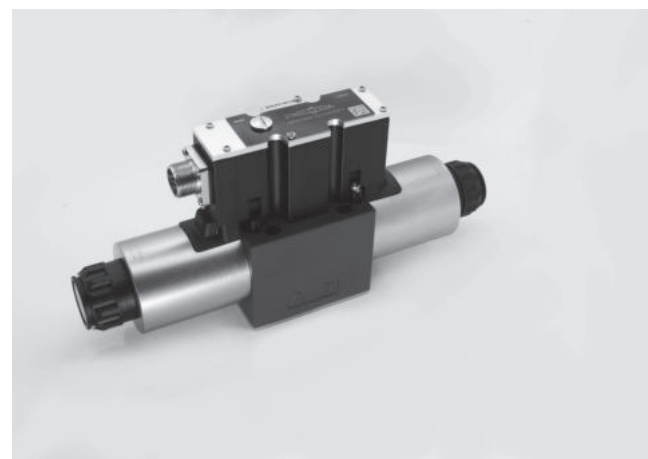


## Proportional Directional Valve

Model: 4WRA(E)...2XJ



- ◆ Size 6 and 10
- ◆ Maximum working pressure 315 bar
- ◆ Maximum working flow 42 L/min (size 6)  
75 L/min (size 10)

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### Features

- Proportional direction valve with direct operated proportional solenoid
- For subplate mounting
- Control the direction and flow
- Spring centred control spool
- Both valves and proportional amplifiers from the same supplier

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## Function description, sectional drawing

The 4WRA(E) valve is a 4/2-way and 4/3-way proportional directional valve with direct operated and subplate mounting. It is actuated by proportional solenoids with central thread and detachable coil. The control of the solenoids can be achieved through external amplifier (4WRA) or internal amplifier (4WRAE).

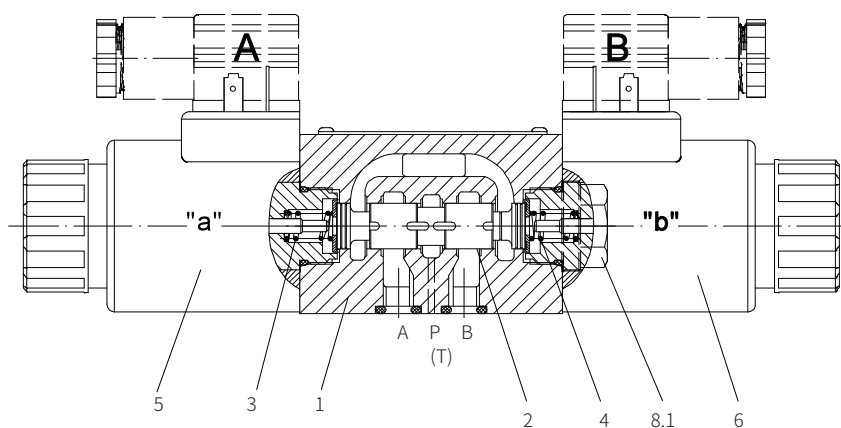
**Structure:**

The valves consist of:

- Valve body with mounting surface (1)
- Control spool (2) with compression springs (3 and 4)
- Solenoids (5 and 6) with central thread
- Optional amplifier (7)

**Operating Principle:**

- When the solenoids (5 and 6) are de-energized, the compression springs (3 and 4) hold the control spool (2) in the central position.  
→The control spool (2) is pushed to the left in proportion to the electrical input signal.
- After the proportional solenoid is energized, it will directly push the control spool (2), e.g. energization of solenoid "b" (6):  
→At this time, P to A and B to T are connected through the orifice formed by the spool and the valve body with progressive flow characteristics.
- De-energization of solenoid (6)  
→The control spool (2) is pushed back to the center position by the compression spring (3).



