

2-Way Proportional Flow Control Valve

Model: 2FRE6...2XJ



ГИДРООТВЕТ
доступная гидравлика

- ◆ Size 6
- ◆ Maximum working pressure 210bar
- ◆ Maximum working flow 25 L/min

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Features

- With pressure compensation for the pressure compensated control a flow
- Operation by proportional solenoid
- With electrical position feedback of control throttle
- The position transducer coil is axially adjusted to make the zero position adjustment of the throttle port easy (electrical, hydraulic)
- Flow control in both directions via rectifier sandwich plate

Function description, sectional drawing

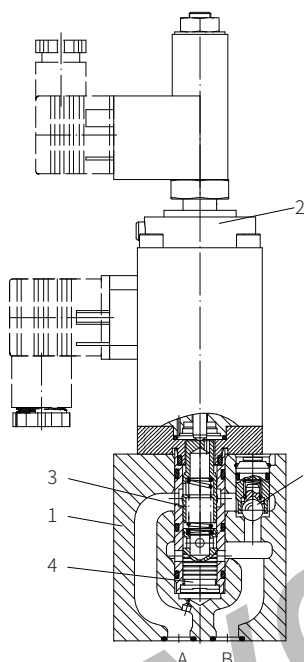
The 2FRE...proportional flow control valves have a 2-way function. They can control a corresponding flow independent of pressure and temperature according to the provided electrical command value. The valve basically consists of valve body (1), proportional solenoid with inductive position transducer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

Proportional flow control valve model 2FRE6B-2XJ/ (without external closing, with check valve)

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 delay via two ramps in the proportional amplifier. Via the check valve (5) 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.



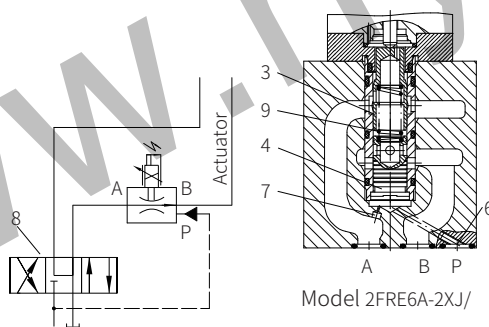
Model 2FRE6B-2XJ/

Proportional flow control valve model 2FRE6A-2XJ/ (with external closing, without check valve)

In principle, the function of this valve is similar with the valve 2FRE6B-2XJ/K4RV.

To suppress the start-up jump when the measurement orifice (3) (command value > 0%) is open, a closing of the pressure compensator (4) is provided via port P (6). The internal connection between port A and the pressure compensator (4) is blocked. Via the external port P (6), the pressure in port P of the directional valve (8) acts on the pressure compensator (4) and keeps it in its closed position against the spring force (7).

If the directional valve (8) is switched from P to B, the pressure compensator (4) moves from the closed position to the corresponding compensation position, thus start-up jump is avoided.



Model 2FRE6A-2XJ/

Models and specifications

Proportional flow control valve

2FRE	6	-2X	J	/		*
size 6	=6					
with external closing of the pressure compensator (suppression of the start-up jump)	=A					
without external closing of the pressure compensator	=B					
20 to 29 series (20 to 29 series installation and connection size unchanged)		=2X				
Rekith			=J			
rated flow A → B						
to 3 L/min			=3Q			
to 6 L/min			=6Q			
to 10 L/min			=10Q			
to 16 L/min			=16Q			
to 25 L/min			=25Q			

more information in text

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

R= with check valve
 M= without check valve

Rectifier sandwich plate

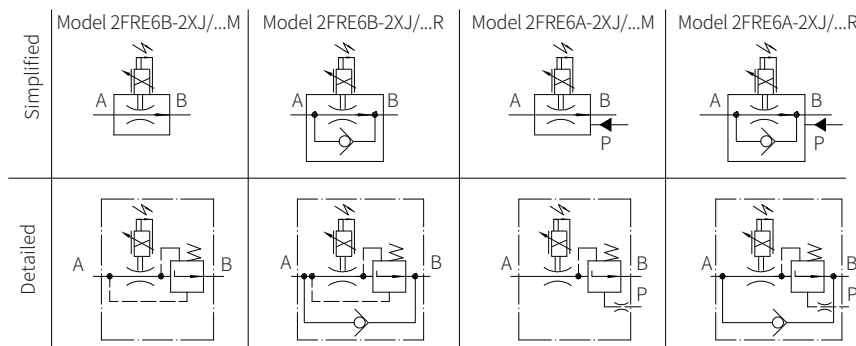
Z4S	6	-	J	/	*
size 6	=6				
10 to 19 series (10 to 19 series installation and connection size unchanged)		=1X			
Rekith			=J		

more information in text

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

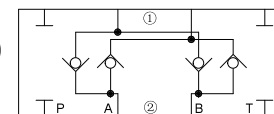
Functional symbols

Proportional flow control valve (simplified, detailed)



Rectifier sandwich plate

(①= Valve side, ②= Subplate side)



