

4WRA(E)...type Proportional Directional Valve



4WRA and 4WRAE...type

Size 6, 10
Max. Working Pressure: 315 bar
Max. Flow: 42 L/min (size 6)
75 L/min (size 10)

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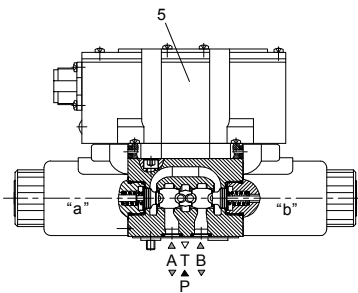
Features

- Direct operated proportional directional valve to control the direction and magnitude of a flow
- For subplate mounting: Porting pattern conforms to ISO4401
- Actuation by means of proportional solenoids with central thread and removable coil
- Spring centred control spool
- Control electronics 4WRAE...2XJ: integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
4WRA...2XJ: available module amplifier

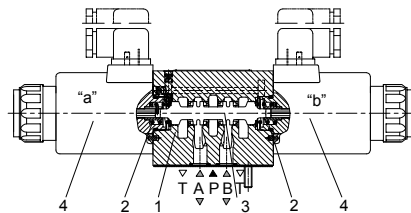
Function and configurations

4WEA(E) type proportional valve in 4/2-way and 4/3-way is designed as a direct operated components for subplate mounting. It is actuated by proportional solenoids with central thread and removable coil. The solenoids are controlled either by external control electronics (type 4WRA...2XJ) or by integrated control electronics (type 4WRAE...2XJ).

The valve consists of Housing (1) with mounting surface, Control spool (3) with compression springs(2), Solenoids (4) with central thread, Optional integrated electronics (5) With the solenoids (4), de-energised, the control spool (3) is held in the central position by the compression springs (2). Direct operation of the control spool (3) by energising one of the proportional solenoids(4) e.g. control of solenoid right, then movement of the control spool (3) to the left in proportion to the electrical input signal, and connection from P to A and B to T via orifice-like crosssections with progressive flow characteristics.

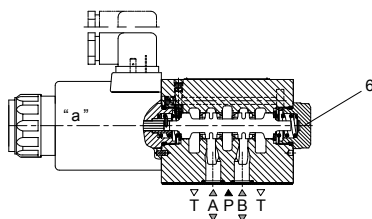


Type 4WRAE 6...-2XJ/...

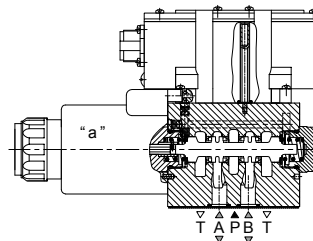


Type 4WRA 10...-2XJ/...

4WRA(E)...A-2XJ the 2 switched position valves are however only fitted with solenoid "a". A plug (6) is fitted in place on the "b" proportional solenoid.



Type 4WRA 10...A-2XJ/...

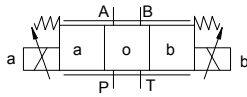


Type 4WRAE 10...A-2XJ/...

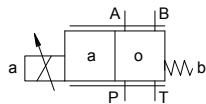
Symbols

Without integrated electronics

Type 4WRA...-2XJ/...

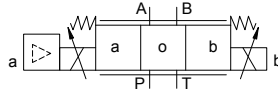


Type 4WRA...A-2XJ/...

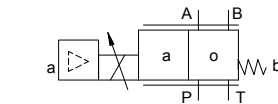


With integrated electronics

Type 4WRAE...-2XJ/...



Type 4WRAE...A-2XJ/...