Model 4WRA6...2XJ

## Function description, sectional drawing

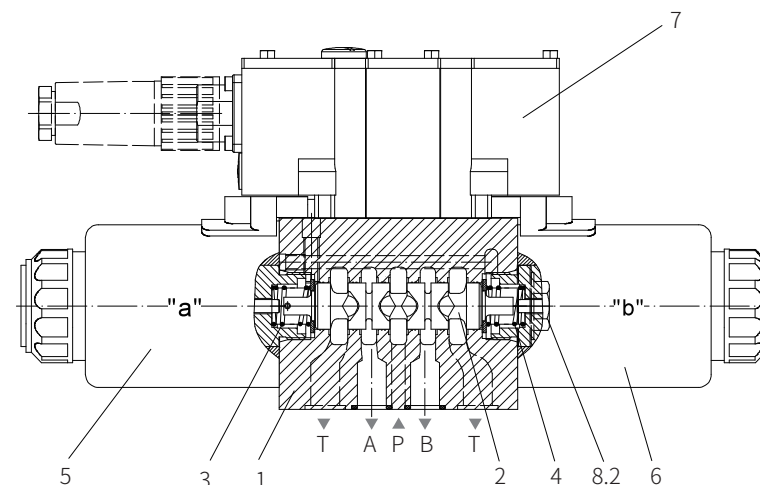
**Two Position Valves:**

(Model 4WRA...A...)

In principle, the function of this valve is similar to the valve with three-position, but it is installed with solenoid "a" only. A plug (8.1 for NG6 and 8.2 for NG10) is installed instead of the proportional solenoid "b".

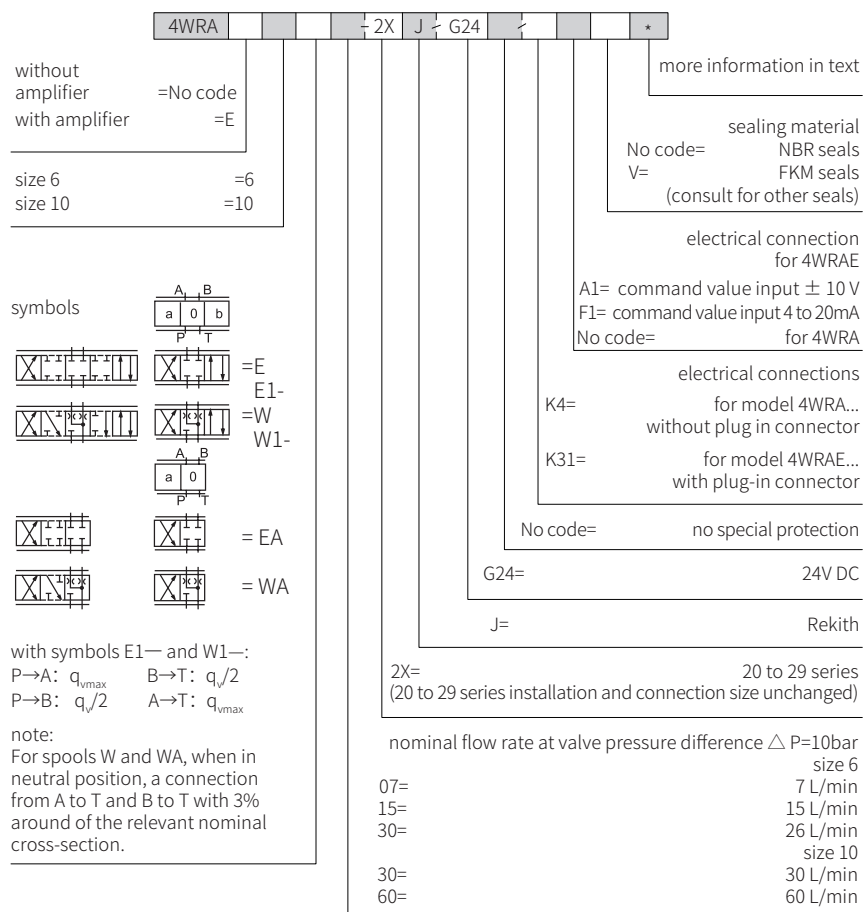
**Note for model 4WRA- 2XJ/...**

It must be avoided to drain all the oil in the return line. If necessary, a back pressure valve is to be installed in the circuit (back pressure about 2 bar).



