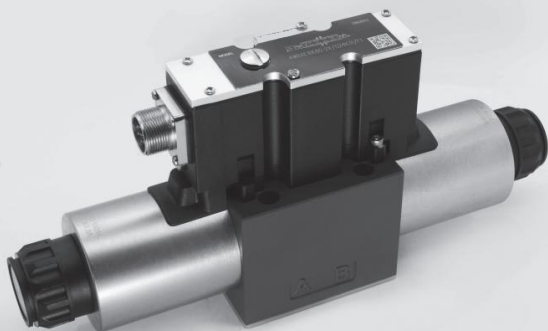


Proportional Directional Valve

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



- ◆ 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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Functional symbols	05
Technical parameters	05-06
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Component size	10-13
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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

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).

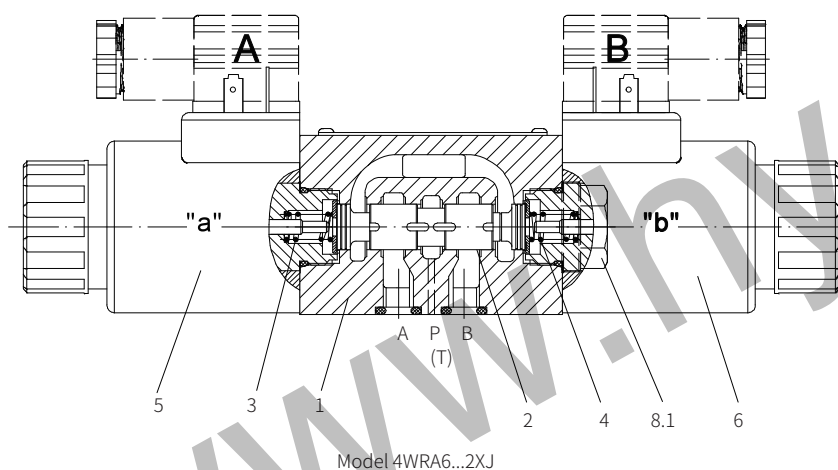
Structure:

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).



Function description, sectional drawing

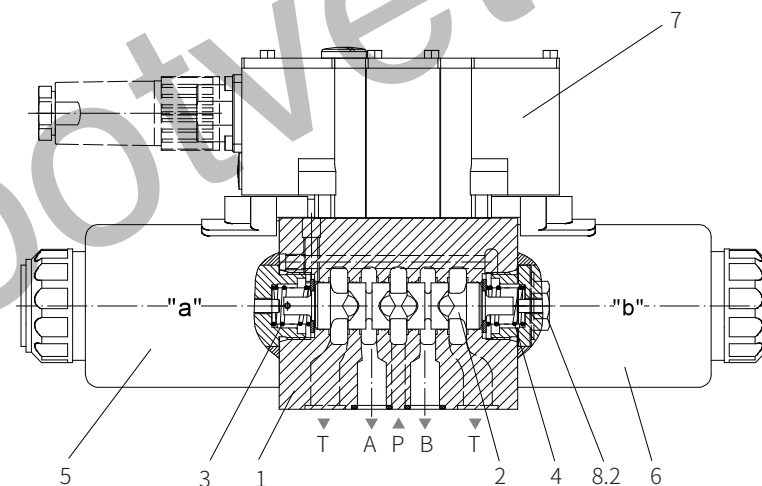
Two Position Valves:

(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

without amplifier =No code
with amplifier =E

size 6 =6
size 10 =10

symbols

with symbols E1— and W1—:
P→A: q_{vmax} B→T: $q_v/2$
P→B: $q_v/2$ A→T: q_{vmax}

note:
For spools W and WA, when in neutral position, a connection from A to T and B to T with 3% around of the relevant nominal cross-section.

4WRA 2X G24 *

more information in text

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

electrical connection for 4WRAE
A1= command value input ± 10 V
F1= command value input 4 to 20mA
No code= for 4WRA

electrical connections
K4= for model 4WRA... without plug in connector
K31= for model 4WRAE... with plug-in connector

No code= no special protection

G24= 24V DC

2X= 20 to 29 series
(20 to 29 series installation and connection size unchanged)

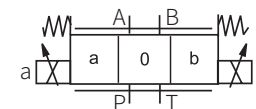
nominal flow rate at valve pressure difference $\Delta P=10$ bar

size 6
07= 7 L/min
15= 15 L/min
30= 26 L/min

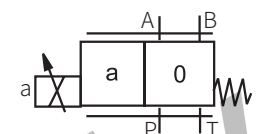
size 10
30= 30 L/min
60= 60 L/min

Functional symbols

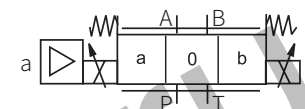
Without amplifier
Model 4WRA...