Ordering code

4WRA					- 2XJ / G24	/		*
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Without integrated = No code
With integrate = E

Nominal size 6 = 6
Nominal size 10 = 10

Spool symbols

		= E
		= W
		= EA
		= WA

Transitional symbols

Further information in plain text

V = FKM
No code = NBR

No code = for 4WRA
Interface A1 or F1 for 4WRAE:
A1= Command value input $\pm 10V$
F1=Command value input 4 to 20mA

4WRA: Z4= With plug-in connector
K4= Without plug-in connector
DT= Without plug-in Deutsch connector
4WRAE: K31= Without plug-in connector
Z31= With plug-in connector

No code = Without hand override
N9 = With protected hand override

Power supply voltage of electric control device:
G24= Power supply voltage 24VDC

2XJ= Series 20J~29J
(20J to 29J, unchanged installation and connection dimensions)

Nominal flow at a valve pressure differential $\Delta P=10\text{bar}$

NG6:	07=	7L/min
	15=	15L/min
	30=	26L/min
NG 10:	30=	30L/min
	60=	60L/min

Technical data

1. Hydraulic				
Installation		Optional, preferably horizontal		
Nominal size		6	10	
Weight	4WRA...2XJ	Kg	2.0	6.6
	4WRAE...2XJ		2.2	6.8
Nominal flow Q_{vnom} at $\Delta p = 10$ bar		L/min	7,15,26	30,60
Hysteresis		%	≤ 5	
Reversal span		%	≤ 1	
Response sensitivity		%	≤ 0.5	
Max.operating pressure	Ports A, B, P	bar	315	
	Port T	bar	210	
Pressure fluid		Mineral oil (HL, HLP) to DIN 51524 Other pressure fluids on request!		
Ambient air temperature range	4WRA...2XJ	$^{\circ}\text{C}$	-20 $^{\circ}\text{C}$ to 70 $^{\circ}\text{C}$ (-4 $^{\circ}\text{F}$ to 158 $^{\circ}\text{F}$)	
	4WRAE...2XJ	$^{\circ}\text{C}$	-20 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$ (-4 $^{\circ}\text{F}$ to 122 $^{\circ}\text{F}$)	
Viscosity range		mm^2/s	20 to 380 (preferably 30 to 46)	
Fluid Cleanliness Class		NAS1638 class9 or ISO 4406 class 20/18/15		

2. Electrical					
1) Solenoid data					
Voltage type		DC			
Command value signal for 4WRAE		$\pm 10\text{V}$ or 4 ~ 20mA			
Max.current per solenoid		A	2.5	1.5	0.8
Solenoid coil resistance	Cold value at 20 $^{\circ}\text{C}$	Ω	2	4.8	19.5
	Max.warm value		3	7.2	28.8
Duty		%	ED100%		
Max.coil temperature		$^{\circ}\text{C}$	150		
Valve protection to EN 60529		IP 65			
2) Control electronics					
Amplifier	4WRA...2XJ	VT-VSPA2-...-2XJ			
	4WRAE...2XJ	Integrated in the valve(OBE)			
Supply voltage	Nominal voltage	VDC	24		
	Lower limiting value	V	21/22(4WRA), 19(4WRAE)		
	Upper limiting value	V	35		
Amplifier power consumption	I_{max}	A	<1.8		
	Impulse current	A	3		

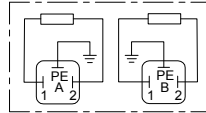
Electrical connections, plug-in connectors

nominal dimensions in mm

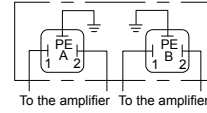
- For type 4WRE...2XJ (without integrated electronics)

Connections on the component plug

Plug-in connector to DIN EN 175301-803 or ISO 4400



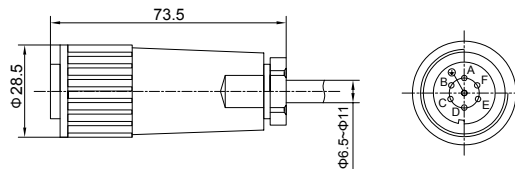
Connections on the plug-in connector



- For type 4WRAE...2XJ (with integrated electronics (OBE))

For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804



- Integrated control electronics for type 4WRAE

Component plug allocation

	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC (U(t)=19V to 35V)	
	B	GND	
	C	n.c. ¹⁾	
Differential amplifier input	D	$\pm 10V$, $R_e > 50K\Omega$	4 to 20mA, $R_e > 100\Omega$
	E	reference potential command value	
	F	n.c. ¹⁾	

Connection cable:

Recommended:
 - up to 25 m cable length type LiYCY 7x0.75 mm²;
 - up to 50 m cable length type LiYCY 7x1.0 mm².
 For outside diameter see plug-in connector sketch. Only connect screen to PE on the supply line.