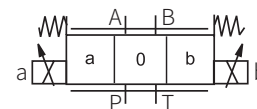
Model 4WRAE10...2XJ/

## Models and specifications

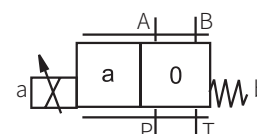


## Functional symbols

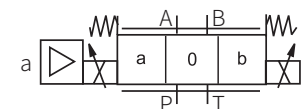
Without amplifier  
Model 4WRA...



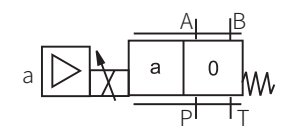
Model 4WRA...EA...; 4WRA...WA...



With amplifier  
Model 4WRAE...



Model 4WRAE...EA...; 4WRAE...WA...



## Technical parameters

Overview				
Size		6		10
Installation position		Optional, firstly horizontal		
Storage temperature range		°C -20 to +80		
Environment	4WRA	°C -20 to +70		
temperature range	4WRAE	°C -20 to +50		
Weight	4WRA	kg	2.0	6.6
	4WRAE	kg	2.2	6.8
Hydraulic (measured when using HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )				
Maximum working pressure	Oil port A, B, P bar		315	
	Oil pot T bar		210	
Nominal flow rate $q_v$ nom at $\Delta P=10$ bar	L/min		7, 15, 26	30, 60
Maximum permissible flow	L/min		42	75
Pressure medium		Mineral oil (HL, HLP) <sup>1)</sup> to DIN 51524; Biology can quickly decompose Oil according to VDMA 24568; HETG (Rapeseed oil) <sup>1)</sup> ; HEPG(Polyethyleneglycol) <sup>2)</sup> ; HEES (Synthetic Fats) <sup>2)</sup>		
Oil temperature range	°C		-20 to +80 (preferably +40 to +50)	
Viscosity range	mm <sup>2</sup> /S		20 to 380 (preferably 30 to 46)	
Cleanliness of oil <sup>3)</sup>	The maximum allowable pollution level of oil is ISO4406 Class 20 / 18 / 15			
Hysteresis	%		≤5	
Reversal span	%		≤1	
Sensitivity	%		≤0.5	

1) For NBR seal and FKM seal.

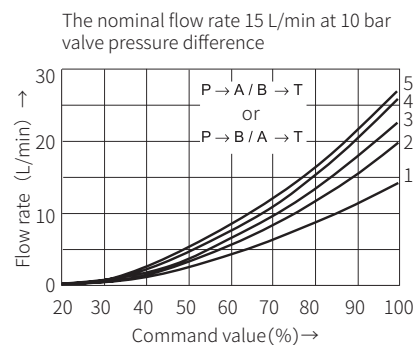
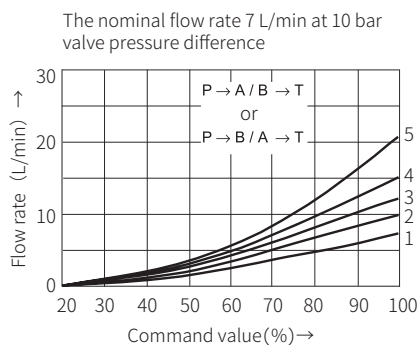
2) Only for FKM seal.

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			
Size		6	10
Voltage type		DC	
Command value signal voltage input "A1" V		±10	
For 4WRAE current input "F1" mA		4 to 20	
Maximum current per solenoid A		2.5	3.3
Solenoid coil Cold value at 20°C	Ω	2	
resistance Maximum warm value	Ω	3	
Power rate %		100	
Maximum coil temperature °C		150	
Electrical connection 4WRA		With component plug and plug-in connector to DINEN 175301-803 or ISO4400	
4WRAE		With component plug and plug-in connector to DINEN 175201-804	
Valve protection to EN60529		IP65, plug installed and locked	

## Characteristic curve

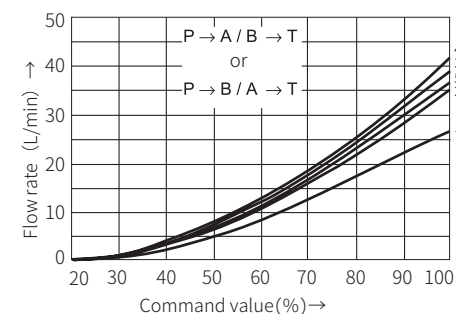
Size 6 (measured when using HLP46,  $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

