

2FRE6

2-way proportional flow control valve , with electrical position feedback

Nominal size 6
 Series 2X
 Maximum operating pressure 210 bar
 Maximum flow 25 L/min



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Features

- 1 - 2-way design, valve with a pressure compensator for the pressure compensated control of a flow
- 1 - Actuation via a proportional solenoid
- 1 - For subplate mounting: Porting pattern to DIN 24 340 form A, ISO 4401-03-02-0-05
- 3 - With electrical position feedback of the control orifice
- 4 - The position transducer coil can be axially moved making the zero point adjustment of the control orifice easy, without having to touch the electronics (electrical-hydraulic)
- 5 - Flow control is possible in both directions by using a rectifier sandwich plate
- 6 - Electrical amplifier RT-MRPD1-150-30 in modular format(separate order)
- 8

Ordering details

2FRE	6	B	-	2X	/	1L	K4	R	V	*
01	02	03		04		05	06	07	08	09

01	2FRE	2-way proportional flow control valve
02	6	Nominal size 6
03	A	With external closing of the pressure compensator (suppression of start-up jump)
	B	Without external closing of the pressure compensator

04	2X	Series 20 to 29 (20 to 29: unchanged installation and connection dimensions)
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Rate flow A→B

05	1L	1 l/min	Linear
	2L	2 l/min	
	8L	8 l/min	
	3Q	3 l/min	Progressive
	6Q	6 l/min	
	10Q	10 l/min	
	16Q	16 l/min	
	25Q	25 l/min	Progressive with fast feed
	2QE	25 l/min, fine control range up to 2 L/min)	

06	K4	With component plug to DIN EN 175301-803-A for solenoid,Manufacturer Hirschmann for the position transducer
07	R	With check valve
	M	Without check valve

Seal material

08	M	NBR seals
	V	FKM seals
09	*	Further details in clear text

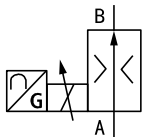
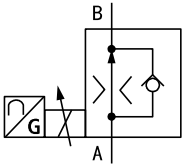
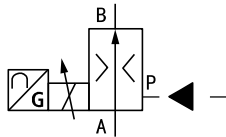
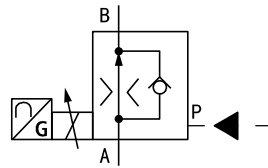
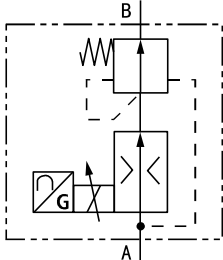
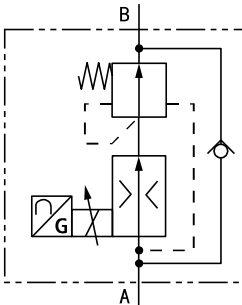
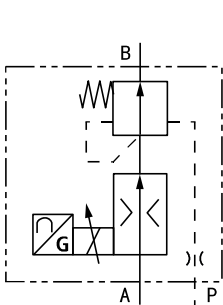
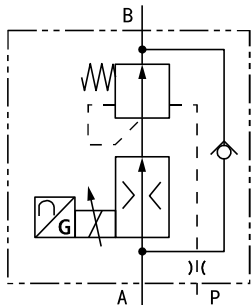
Rectifier sandwich plate

Z4S	6	-	1X	/	V	*
01	02		03		04	05

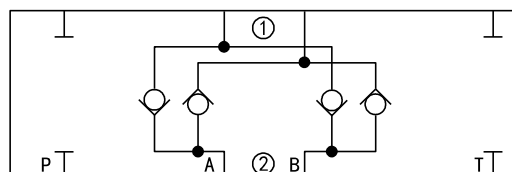
01	Z4S	Rectifier sandwich plate
02	6	Nominal size 6
03	1X	Series 10 to 19 (10 to 19: unchanged installation and connection dimensions)
Seal material		
04	M	NBR seals
	V	FKM seals
05	*	Further details in clear text

Note: Z4S6-1x rectifier sandwich plate can not be combined use of proportional flow control valve 2FRE6A-2X (with external closure of pressure compensator).

