

## 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)

#### Contents

Function and configuration	02
Symbols	03
Ordering code	03
Technical data	04
Electrical connections, plug-in connectors	05
Characteristic curves	06-08
Unit dimensions	09-12

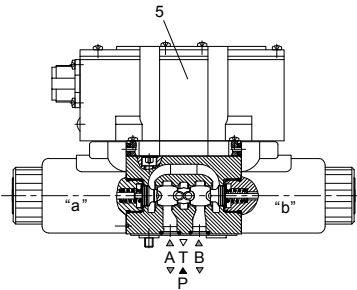
#### Features

- 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

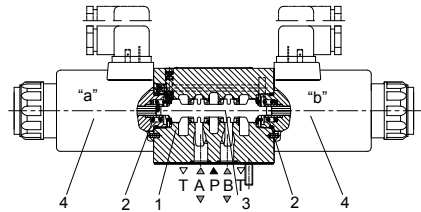
## Function and configurations

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.

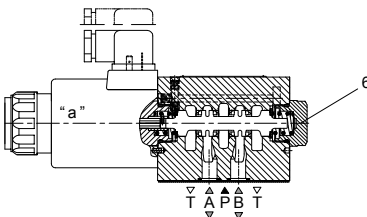


**Type 4WRAE 6...-2XJ/...**

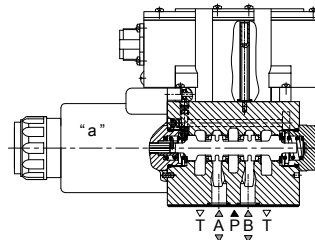


**Type 4WRA 10...-2XJ/...**

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/...**



## 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 $Q_{\text{nom}}$ 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	°C	-20°C to 70°C (-4° F to 158° F)		
	4WRAE...2XJ	°C	-20°C to 50°C (-4° F to 122° F)		
Viscosity range			mm <sup>2</sup> /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			± 10V or 4 ~ 20mA			
Max.current per solenoid			A	2.5	1.5	0.8
Solenoid coil resistance	Cold value at 20°C		Ω	2	4.8	19.5
	Max.warm value			3	7.2	28.8
Duty			%	ED100%		
Max.coil temperature			°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	$I_{\text{max}}$		A	<1.8		
	Impulse current		A	3		

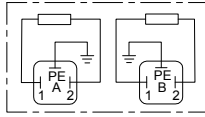
# Electrical connections, plug-in connectors

nominal dimensions in mm

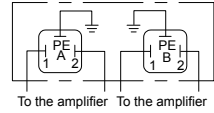
## For type 4WRE...2XJ (without integrated electronics)

### Connections on the component plug

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



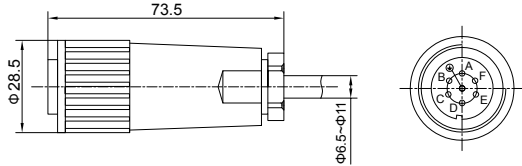
### Connections on the plug-in connector



## 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	
Differential amplifier input	C	n.c. <sup>1)</sup>	4 to 20mA, Re>100Ω
	D	±10V, Re>50KΩ	
	E	reference potential command value	n.c. <sup>1)</sup>
	F		

### Connection cable:

Recommended:  
 - up to 25 m cable length type LiYCY 7x0.75 mm<sup>2</sup>;  
 - up to 50 m cable length type LiYCY 7x1.0 mm<sup>2</sup>.  
 For outside diameter see plug-in connector sketch. Only connect screen to PE on the supply line.

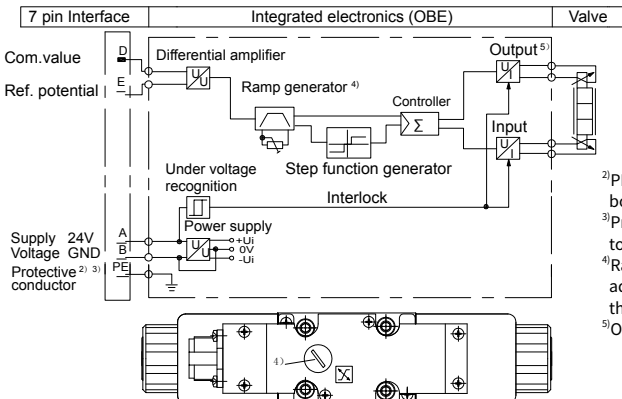
<sup>1)</sup>Contacts C and F must not be connected!

### 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



<sup>2)</sup>PE is connected to the cooling body and the valve housing!

<sup>3)</sup>Protective conductor screwed to the valve housing and cover.

<sup>4)</sup>Ramp can be externally adjusted from 0 to 2.5s, the same applies for T<sub>up</sub> and T<sub>down</sub>.