## Characteristic curve

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

Size 6

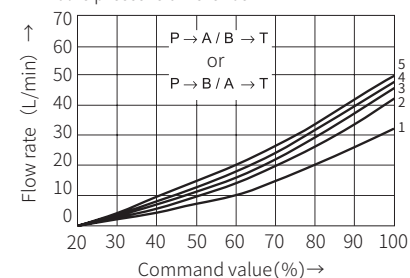
The nominal flow rate 30L/min at 10 bar valve pressure difference



1  $\Delta P=10$  bar constant  
2  $\Delta P=20$  bar constant  
3  $\Delta P=30$  bar constant  
4  $\Delta P=50$  bar constant  
5  $\Delta P=100$  bar constant  
 $\Delta P$  = valve pressure difference (inlet pressure  $P_p$  minus load pressure  $P_L$  and minus return oil pressure  $P_T$ )

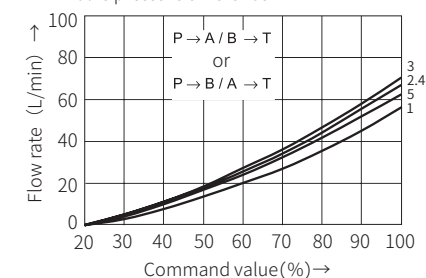
Size 10

The nominal flow rate 30 L/min at 10 bar valve pressure difference



1  $\Delta P=10$  bar constant  
2  $\Delta P=20$  bar constant  
3  $\Delta P=30$  bar constant  
4  $\Delta P=50$  bar constant  
5  $\Delta P=100$  bar constant

The nominal flow rate 60 L/min at 10 bar valve pressure difference

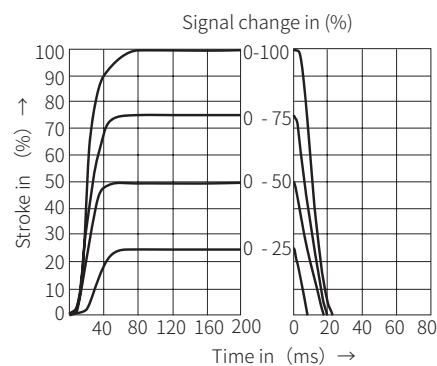


$\Delta P$  = valve pressure difference (inlet pressure  $P_p$  minus load pressure  $P_L$  and minus return oil pressure  $P_T$ )

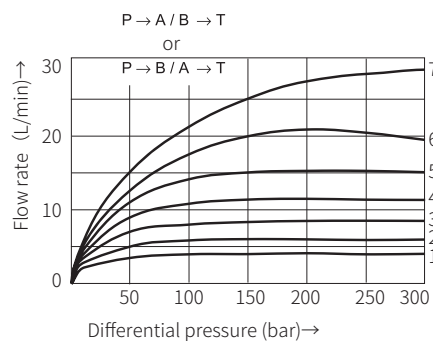
## Characteristic curve

Size 6 (measured when using HLP46,  $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

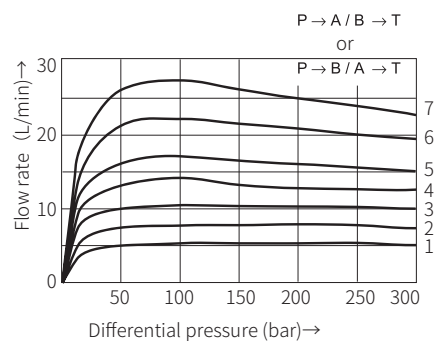
Transition performance of the valve when the input signal is a step signal



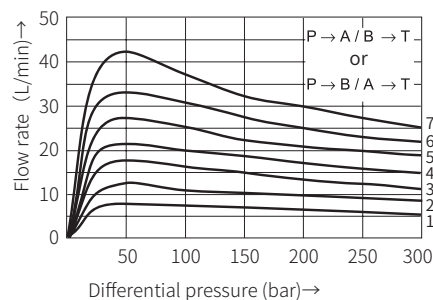
Power limit with a nominal flow rate of 7L/min