Symbols

	2FRE6B-2X/...M	2FRE6B-2X/...R	2FRE6A-2X/...M	2FRE6A-2X/...R
Simple				
Detailed				

Rectifier sandwich plate (Z4S6-1X/V, ① = component side,, ② = subplate side)



Functions, section

The type 2FRE 6... proportional flow control valves have a 2-way function. They can, from a applied electrical command value, regulate flow which is pressure and temperature compensated.

They basically comprise of the housing (1), proportional solenoid with inductive position transducer (2), measuring orifice (3), pressure compensator (4) as well as the optional check valve (5).

Proportional flow control valve 2FRE 6 B-2X/.K4R

(without external closing, with check valve)

The setting of the flow is determined (0 to 100 %) at the command value potentiometer. The applied command value adjusts, via the amplifier as well as the proportional solenoid, the measurement orifice (3). The position of the measurement orifice (3) is obtained by the inductive position transducer. Any deviations from the command value are compensated for by the feedback control.

The pressure compensator (4) holds the pressure drop at the measurement orifice (3) at a constant value. The flow is, therefore load compensated.

The small temperature drift is achieved due to the design of the measurement orifice.

At a 0 % command value the measurement orifice is closed.

In the case of a loss of power or a cable break at the position transducer the measurement orifice closes

In the case of a loss of power or a cable break at the position transducer the measurement orifice closes.

From a 0 % command value a jump free start is possible. Via two ramps within the electrical amplifier, it is possible to delay the opening and closing of the measurement orifice.

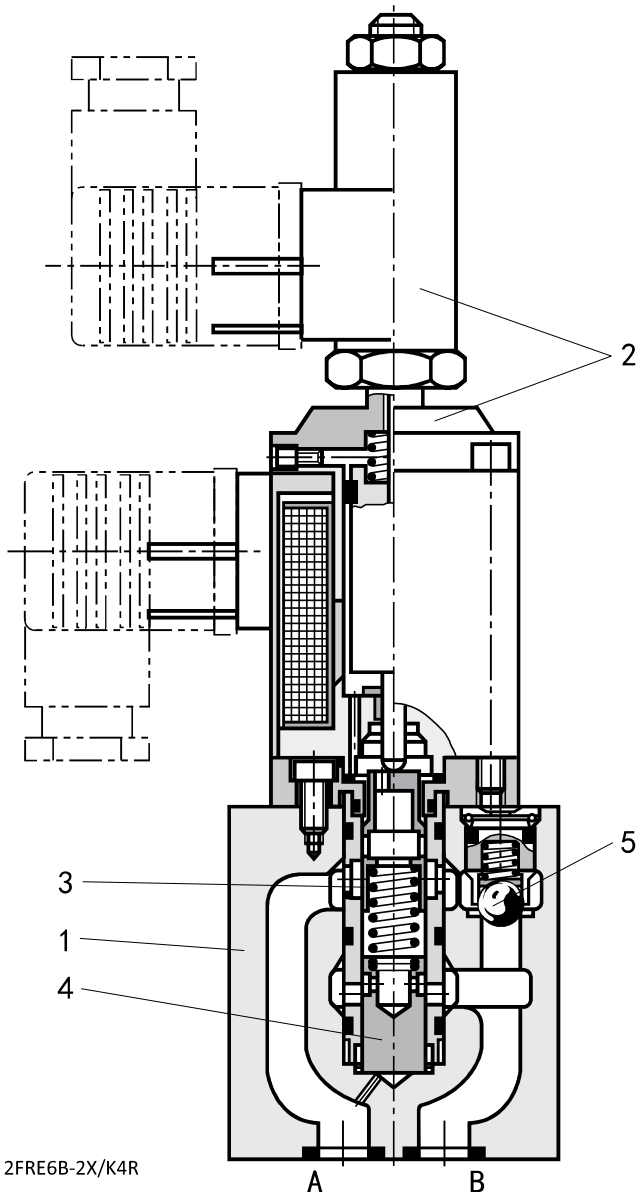
Via the check valve (5) a free flow is possible from B to A. With an additional rectifier sandwich plate type Z4S 6..., which is fitted under the proportional flow control valve, it is possible to control the flow too and from the actuator

