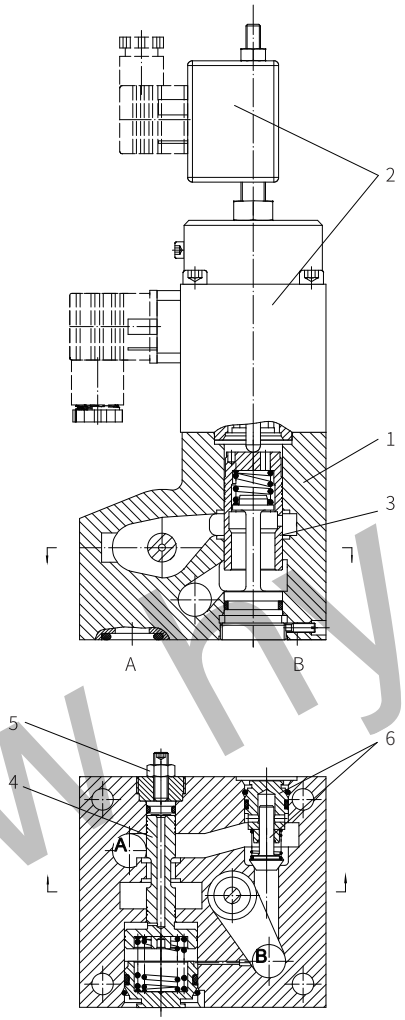
Function description, sectional drawing

The 2FRE... proportional flow control valves have a 2-way function.They can control a corresponding flow with a large degree of compensation for pressure and temperature according to the provided electrical command value. The valve basically consists of valve body (1), proportional solenoid with inductive position transducer (2), measurement orifice (3), pressure compensator (4), stroke limiter (5) and optional check valve (6).

The setting of the flow rate (0 to 100%) is determined on the command value potentiometer. The setting of the flow (0 to 100%) is determined by the command value potentiometer. The applied command value adjusts the measurement orifice (3) via the amplifier and proportional solenoid. The position of the measurement orifice (3) is measured by the inductive position transducer. Any deviation from the command value is compensated through feedback control. The pressure compensator (4) keeps the pressure drop at the measurement orifice (3) at a constant value at all times. Therefore, the flow is load compensated. The low temperature drift is achieved due to the design of the measurement orifice.

With a command value of 0%, the measurement orifice is closed. In the case of a power failure or a cable break at the inductive position transducer, the measurement orifice closes. When the command value is 0%, it is possible a start-up without overshoot. The opening and closing of the measurement orifice can be delay via two ramps in the proportional amplifier. Via the check valve (6) a free flow from B to A is possible.

By installing a rectifier sandwich plate Z4S6...under the proportional flow control valve, the flow from the actuator can be controlled in both directions.



Models and specifications

Proportional flow control valve

2FRE _ – 4X / B _ *

size 10 =10
size 16 =16

40 to 49 series =4X
(40 to 49 series installation and connection size unchanged)

B= pressure compensator, with stroke limiter

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

more information in text

flow range A → B		
size 10		size 16
Linear	Increase by degrees	Linear
to 5L/min=5L to 10L/min=10L to 16L/min=16L to 25L/min=25L to 50L/min=50L to 60L/min=60L	to 5L/min=5Q to 10L/min=10Q to 16L/min=16Q to 25L/min=25Q	to 80L/min=80L to 100L/min=100L to 125L/min=125L to 160L/min=160L

Rectifier sandwich plate

Z4S _ – 2X / _ *

size 10 =10
size 16 =16

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

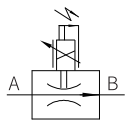
sealing material
No code= NBR seals
V= FKM seals
(consult for other seals)

more information in text

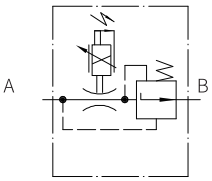
Functional symbols

Proportional flow control valve

Simplified

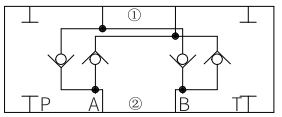


Detailed



Rectifier sandwich plate

(①= Valve side, ②= Subplate side)