Power limit with a nominal flow rate of 15L/min



Power limit with a nominal flow rate of 30L/min

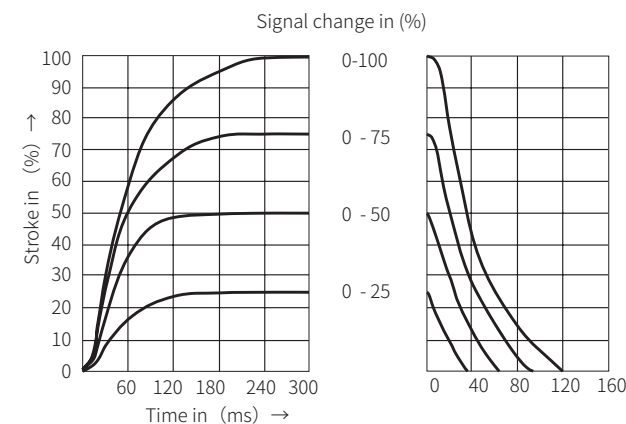


- 1 Command value=40 %
  - 2 Command value=50 %
  - 3 Command value=60 %
  - 4 Command value=70 %
  - 5 Command value=80 %
  - 6 Command value=90 %
  - 7 Command value=100 %
- If the power limit of the valve is exceeded,  
the movement of the spool will become unstable

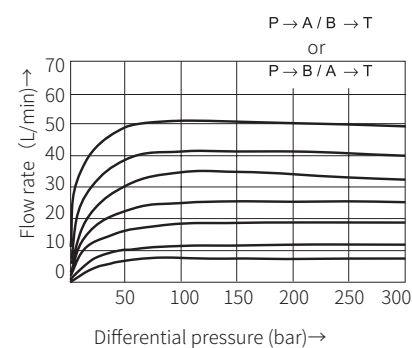
## Characteristic curve

Size 10 (measured when using HLP46,  $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

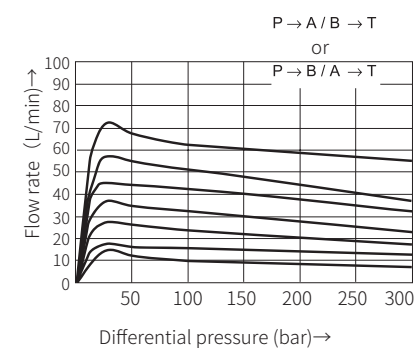
Transition performance of the valve when the input signal is a step signal



Power limit with a nominal flow rate of 30L/min



Power limit with a nominal flow rate of 60L/min



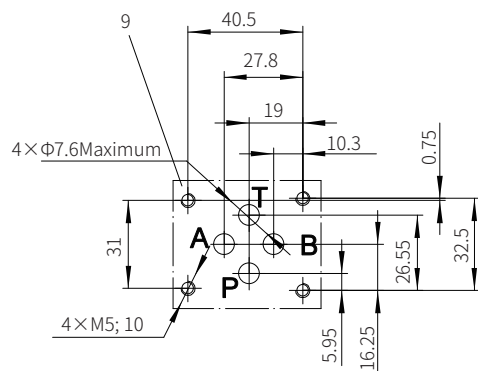
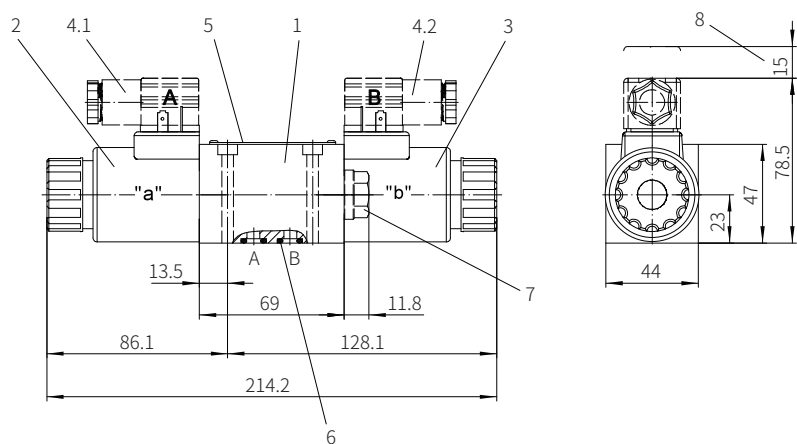
- 1 Command value=40 %
- 2 Command value=50 %
- 3 Command value=60 %
- 4 Command value=70 %
- 5 Command value=80 %
- 6 Command value=90 %
- 7 Command value=100 %

If the power limit of the valve is exceeded,  
the movement of the spool will become unstable

## Component size

Size unit: mm

Model 4WRA6...-2XJ/...