<sup>5)</sup>Output stages current regulated.

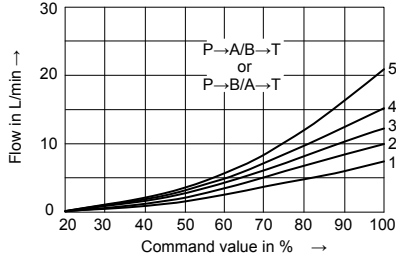
# Characteristic curves

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

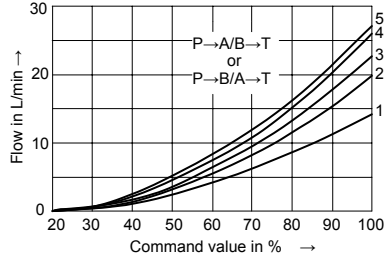
## · Type 4WRAE (NG 6 and 10)

### NG 6

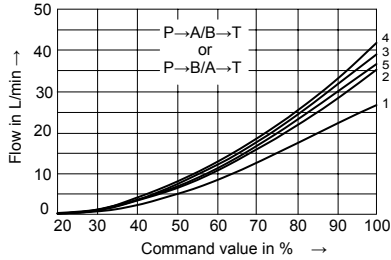
7 L/min nominal flow at a 10 bar valve pressure differential



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



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

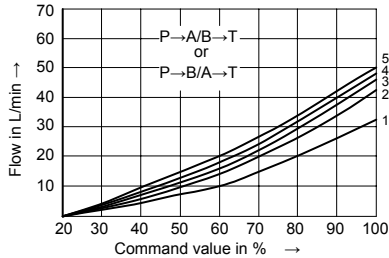


- 1  $\Delta p=10\text{bar}$  constant
- 2  $\Delta p=20\text{bar}$  constant
- 3  $\Delta p=30\text{bar}$  constant
- 4  $\Delta p=50\text{bar}$  constant
- 5  $\Delta p=100\text{bar}$  constant

$\Delta p$ =Valve pressure differential  
(inlet pressure  $p_p$  minus load pressure  $p_l$  minus return pressure  $p_r$ )

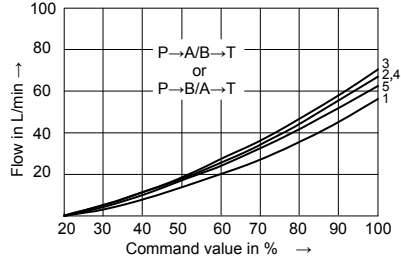
### NG 10

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



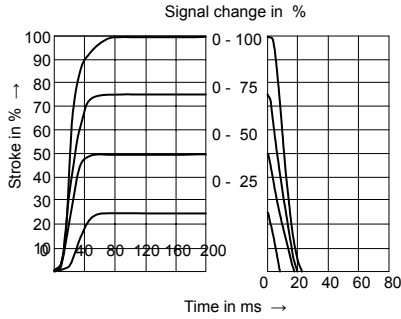
$\Delta p$ =Valve pressure differential  
(inlet pressure  $p_p$  minus load pressure  $p_l$  minus return pressure  $p_r$ )

# Characteristic curves

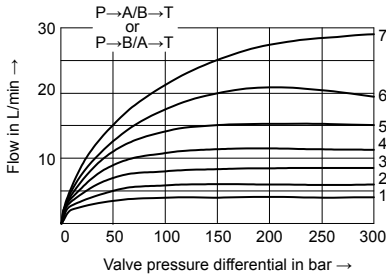
(measured with HLP46,  $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$ )

## NG 6

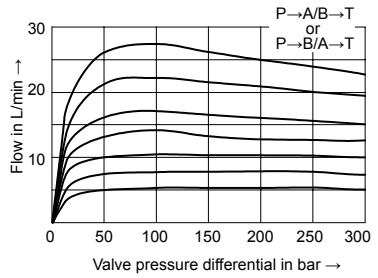
Transient function with a stepped form of electrical input sign



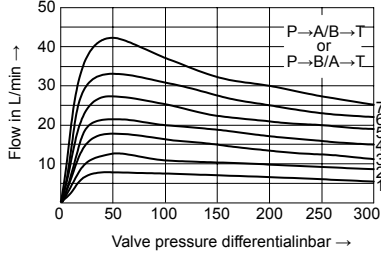
Performance limit, nominal flow 7 l/min



Performance limit, nominal flow 15 l/min



Performance limit, nominal flow 30 l/min



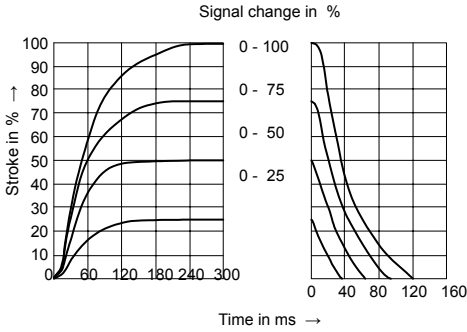
1. Com. value = 40 %
2. Com. value = 50 %
3. Com. value = 60 %
4. Com. value = 70 %
5. Com. value = 80 %
6. Com. value = 90 %
7. Com. value = 100 %