Proportional flow control valve type 2FRE 6 A-2X/.K4M

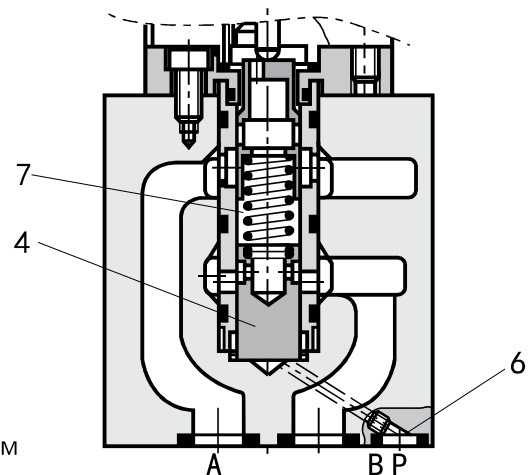
(with external closing, without check valve)

The function of this valve is in principle the same as valve type 2FRE 6 B-2X/.K4RV

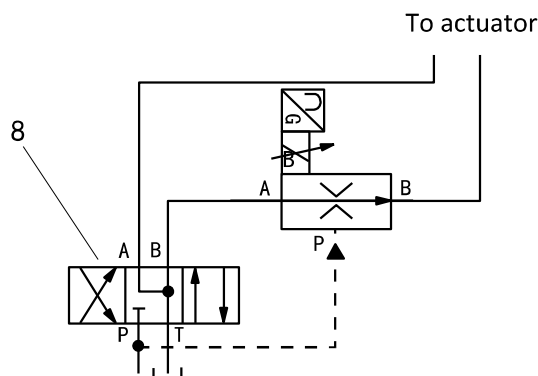
To suppress the start-up jump when the measurement orifice (3) (command value > 0 %) is open, there is provision for the pressure compensator (4) to be held closed via port P (6). The internal connection (7) between port A and the pressure compensator (4) is plugged. Via the external port P (6) the pressure in port P, before the directional valve (8) acts on the pressure compensator (4) and holds it against the spring force (7) in the closed position. If the directional valve (8) is switched over from P to B, then the pressure compensator (4) moves from the closed position into the regulating position and the start-up jump is thereby avoided.



2FRE6B-2X/K4R



2FRE6A-2X/K4M



Technical data (for applications outside these parameters, please consult us!)

General

Installation		optional
Storage temperature range	°C	-20 ... +80
Ambient temperature range	°C	-20 ... +50
Weight	Proportional flow control valve	kg 1.8
	Rectifier sandwich plate	kg 0.9

Hydraulic, proportional flow control valve (HLP46 at 40 °C ± 5 °C)

Max. permissible operating pressure, port A	bar	210								
		1L	2L	8L	3Q	6Q	10Q	16Q	25Q	2QE
Max. flow	l/min	1	2	8	3	6	10	16	25	25
Min. flow	up to 100bar	mL/min	25	25	50	15	25	50	70	100
	up to 210bar	mL/min	25	25	50	25	25	50	70	100
Max. leakage flow at command value 0 % $\Delta p_{A \rightarrow B}$ (measured at $v = 41 \text{ mm}^2/\text{s}$, and $\vartheta = 50 \text{ °C}$)	50bar	mL/min	4	4	6	4	4	6	7	10
	100bar	mL/min	5	5	8	5	5	8	10	15
	210bar	mL/min	7	7	12	7	7	12	15	22
Minimum pressure differential	bar	6 ... 10								
Pressure fluid		DIN51524 further pressure fluids on request!								
Hydraulic fluid temperature range (flown-through)	°C	-20 ... +80								
Viscosity range	mm ² /s	15 ... 380								
Degree of contamination		ISO4406 20/18/15 ¹⁾								
Hysteresis	%	< ± 1 at $q_{V \max}$								
Repeatability	%	< 1 at $q_{V \max}$								