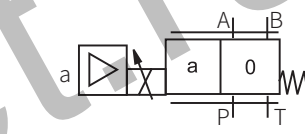
Model 4WRA...EA...; 4WRA...WA...



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		°C	
4WRA		-20 to +70	
temperature range		°C	
4WRAE		-20 to +50	
Weight		kg	
4WRA		2.0	
4WRAE		6.6	
		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	
Maximum permissible flow		L/min	
		42	
Pressure medium		75	
		Mineral oil (HL, HLP) ¹⁾ to DIN 51524; Biology can quickly decompose Oil according to VDMA 24568; HETG (Rapeseed oil) ¹⁾ ; HEPG(Polyethyleneglycol) ²⁾ ; HEES (Synthetic Fats) ²⁾	
Oil temperature range		°C	
		-20 to +80 (preferably +40 to +50)	
Viscosity range		mm ² /S	
		20 to 380 (preferably 30 to 46)	
Cleanliness of oil ³⁾		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.

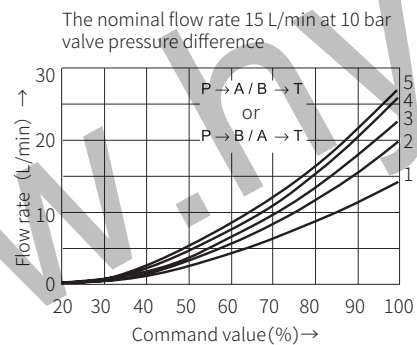
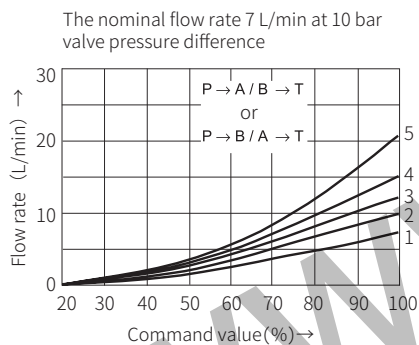
3) The oil must meet the cleanliness degree requested by the components in the hydraulic system. Effective oil filtration can prevent failure and increase the service life of the components.

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

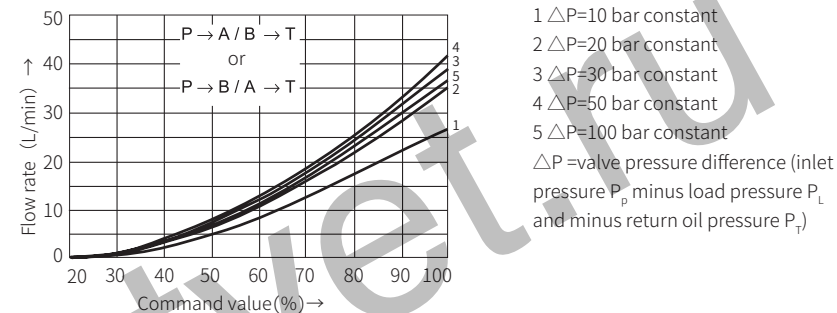


Characteristic curve

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

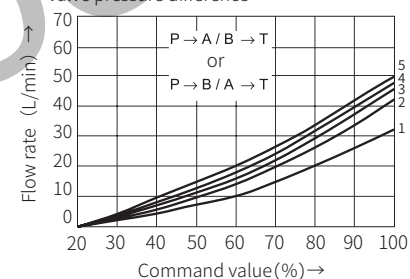
Size 6

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



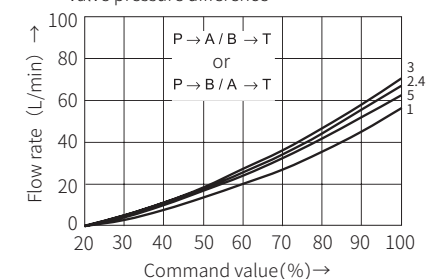
Size 10

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

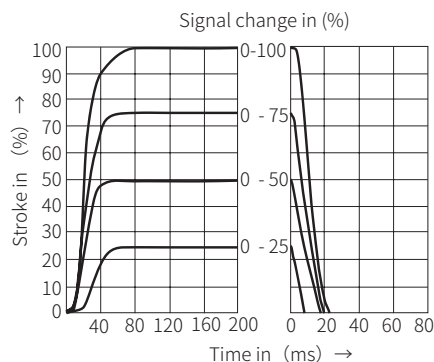


ΔP = valve pressure difference (inlet pressure P_p minus load pressure P_L and minus return oil pressure P_T)