Technical Parameters

Overview		
Installation position	Optional	
Storage temperature range	°C -20 to +80	
Environment temperature range	°C -20 to +50	
Weight	Proportional flow control valve Kg 1.8	
	Rectifier sandwich plate Kg 0.9	
Hydraulic (Measured when using HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)		
Maximum working pressure	Port A bar to 210	
Flow	type	3Q 6Q 10Q 16Q 25Q
	$q_{v\max}$ L/min	3 6 10 16 25
	q_{\max} to 100 bar cm ³ /min	15 25 50 70 100
	to 210 bar cm ³ /min	25 25 50 70 100
Maximum leakage of flow when		
Δp A → B with command value 0%	50 bar cm ³ /min	4 4 6 7 10
	100 bar cm ³ /min	5 5 8 10 15
	210 bar cm ³ /min	7 7 12 15 22
Minimum pressure differential	bar 6 to 10	
Pressure differential with free return flow B → A		
Pressure and flow of: input/output pressure	See characteristic curve	
Temperature dependence		
Temperature drift, hydraulic and electric		
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⁾	
Cleanliness of oil ³⁾	The maximum allowable pollution level of oil is ISO 4406 (C): 20/18/15	
Oil temperature range	°C 20 to +80	
Viscosity range	mm ² /s 15 to 380	
Hysteresis	% $\leq \pm 1$ of $q_{v\max}$	
Repetition accuracy	% < 1 of $q_{v\max}$	
Manufacturing tolerance model 2FRE6...	$\leq \pm 3\%$ with command value 33%	
	$\leq \pm 5\%$ with command value 100%	
RT-MRPD1-150-30-CN-A1/F1	% < 1	
Hydraulic – Rectifier sandwich plate		
Working pressure	bar to 210	
Cracking pressure	bar 0.7	
Nominal flow rate	L/min 25	

1) For NBR seal and FKM seal.

2) Only for FKM seal.

3) 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.

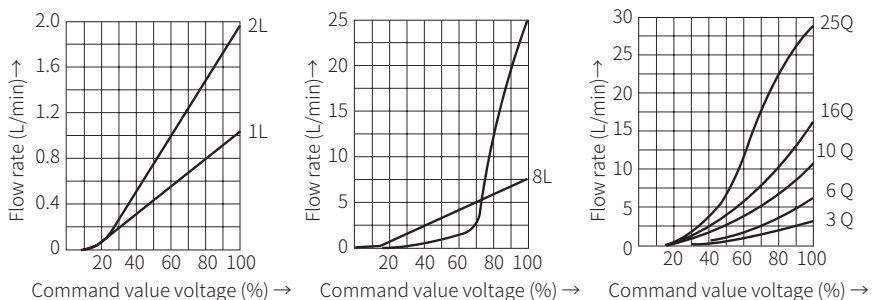
Technical Parameters

Electrical (proportional solenoid)			
Protection to DIN 40050	IP65 ²⁾		
Voltage type	DC		
Coil resistance	Cold value at 20°C	Ω	5.4
	Maximum warm value	Ω	8.2
Duty cycle	continuous		
Maximum current per solenoid	A	1.5	
Electrical connections	Plate connector Connecting plug		
Electrical (Inductive position transducer)			
Protection to DIN 40050	IP65		
Coil resistance (total resistance of the coils between....) at 20°C	Ω	1 and 2 31.5	2 and $\frac{1}{2}$ 45.5
			1 and $\frac{1}{2}$ 31.5
Electrical connections	plate connector GSA Connecting plug GM209N		
Inductivity	mH	6 to 8	
Oscillator frequency	KHz	2.5	
Electrical position measurement system	Different throttle valves		
Nominal stroke	mm	3.5	

Characteristic curve

(Measured when using HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

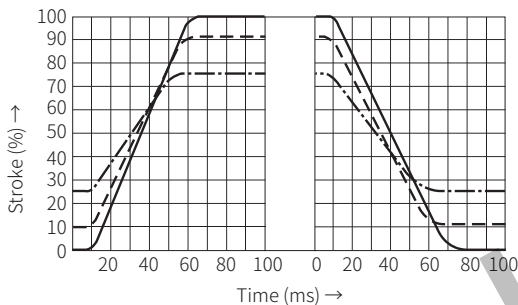
Command value voltage in relation to the flow
(Flow control of A → B); $p_{nom} = 50\text{bar}$



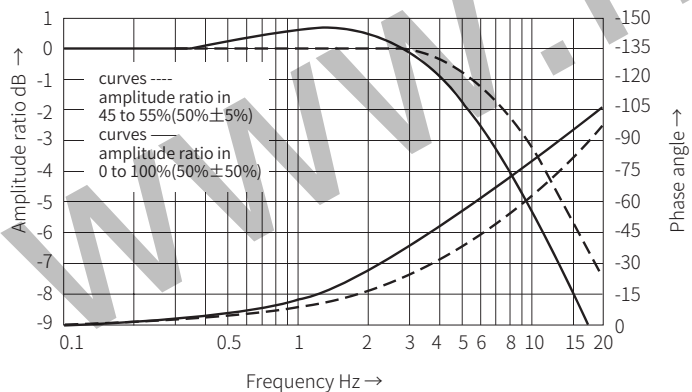
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Dynamic response