Hydraulic, rectifier sandwich plate (HLP46 at 40 °C ± 5 °C)

Operating pressure	bar	up to 210
Cracking pressure	bar	0.7
Nominal flow	l/min	25

Electrical, proportional solenoid

Voltage type		DC
Duty	%	100
Protection to DIN 40 050		IP65
Coil resistance	Cold value at 20 °C	Ω 5.4
	Max. warm value	Ω 8.2
Max. current per solenoid	A	1.5
Electrical connection		Plug-in connector to DIN EN 175301-803-A

Electrical, inductive position transducer

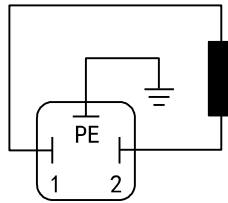
		1 and 2	2 和 1	1 和 2
Coil resistance at 20 °C	Ω	31.5	45.5	31.5
Electrical connection		GM 209N		
Protection to DIN 40 050		IP65		
Inductivity	mH	6~8		
Oscillator frequency	kHz	2.5		
Electrical position measuring system		differential throttle		
Nominal stroke	mm	3.5		
Control electronics (separate order)		RT-MRPD1-150-30/A1(F1)		

- 1) In the hydraulic system, the cleanliness of the oil must meet the requirements of the components, and effective filtration can prevent the failure of the hydraulic system and prolong the service life of the components.

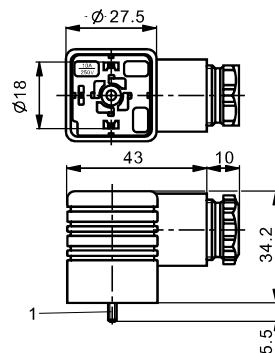
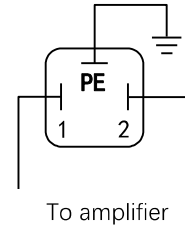
Electrical connections

Proportional solenoid

Connections on component plug



Connections on plug-in connector

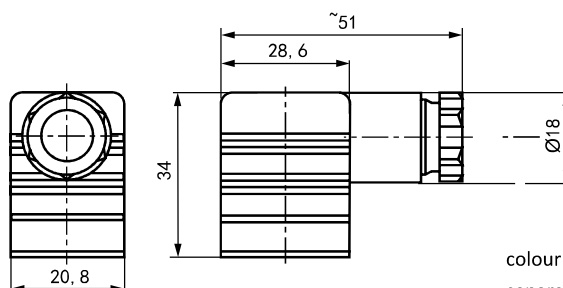
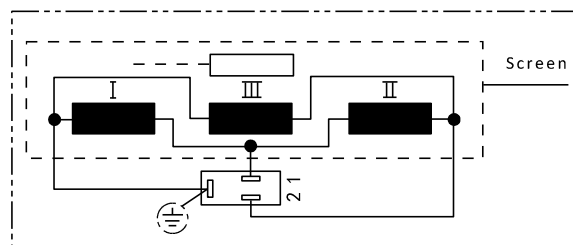