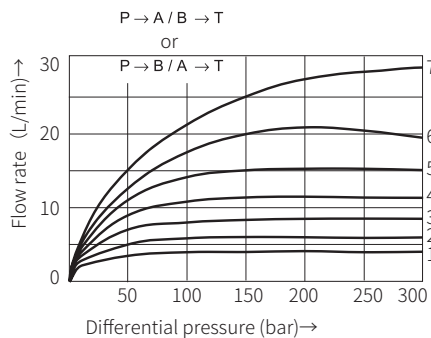
Characteristic curve

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

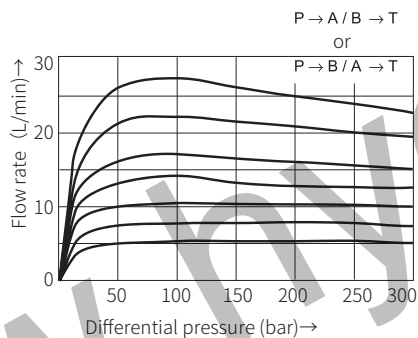
Transition performance of the valve when the input signal is a step signal



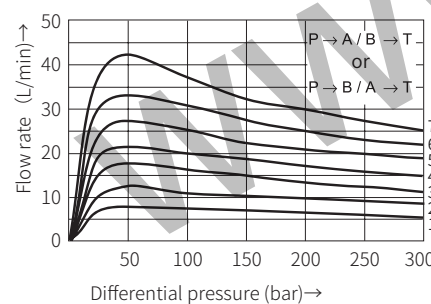
Power limit with a nominal flow rate of 7L/min



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



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

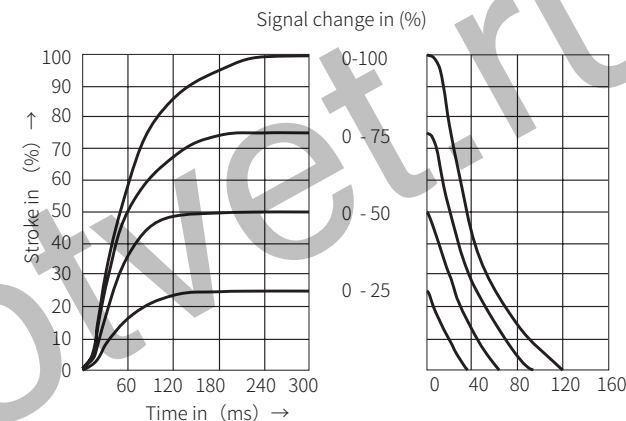


- 1 Command value=40 %
 - 2 Command value=50 %
 - 3 Command value=60 %
 - 4 Command value=70 %
 - 5 Command value=80 %
 - 6 Command value=90 %
 - 7 Command value=100 %
- If the power limit of the valve is exceeded,
the movement of the spool will become unstable

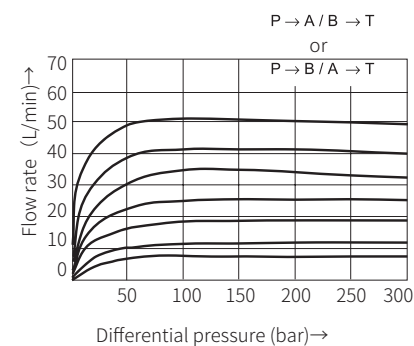
Characteristic curve

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

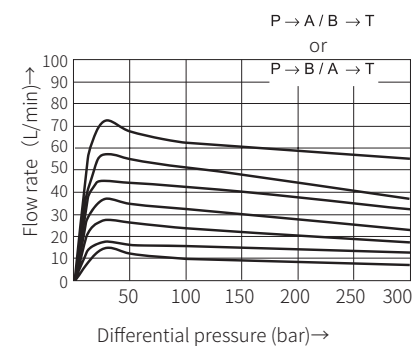
Transition performance of the valve when the input signal is a step signal