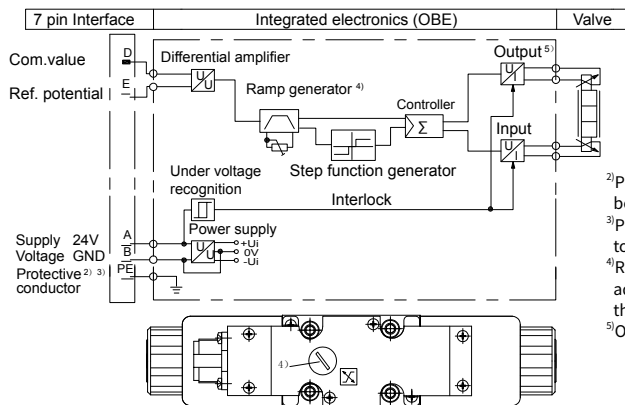
¹⁾Contacts C and F must not be connected!

Command value:

A positive command value 0 to +10 V (or 12 to 20 mA) at D and the reference potential at E results in a flow from P to A and B to T. A negative command value 0 to -10 V (or 12 to 4 mA) at D and the reference potential at E results in a flow from P to B and A to T.

For a valve with 1 solenoid on side (e.g. spool variants EA and WA) a positive command value at D and the reference potential at E results in a flow from P to B and A to T.

- Integrated electronics (OBE) for type 4WRAE...2XJ



- ²⁾PE is connected to the cooling body and the valve housing!
- ³⁾Protective conductor screwed to the valve housing and cover.
- ⁴⁾Ramp can be externally adjusted from 0 to 2.5s, the same applies for T_{up} and T_{down} .
- ⁵⁾Output stages current regulated.

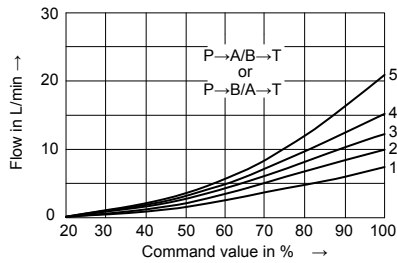
Characteristic curves

(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

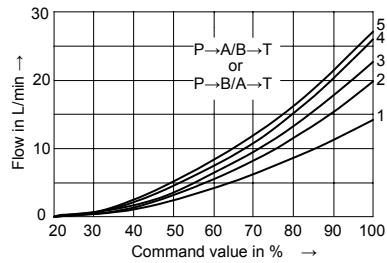
• Type 4WRAE (NG 6 and 10)

NG 6

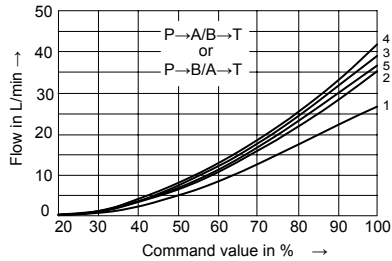
7 L/min nominal flow at a 10 bar valve pressure differential



15 L/min nominal flow at a 10 bar valve pressure differential



30 L/min nominal flow at a 10 bar valve pressure differential

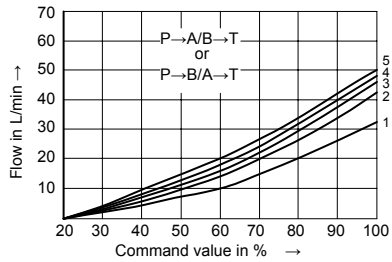


- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_r)