colour black

separate order under material no. HP18110741

Fixing screw: M3, torque 0.5 Nm

Inductive position transducer



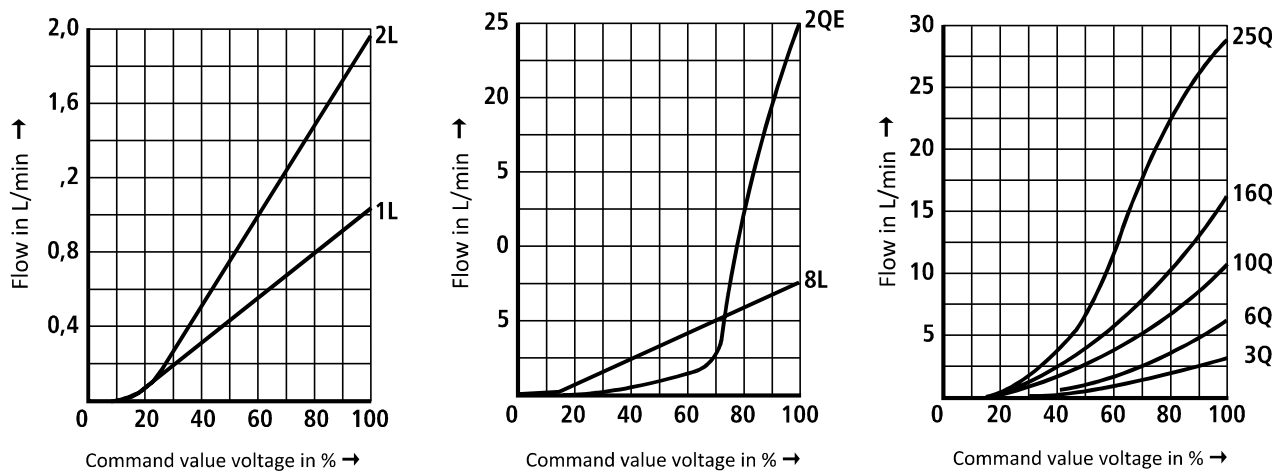
colour black

separate order under material no. HP19030190

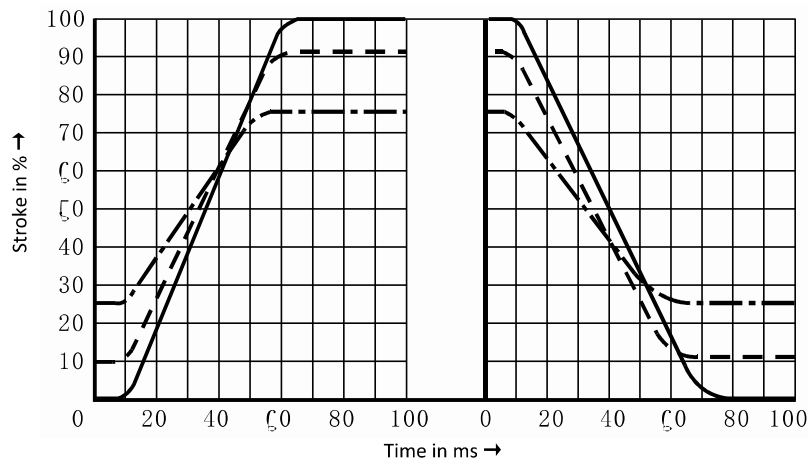
Fixing screw: M3, torque 0.5 Nm

Characteristic curves (HLP46 at 40 °C ± 5 °C)

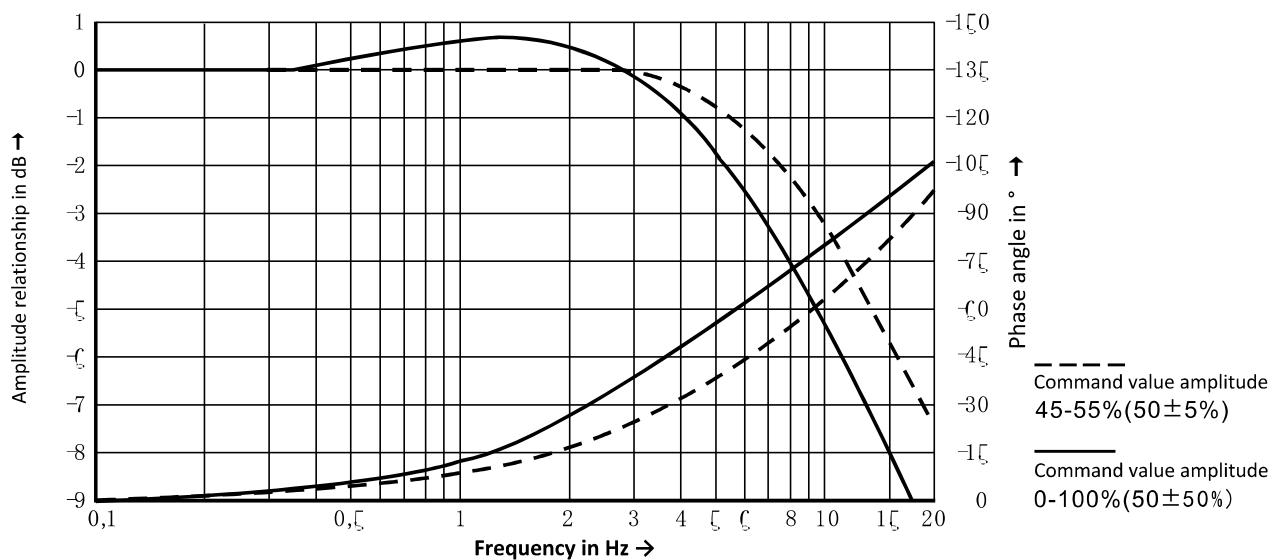
Characteristic curves (flow control from A → B); $p_s = 50$ bar