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



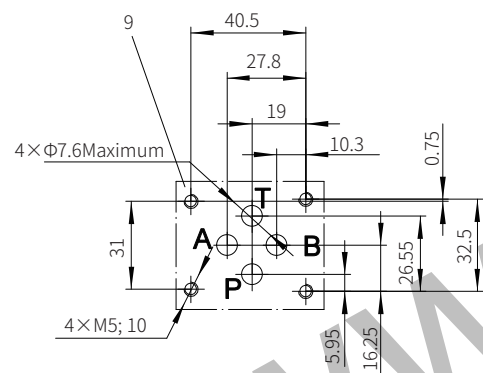
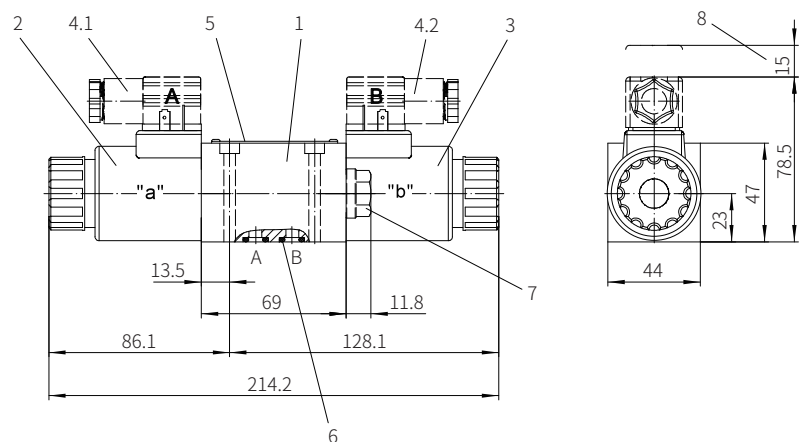
Power limit with a nominal flow rate of 60L/min



- 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

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

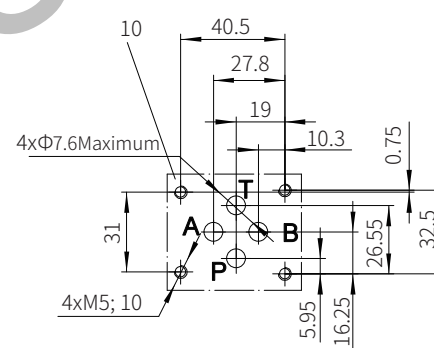
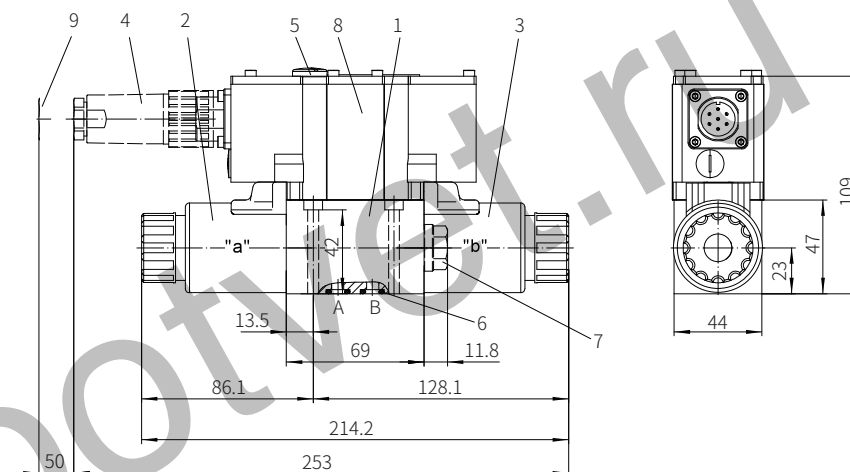




 Required surface finishing of mating components
 Valve fixing screw
 M5x50-10.9 grade GB/T70.1-2000
 Tightening torque $M_t = 7.8 \text{ Nm}$

- 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
(Two-position valve, symbol EA or WA)
- 8 Space required to remove the plug
- 9 Valve connection surface

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

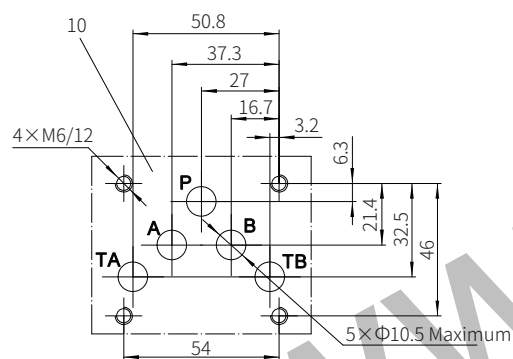
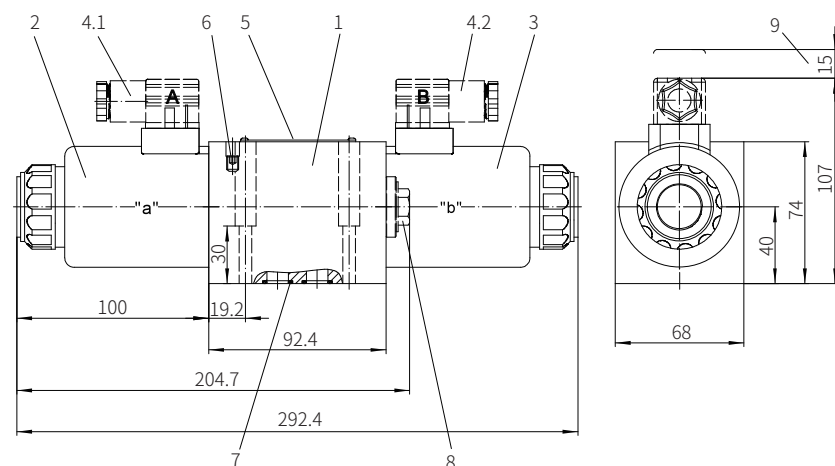