# Characteristic curves

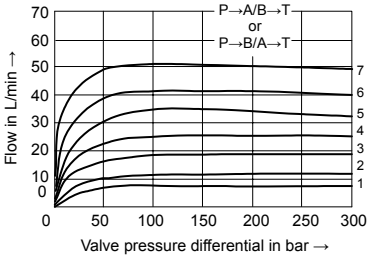
(measured with HLP46,  $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

## NG 10

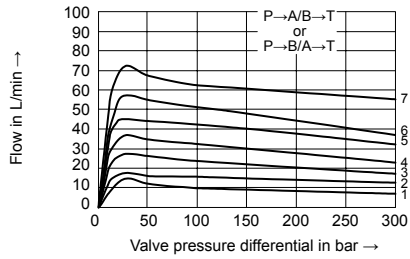
Transient function with a stepped form of electrical input sign



Performance limit, nominal flow 30l/min



Performance limit, nominal flow 60 l/min



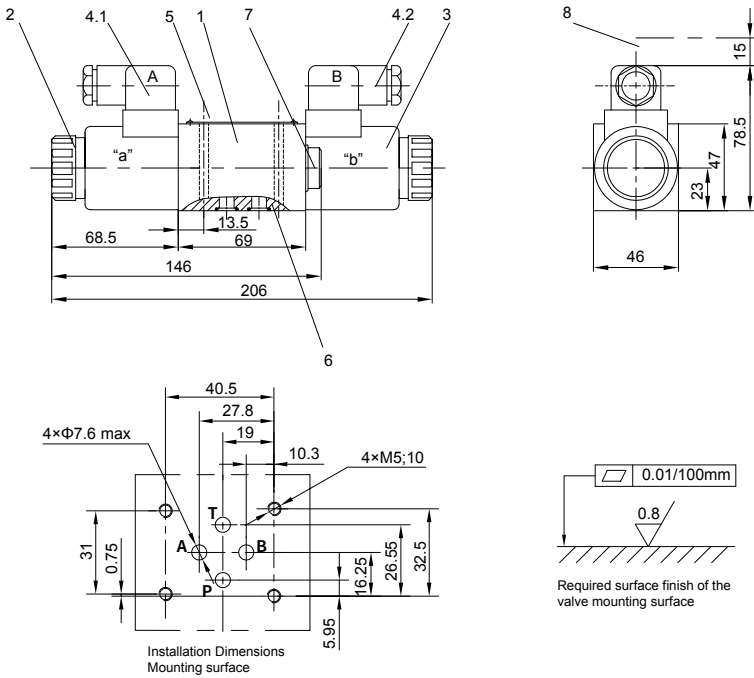
- 1.Com. value = 40 %
- 2.Com. value = 50 %
- 3.Com. value = 60 %
- 4.Com. value = 70 %
- 5.Com. value = 80 %
- 6.Com. value = 90 %
- 7.Com. value = 100 %



# Unit dimensions

(nominal dimensions in mm)

## Type 4WRA6...2XJ

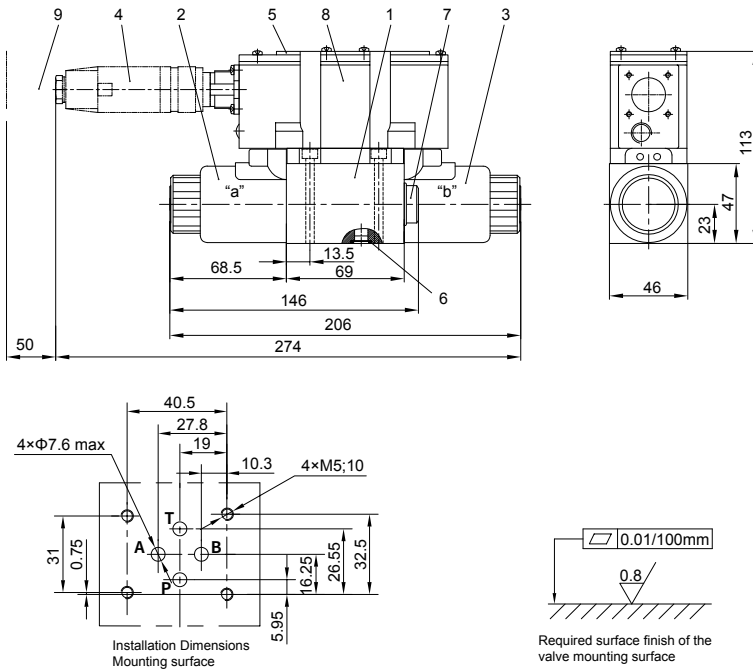


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T  
(R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid  
(2 switching positions,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