Transient function with a stepped form of command value change; $p_{nom} = 100$ bar; valve type 25Q

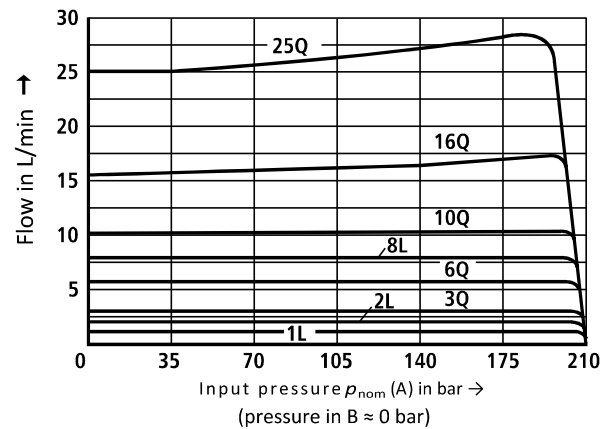
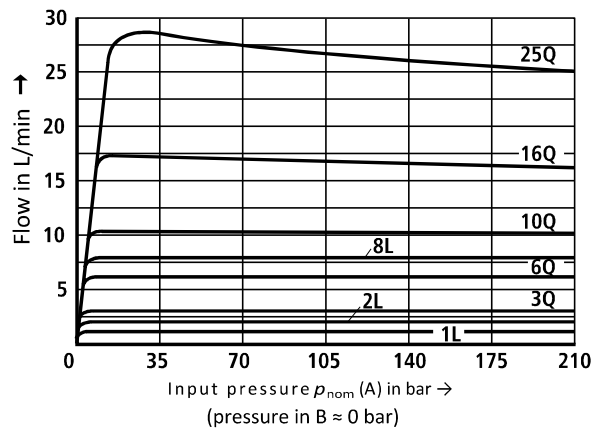


Frequency response characteristic curve; $p_{nom} = 100$ bar; valve type 25Q

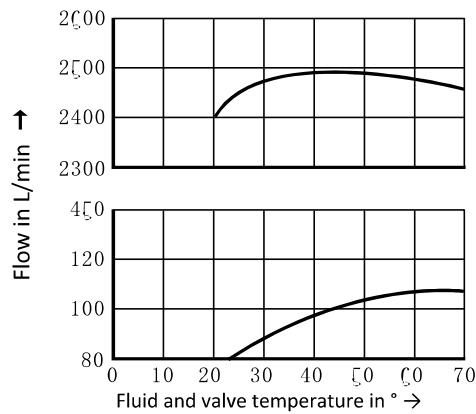


Characteristic curves (HLP46 at 40 °C ± 5 °C)

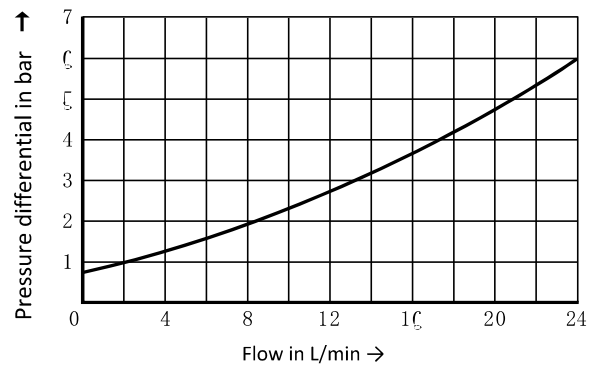
Proportional flow control valve
 Pressure - flow relationship