Technical parameters

Overview											
Size				10				16			
Installation position				Optional							
Storage temperature range		°C		-20 to +80							
Environment temperature range		°C		-20 to +70							
Weight	Proportional flow control valve	kg		6.1				8.5			
	Rectifier sandwich plate	kg		3.2				9.3			
Hydraulic (Measured when using HLP46, ϑ_{oil}=40°C ± 5°C)											
Maximum working pressure	Port A	bar		to 315							
Flow $q_{v\,max.}$	Size	NS		10				16			
	Linear	L/min	10	16	25	50	60	80	100	125	160
	Progressive with rapid speed	L/min		40				-			
Minimum pressure differential		bar		3 to 8				6 to 10			
Pressure differential with free return flow B → A		bar		See characteristic curve							
Flow control temperature drift											
Hydraulic + electrical △q_v/°C		%		0.1 of $q_{v\,max.}$							
Pressure compensator(to △p=315 bar)		%		± 2 of $q_{v\,max.}$							
Fluid				Mineral oil (HL, HLP)[1] in accordance with DIN 51524; Fast living organisms degraded oil according to VDMA 24568; HETG (Rapeseed oil)[1]; HEPG(Polyethyleneglycol)[2] ; HEES (Synthetic Fats)[2]							
Oil temperature range		°C		-20 to +80							
Viscosity range		mm^2/s		15 to 380							
Cleanliness of oil				The maximum allowable pollution level of oil is ISO4406 class 20/18/15 (we recommend a filer with a minimum retention rate of 10)							
Hysteresis		%		< ±1 of $q_{v\,max}$							
Repeatability		%		<1 of $q_{v\,max}$							
Manufacturing tolerance	model 2FRE6...	%		⩽ ±2% with command value 33% ⩽ ±5% with command value 100%							
	amplifier RT-MRPD1-151-30-CN-A1/F1	%		< ±2							
Hydraulic – Rectifier sandwich plate											
Working pressure		bar		to 315							
Cracking pressure		bar		15							
Nominal flow	Size	NS		10				16			
		L/min		60				160			

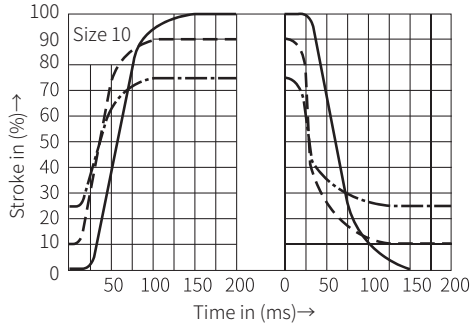
Technical parameters

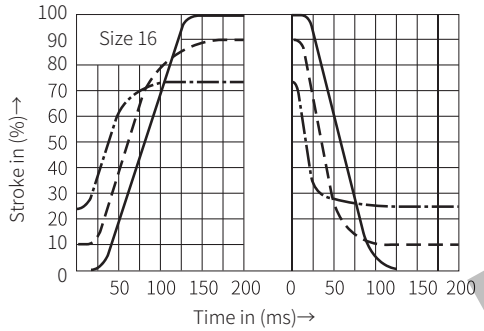
Electrical (proportional solenoid)				
Voltage type			DC	
Coil resistance	Cold value at 20°C	Ω	10	
	Maximum warm value	Ω	13.9	
Duty cycle		%	100	
Maximum current per solenoid		A	1.51	
Electrical connections			Component plug	
			Connecting plug	
Protection to DIN 40050			IP65	
Electrical (Inductive position transducer)				
Coil resistance (total resistance of the coils between....) at 20°C		Ω	1 and 2	2 and ⏚	1 and ⏚
			31.5	45.5	31.5
Electrical connections			Component plug		
			Connecting plug		
Inductivity		mH	6 to 8		
Oscillator frequency		KHz	2.5		
Electrical position measurement system			Different throttle valves		
Nominal stroke		mm	4		
Protection to DIN40050			IP65		