Required surface finishing of mating components

Valve fixing screw

M5x50-10.9 grade GB/T70.1-2000

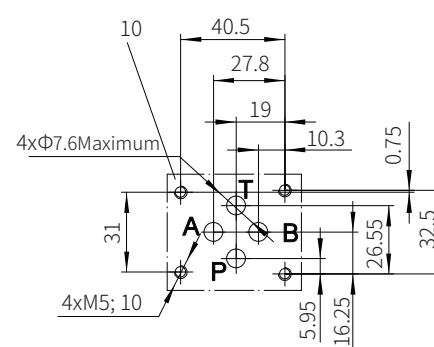
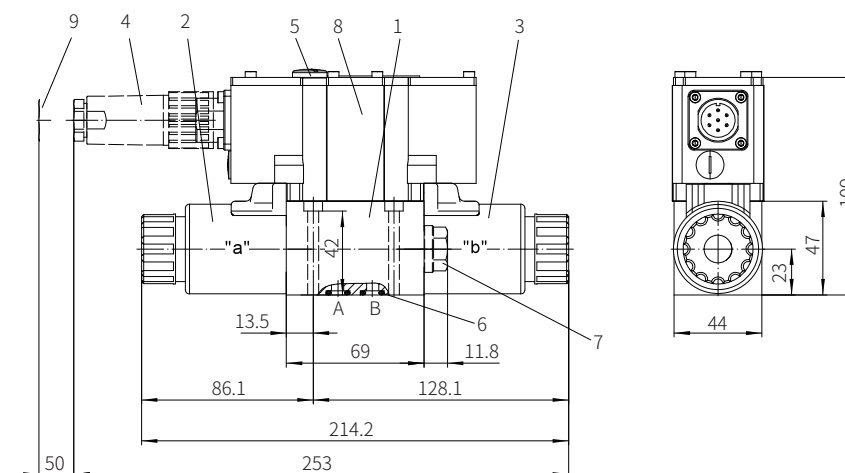
Tightening torque  $M_s = 7.8 \text{ Nm}$

- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Grey plug "A"
- 4.2 Black plug "B"
- 5 Name plate
- 6 O-ring 9.25x1.78 (for oil port P, A, B, T)
- 7 Plug for valve with one solenoid
- 8 (Two-position valve, symbol EA or WA)
- 8 Space required to remove the plug
- 9 Valve connection surface

## Component size

Size unit: mm

Model 4WRAE6...-2XJ/...



Required surface finishing of mating components

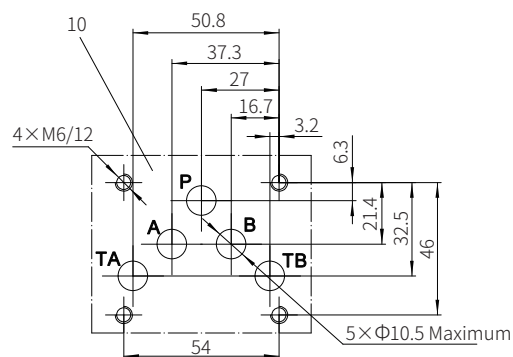
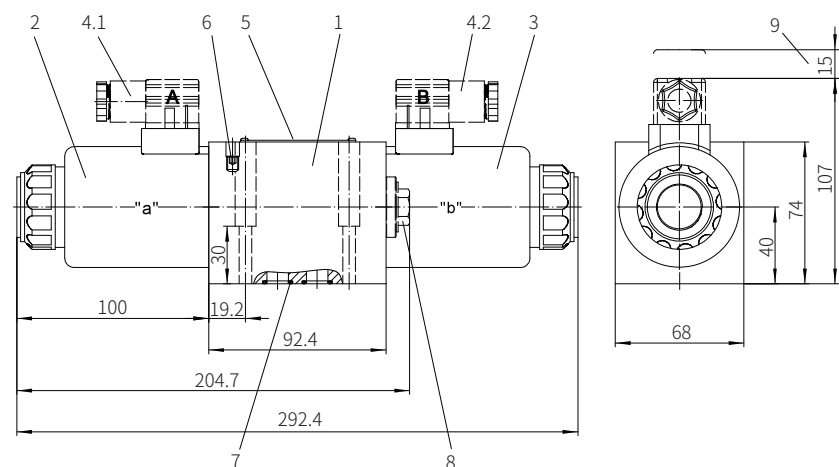
Valve fixing screw  
M5x50-10.9 grade GB/T70.1-2000  
Tightening torque  $M_A=7.8\text{Nm}$