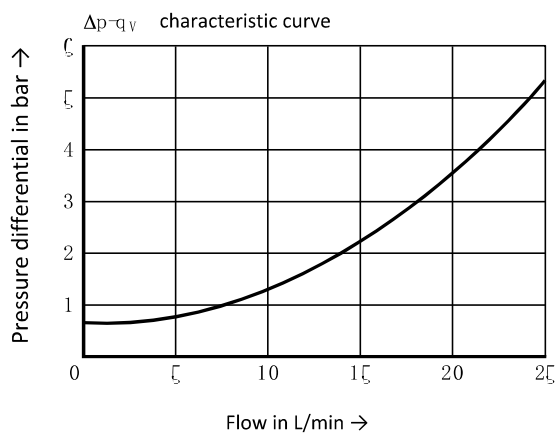
Temperature relationship at $\Delta p=30\text{bar}$



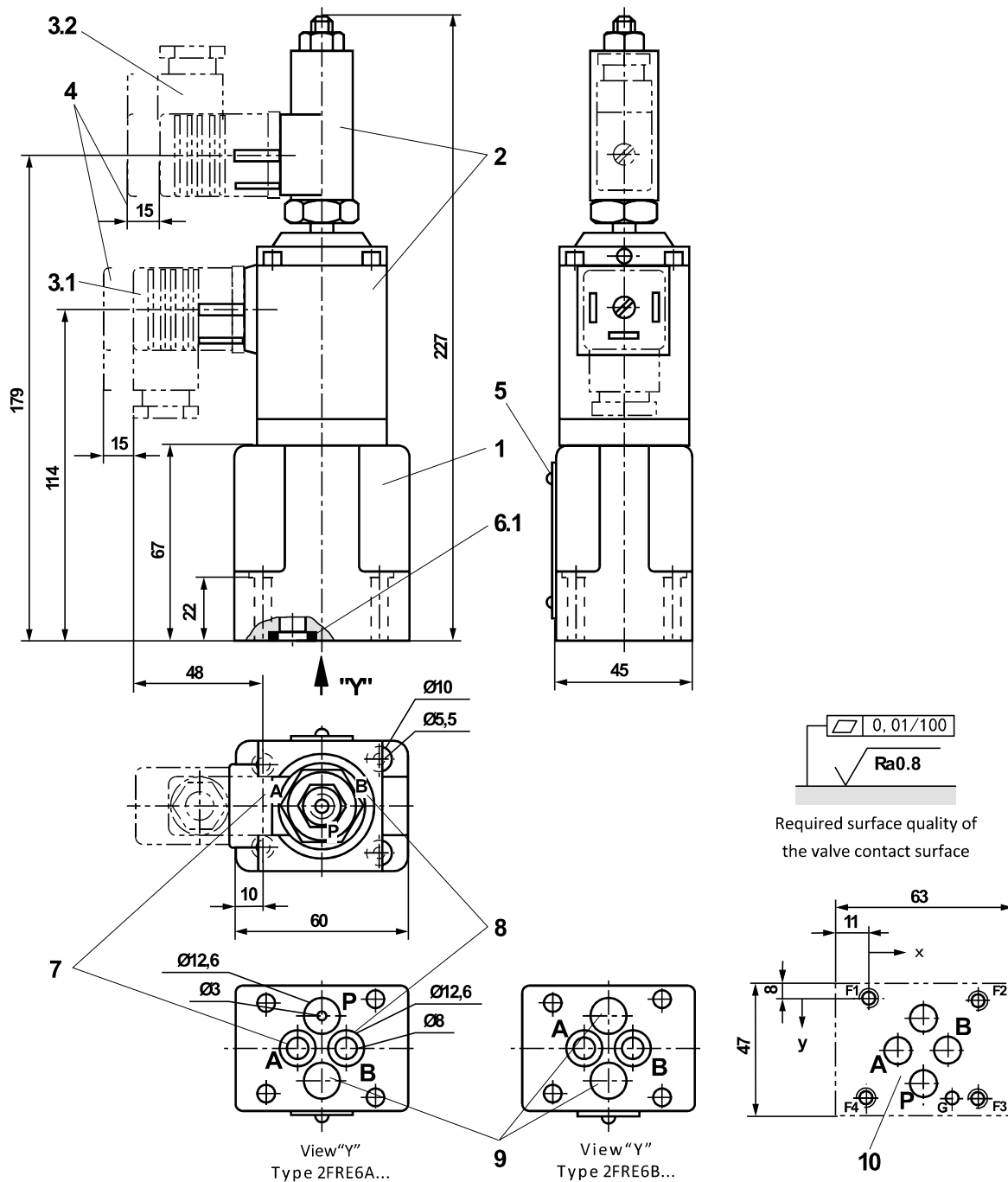
Pressure differential over check valve B → A
 Orifice closed