Characteristic curve

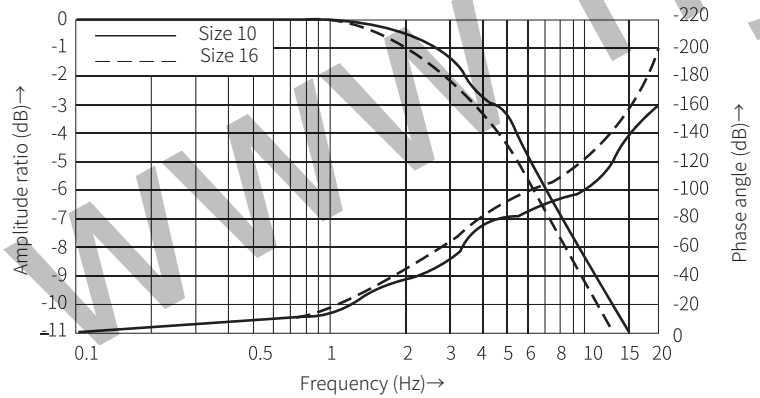
(Measured when using HLP46, ϑ_{oil}=40°C ± 5°C,
Pnom = 50 bar, Amplitude 0 → >100 %; size 10 type 60L and size 16 type 160L)

Transient function at stepped command value change





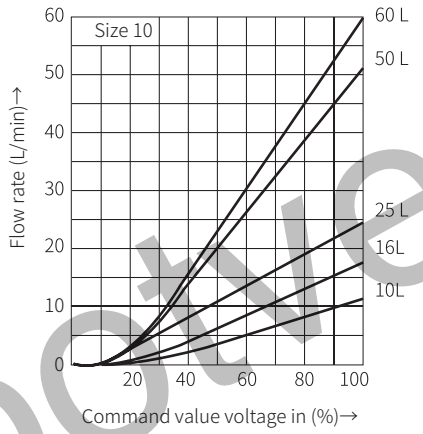
Frequency response characteristic curves

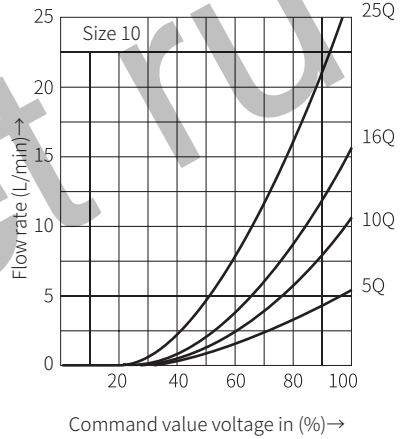


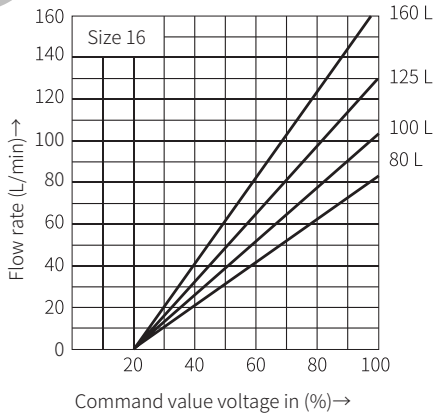
Characteristic curve

(Measured when using HLP46, ϑ_{oil}=40°C ± 5°C)

Dependence of flow on command value voltage (flow control from A → B)



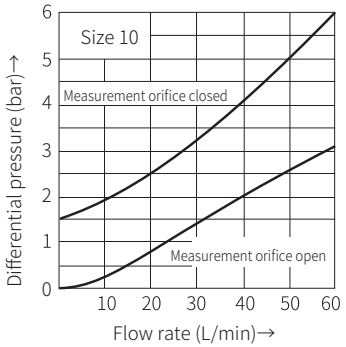


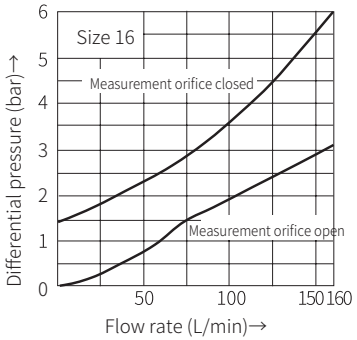


Characteristic curve

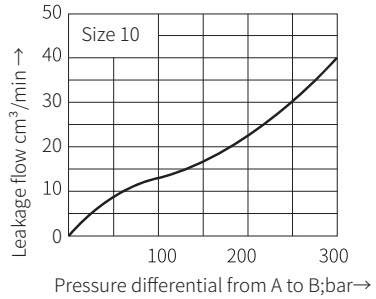
(Measured when using HLP46, ϑ_{oil}=40°C ± 5°C)