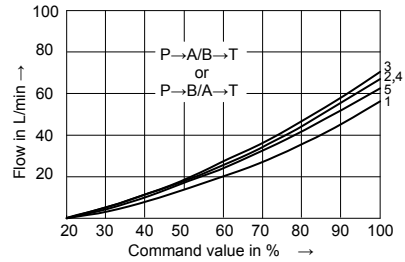
NG 10

30 L/min nominal flow at a 10 bar valve pressure differential



- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

60 L/min nominal flow at a 10 bar valve pressure differential



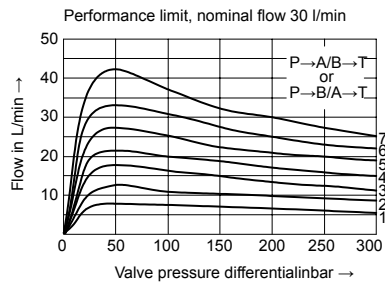
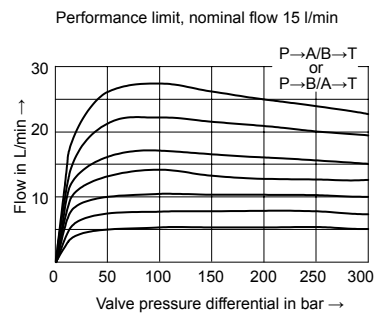
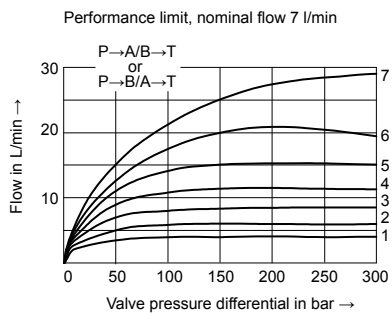
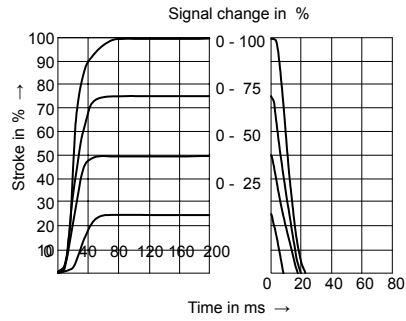
Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_r)

Characteristic curves

(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 6

Transient function with a stepped form of electrical input sign



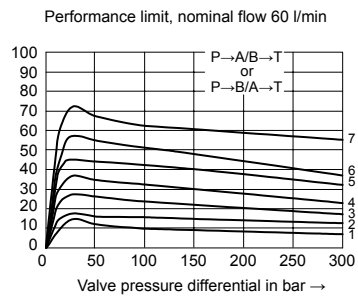
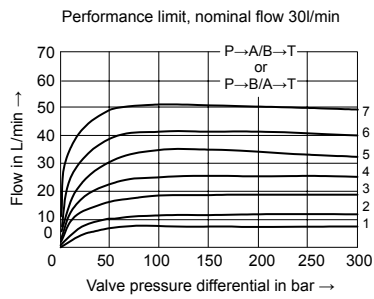
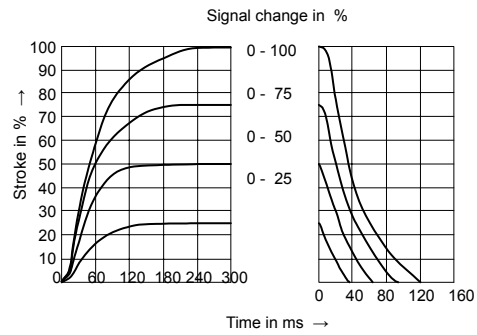
1. Com. value = 40 %
2. Com. value = 50 %
3. Com. value = 60 %
4. Com. value = 70 %
5. Com. value = 80 %
6. Com. value = 90 %
7. Com. value = 100 %