Required surface finishing of mating components

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
(Two-position valve, symbol EA or WA)
- 8 Space required to remove the plug
- 9 Valve connection surface

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



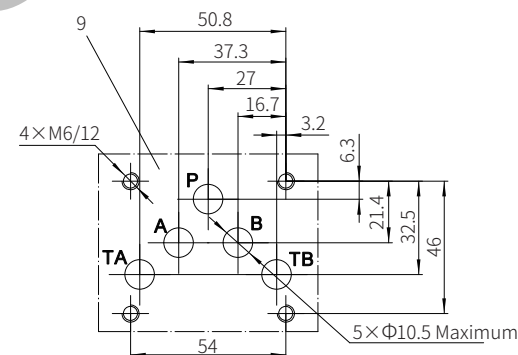
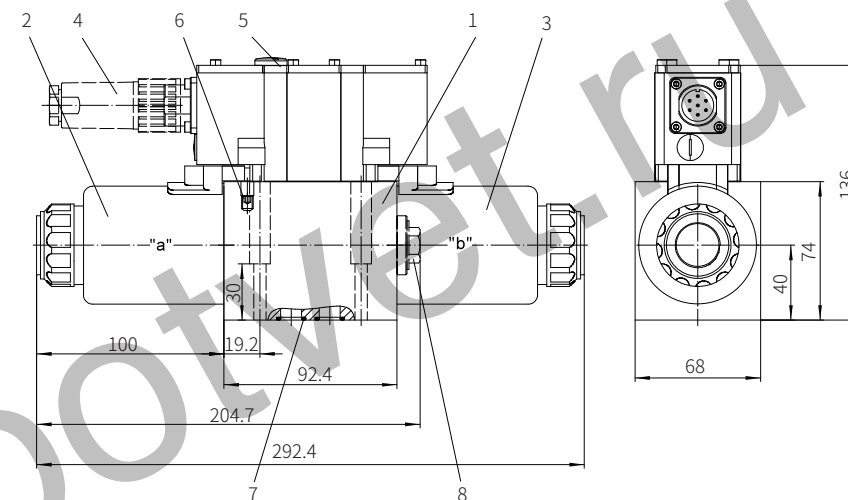
- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Grey plug "A"
- 4.2 Black plug "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 O-ring 12x12 (for oil port P, A, B, T)
- 8 Plug for valve with one solenoid
(Two-position valve, symbol EA or WA)
- 9 Space required to remove the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

Required surface finishing of mating components

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

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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 $M_A=13.7\text{Nm}$

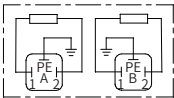
0669

Electrical connections

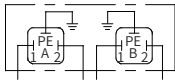
Model 4WRA...2XJ/...(Without built-in amplifier)

Component plug connection form

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

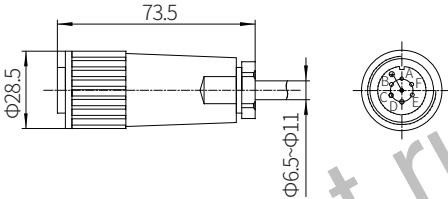


Component plug connection form



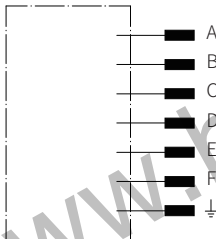
Model 4WRAE...2XJ/...(With built-in amplifier)

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 ¹⁾	
Differential amplifier input	D	$\pm 10V$, $Re>50K \Omega$	4~20mA, $Re>100 \Omega$
	E	Reference potential	
	F	no connection ¹⁾	

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 5x0.75mm²

Cable length up to 50m, model LiYCY 5x1.0mm²

The external diameter of the cable is 6.5 to 11mm

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

¹⁾ Contacts C and F are not allowed to be connected together.