# Unit dimensions

(nominal dimensions in mm)

## Type 4WRAE6...2XJ

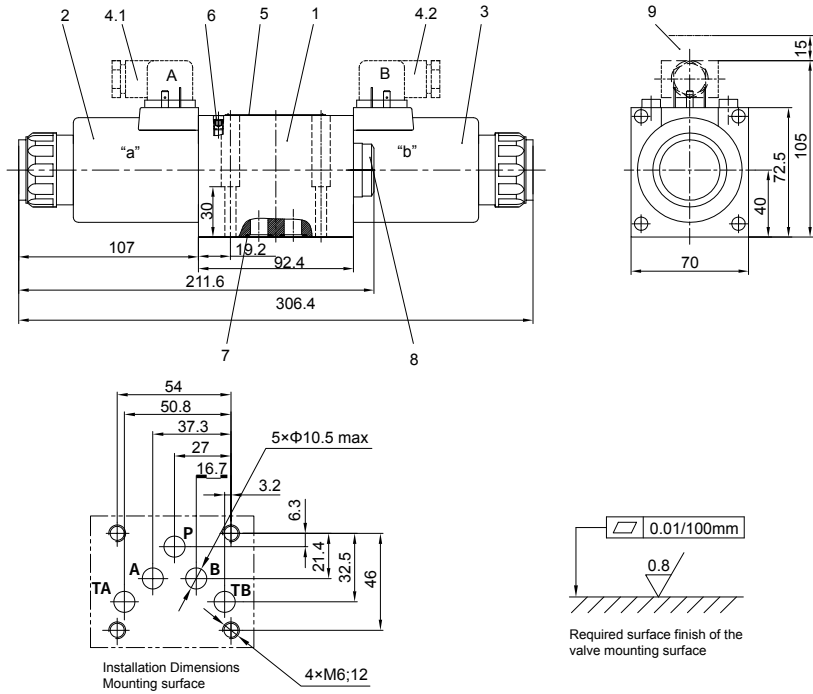


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Plug-in connector
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T  
(R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid  
(2 switching positions, versions EA or WA)
- 8 Integrated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

# Unit dimensions

(nominal dimensions in mm)

## Type 4WRA10...2XJ

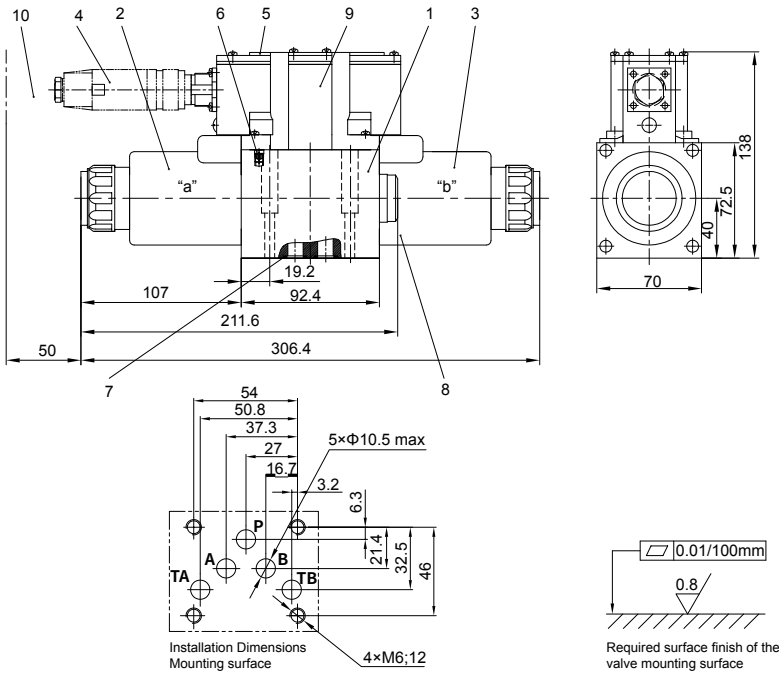


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 Identical seal rings for ports A, B, P and T  
(R-ring 13×1.6×2 or O-ring 12×2)
- 8 Plug for valves with one solenoid  
(2 switching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