- 1 Valve body
- 2 Proportional solenoid “a”
- 3 Proportional solenoid “b”
- 4 Plug
- 5 Name plate
- 6 O-ring 9.25x1.78 (for oil port P, A, B, T)
- 7 Plug for valve with one solenoid
- 8 Two-position valve, symbol EA or WA
- 9 Valve connection surface

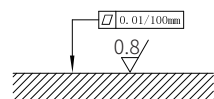
## Component size

Size unit: mm

Model 4WRA10...-2XJ/...



- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Grey plug "A"
- 4.2 Black plug "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 O-ring 12x12 (for oil port P, A, B, T)
- 8 Plug for valve with one solenoid (Two-position valve, symbol EA or WA)
- 9 Space required to remove the plug
- 10 Valve connection surface



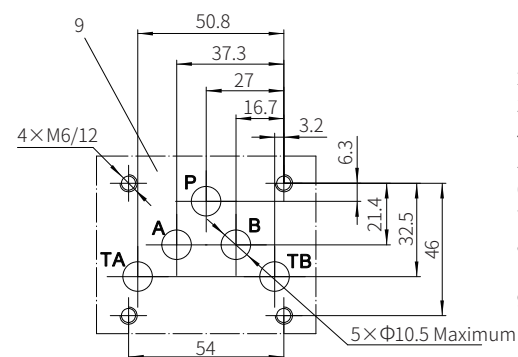
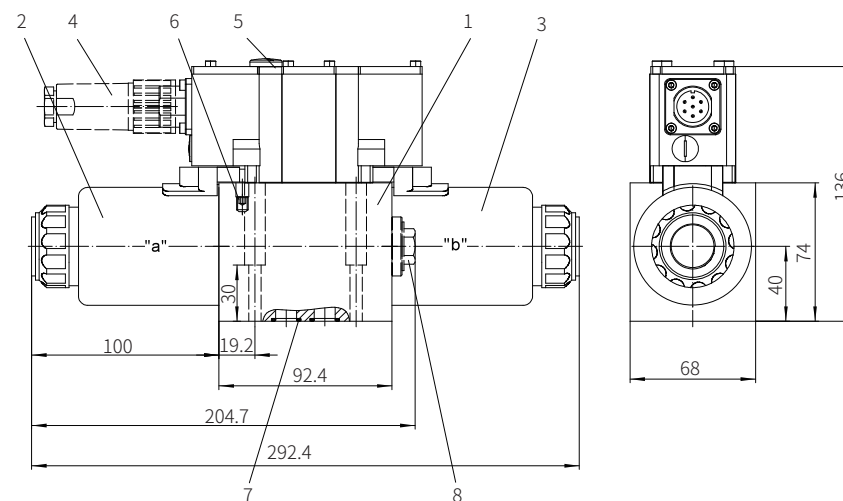
Required surface finishing of mating components

Valve fixing screw  
 M6x40-10.9 grade GB/T70.1-2000  
 Tightening torque  $M_A=13.7\text{Nm}$

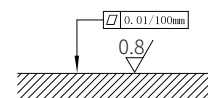
## Component size

Size unit: mm

Model 4WRAE10...-2XJ/...



- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Plug
- 5 Name plate
- 6 Valve bleed screw
- 7 O-ring 12x12 (for oil port P, A, B, T)
- 8 Plug for valve with one solenoid (Two-position valve, symbol EA or WA)
- 9 Valve connection surface



Required surface finishing of mating components

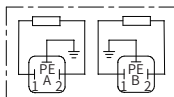
Valve fixing screw  
 M6x40-10.9 grade GB/T70.1-2000  
 Tightening torque  $M_A=13.7\text{Nm}$

## Electrical connections

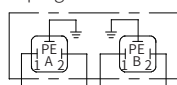
Model 4WRA...2XJ/...(Without built-in amplifier)

Component plug connection form

The plug-in connector to DINEN 175301-803 or ISO4400

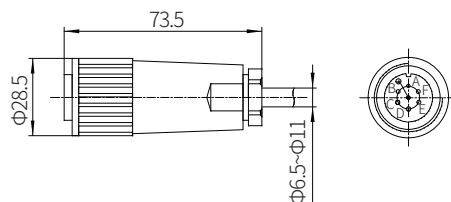


Component plug connection form



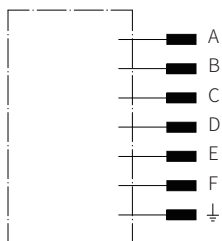
Model 4WRAE...2XJ/...(With built-in amplifier)

The plug-in connector to DINEN 175201-804



Model 4WRAE...(With built-in amplifier)

Terminal identification of plugs



Terminal identification	contact	A1 signal	F1 signal
Supply voltage	A	24VDC(19~35V)	
	B	GND	
	C	no connection <sup>1)</sup>	
Differential amplifier input	D	$\pm 10V$ , $R_e > 50K \Omega$	$4 \sim 20mA$ , $R_e > 100 \Omega$
	E	Reference potential	
	F	no connection <sup>1)</sup>	

Command value:

A positive command value 0 to +10V (or 12 to 20mA) at D and E causes a flow from P to A and B to T.

A negative command value 0 to -10V (or 12 to 4mA) at D and E causes a flow from P to B and A to T.

For valves only with one solenoid in side "A" (symbols EA and WA), a positive command value at D and E causes a flow from P to B and A to T.

Connecting cable:

Recommendation:

Cable length up to 25m, model LiYCY 5x0.75mm<sup>2</sup>

Cable length up to 50m, model LiYCY 5x1.0mm<sup>2</sup>

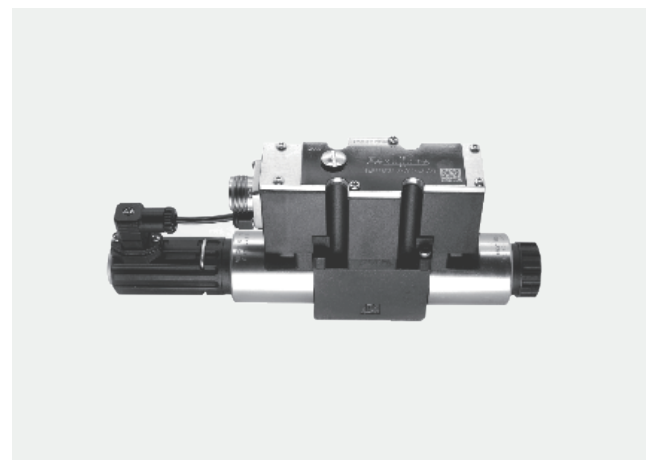
The external diameter of the cable is 6.5 to 11mm

The connection of screen to PE on the supply side only.

<sup>1)</sup> Contacts C and F are not allowed to be connected together.

## Proportional Directional Valve

Model: 4WRE(E)...2XJ



- ◆ Size 6 and 10
- ◆ Maximum working pressure 315 bar
- ◆ Maximum working flow 80 L/min (size 6)  
180 L/min (size 10)

## Contents

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Characteristic curve	06-11
Component size	12-15
Electrical connections	16-17

## Features

- proportional directional valve with direct operated proportional solenoid
- For subplate mounting
- Control the direction and flow
- Spring centred control spool
- Internal amplifier, current input A1 or F1, optional
- Operated by proportional solenoids with thread and detachable coil
- Both valves and proportional amplifiers from the same supplier