Characteristic curves

(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 10

Transient function with a stepped form of electrical input sign

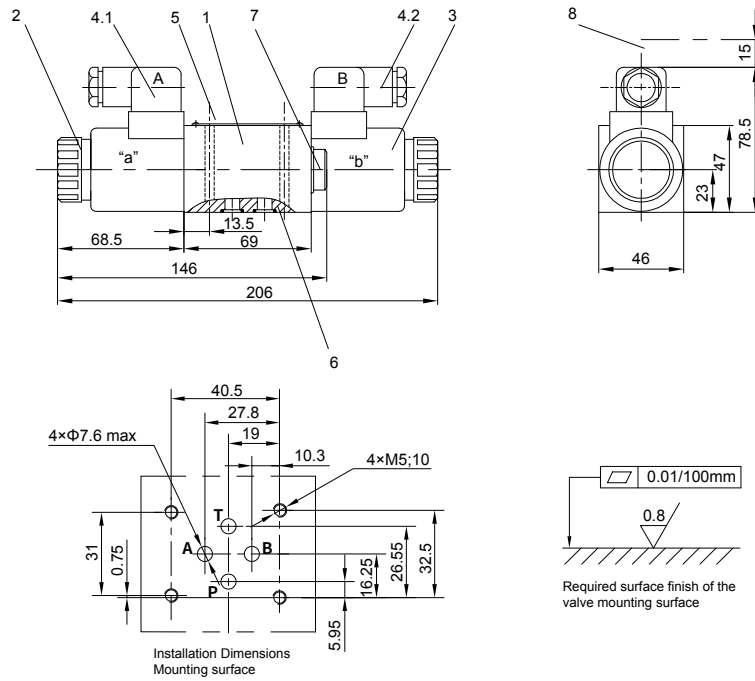


- 1.Com. value = 40 %
- 2.Com. value = 50 %
- 3.Com. value = 60 %
- 4.Com. value = 70 %
- 5.Com. value = 80 %
- 6.Com. value = 90 %
- 7.Com. value = 100 %

Unit dimensions

(nominal dimensions in mm)

Type 4WRA6...2XJ

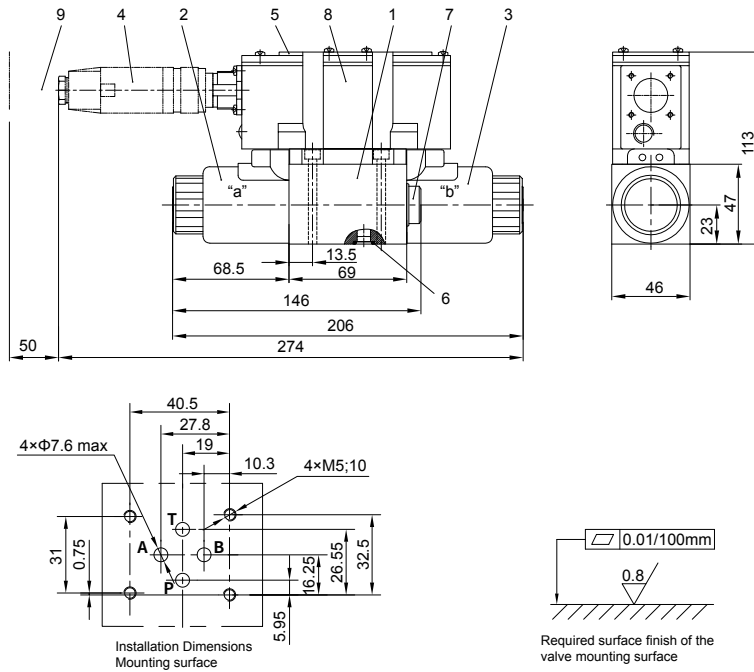


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T
(R-ring $9.81 \times 1.5 \times 1.78$ or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WRAE6...2XJ