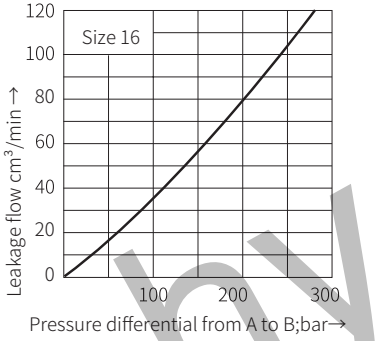
Pressure differential via check valve B → A





Leakage flow from A to B

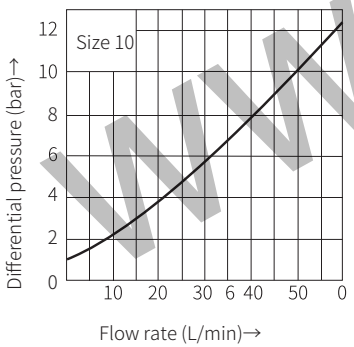


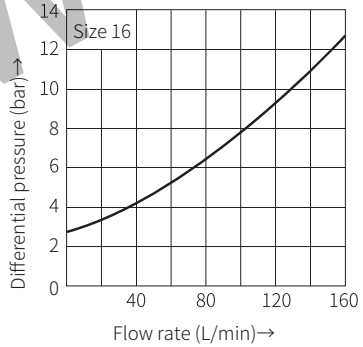


Rectifier sandwich plate

The pressure differential and flow relationship in two flow directions are the same

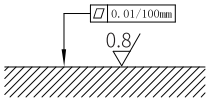
Flow from A → B (B → A)





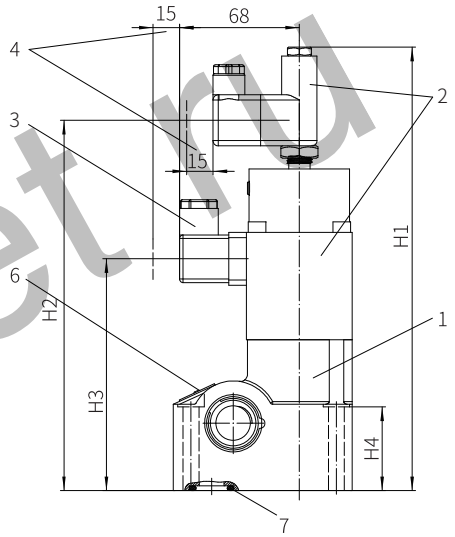
Component size

Size unit: mm

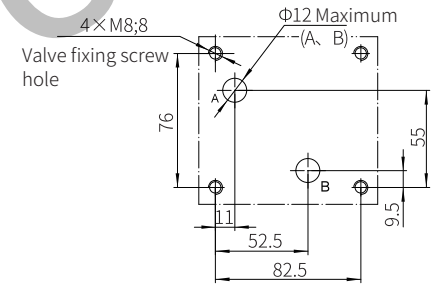


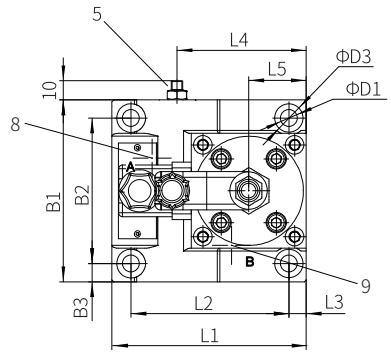
Required surface finishing of mating components

1 Valve body
2 Proportional solenoid with inductive position transducer
3 Connecting plug
4 Space required to remove the plug
5 Pressure compensator with stroke limiter
6 Name plate
7 O-ring
(NG10: 18.66x3.53; NG16: 26.58x3.53)
8 Port A
9 Port B

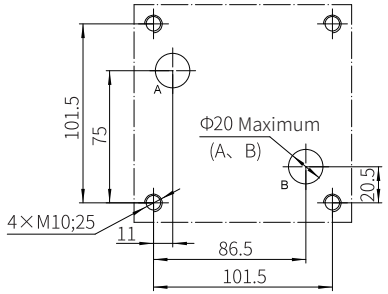


Mounting surface for size 10





Mounting surface for size 16



Size	B1	B2	B3	L1	L2	L3	L4
10	76	9.5	101.5	82.5	9	6	7.5
16	123.5	101.5	11	23.5	101.5	11	81.5

Size	L5	H1	H2	H3	H4	D1	D2
10	30	251.5	210	131.5	47.5	9	15
16	44	261.5	220	141.5	51	11	18

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