Transition function with stepped command value modification; $p_{nom} = 100\text{bar}$; type "25Q"



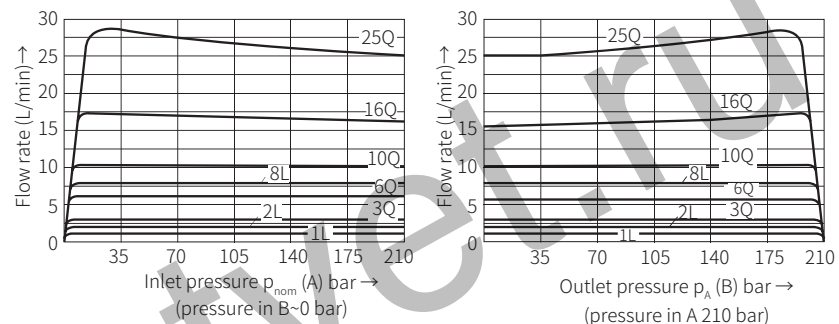
Frequency response characteristic curves; $p_{nom} = 100\text{bar}$; type "25Q"



Characteristic curve

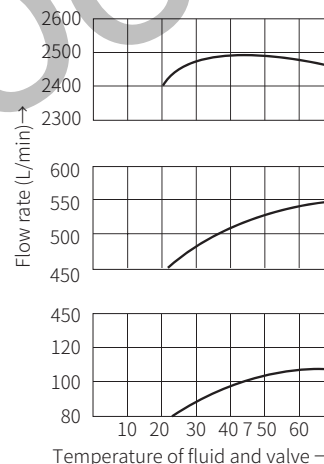
(Measured when using HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

Proportional flow control valve
Pressure in relation to the flow rate

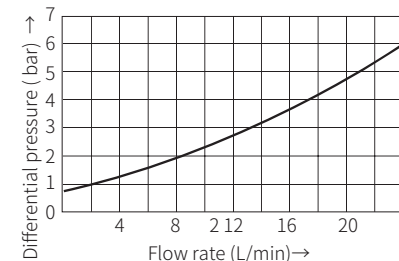


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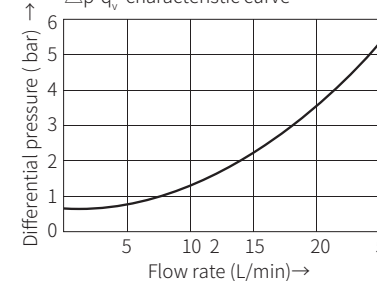
Temperature in relation to the flow rate
at $\Delta p = 30\text{bar}$

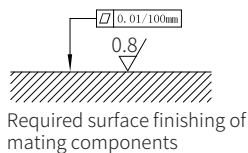


Pressure differential via check valve B → A
Throttle valve closed

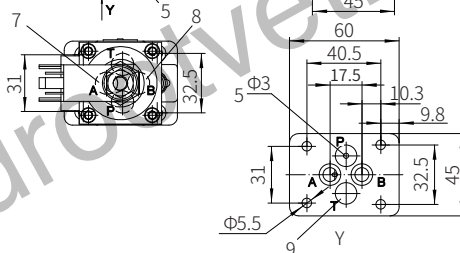
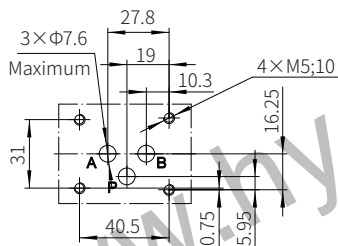
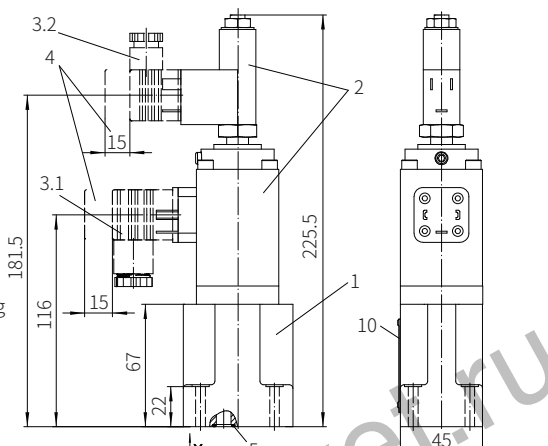


Rectifier sandwich plate
 $\Delta p - q_v$ characteristic curve





- 1 Valve body
- 2 Proportional solenoid with inductive position transducer
- 3 Connecting plug
- 4 Space required to remove the plug
- 5 Hole for model 2FRE6A...
- 6 O-ring 9.25x1.78
- 7 Port A
- 8 Port B
- 9 Blind hole
- 10 Name plate



Rectifier sandwich plate Z4S6-1XJ/...

- 1 Flow control valve
- 2 Rectifier sandwich plate
- 3 Name plate
- 4 O-ring 9.25x1.78 (for port A, B)

Note:

Rectifier sandwich plate Z4S6-1XJ/ cannot be connected with the flow control valve 2FRM6A...3XJ/ with external connection of the pressure compensator.