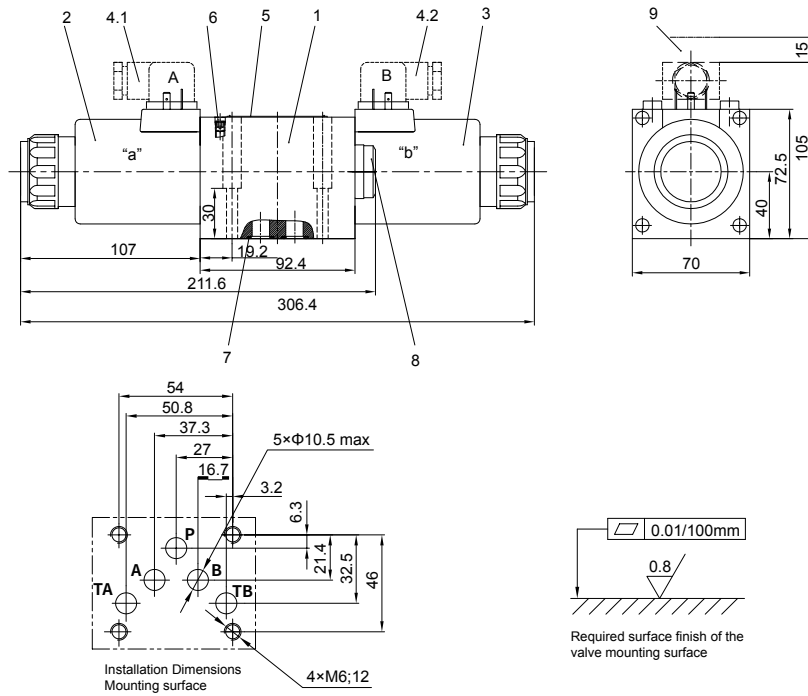


- 1 Valve housing
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- 4 Plug-in connector
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- 6 Identical seal rings for ports A, B, P and T
(R-ring $9.81 \times 1.5 \times 1.78$ or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Integrated electronics (OBE)
- 9 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WRA10...2XJ

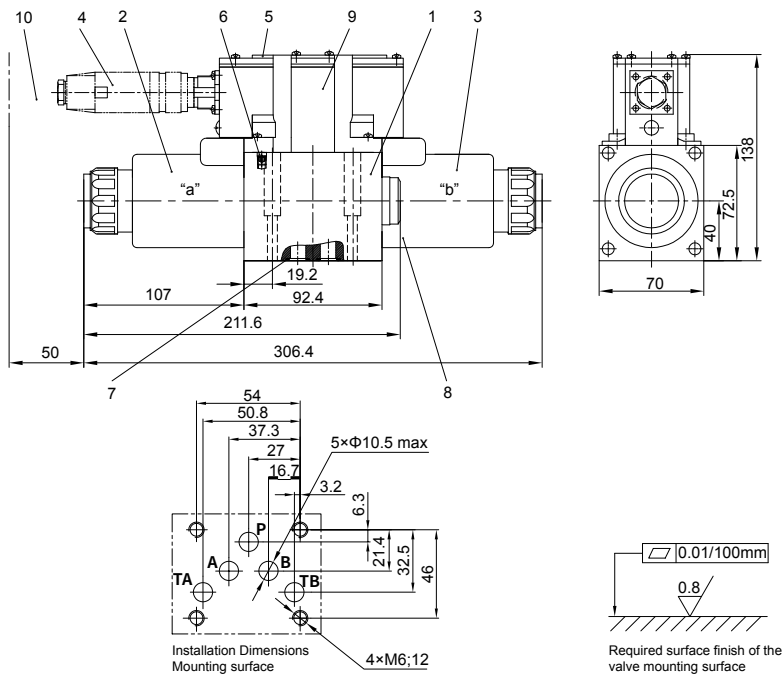


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 Identical seal rings for ports A, B, P and T
(R-ring 13×1.6×2 or O-ring 12×2)
- 8 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 9 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WRAE10...2XJ



- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
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