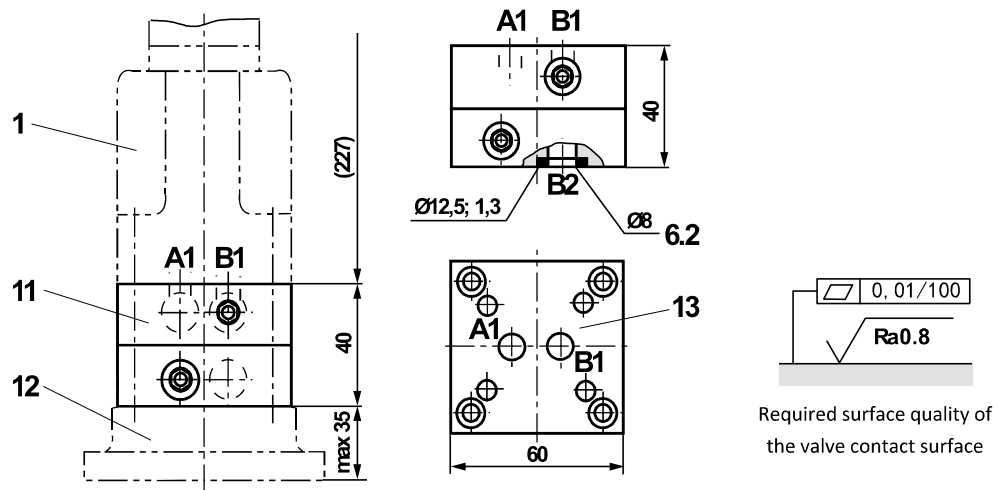
Rectifier sandwich plate (B→A, A→B)



Unit dimensions (Dimensions in mm)



Dimensions in mm	P	A	T	B	F1	F2	F3	F4	G
Diameter/thread	ø7.5 max	ø7.5 max	ø7.5 max	ø7.5 max	M5	M5	M5	M5	ø4
x	21.5	12.7	21.5	30.2	0	40.5	40.5	0	33
y	25.9	15.5	5.1	15.5	0	-0.75	31.75	31	31.75



- 1 Valve housing
- 2 Proportional solenoid with inductive position transducer
- 3.1 Plug-in connector for solenoid, (separate order under material no. HP18110741)
- 3.2 Plug-in connector for inductive position transducer, (separate order under material no. HP19030190)
- 4 Space required to remove plug-in connector
- 5 Name plate
- 6 R-ring 9.81 x 1.50 x 1.78(ports A, B, P and blind hole)
- 7 Port A
- 8 Port B
- 9 Blind hole $\varnothing 12.6$
- 10 For subplate mounting: Porting pattern to ISO 4401-03-02-0-05
- 11 Rectifier sandwich plate
- 12 Mounting plate

- Valve fixing screws without rectifier sandwich plate: 4 GB/T 70.1-M5x30-10.9
- Torque: : 8.1Nm $\pm$ 10%
- Valve fixing screws with rectifier sandwich plate: 4 GB/T 70.1-M5x70-10.9
- Torque: : 8.1Nm $\pm$ 10%