

Proportional directional valve (WFWN 2X)



Specification

The 4/2-and 4/3-way directly operated

Proportional solenoid valves,

Spool with electrical position feedback.

Type	WFWN and WFWNE
Nominal sizes	6 and 10
Component Series	2X
Maximum Operating pressure	315 bar
Maximum Flow	80L/min DN 6 (DN6)
Maximum Flow	180L/min DN 10 (DN10)

Technical data (For application outside these parameters please consult with us)

Specification	WFWN	WFWNE
Installation position	optional, preferably horizontal	
Storage Temperature Range °C	-20~80	
Ambient Temperature Range °C	-20~70	-20~50

Tested under the condition of (P=100bar, Mineral oil HLP4+, 40C± 5C)

Operating Pressure (bar)		PortsA,B,P	315		
		Port T	100		
Nominal Flow q _{vnom} at Δp=10 bar	(L/min)	6DN	8	16	32
		10DN	25	50	75
Flow (Max. Permissible)	(L/min)	6DN	80		
		10DN	180		
Pressure fluid			Mineral oil (HL,HLP) to DIN 51524; For other fluid please consult with us.		
Fluid temp. Range			(°C) -20~80 (+ 40 ~ +50 is preference)		
Viscosity range			(mm²/s) 20~380 (30~ 46 is preference)		
Hysteresis			(%) ≤ 0.1		
Reversal span			(%) ≤ 0.05		
Response sensitivity			(%) ≤ 0.05		
Zero displacement will vary in pressure oil temperature and working temperature.			%100 (K)	0.15	
			%100 (bar)	0.1	
Cleanliness	Maximum premissible degree of pressure fluid contamination to NAS 1638 to class 9 Recommended filter β ₁₀ ≥ 75.				

Electrical

Voltage Type		Direct Voltage	
WFWN	Voltage input "A1" (V)	±10	±10
Command signal	Current input "F1" (mA)	4~20	4~20
Max. current per solenoid (A)		2.5	2.5
Solenoid coil Resistance (Ω)	cold value at 20°C	6DN2.7	10DN3.7
	Max. warm value	6DN4.05	10DN5.55
Duty cycle (%)		100	
Max.Coil temperature ²⁾ (°C)		up to 150	
Electrical connection	socket as per DIN EN 175 301-803 and ISO 4400 with component plug to DIN EN 175301-803 and ISO 4400		socket as per DIN EN 43 563-AM6-3 with component plug to DIN 43 563-BF6-3/Pg11
Insulation of valve to DIN 40 050	IP 65		

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Control electronics

WFWN (type)		Analogue amplifier in Eurocard format ³⁾		Details refer to proportional amplifier	
		Digital amplifier in Eurocard format ³⁾		Details refer to proportional amplifier	
WFWN (type)		Analogue command value module		Integrated into the valves A1.4	
Supply Voltage	WFWN ¹⁾ WFWNE	Rated voltage	VDC	24	
		Lower limiting value	V	21/22	19.4
		Upper limiting value	V	35	
Amplifier current consumption		/ max	A	2	2
		Max. impulse current	A	3	3

1) With WINMAN control amplifier. 2) Due to the occurring surface temperature of the solenoid coils, the European Standards DIN EN 563 and DIN EN 982. 3) separate order.

Model description

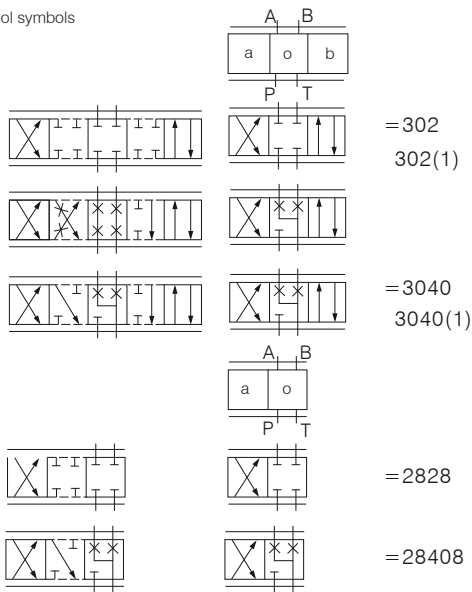
Proportional directional valve

No code Without integrated electronics
N With integrated electronics

Spool with displacement sensor

02 DN 6
03 DN 10

Spool symbols



With spool symbols : 302(1) and 3040(1)

P → A: q_{vmax} B → T: $q_{vmax}/2$

P → B: $q_{vmax}/2$ A → T: q_{vmax}

Note:

With spools 3040 and 2840B, in the neutral position, there is a connection from A to T and B to T with approx. 3 % of the relevant nominal cross section.

WFW — * — E — * — * — * — 2X — G24 — * — * — * — *

Further details in clear text

Omit NBR seal
V FPM seals suitable for mineral oil
Hydraulic oil
(HL, HLP) as per Din 51 524

No code WFW (type)
WFWN (type)
A1 Command value input $\pm 10V$
F1 Command value input 4~20mA

Electrical connection
WFW (type)

²⁾K4 with plug component DIN EN 175301-803

WFWN (type)

²⁾K31 with plug component DIN 43 650-AM2

2X = 24V 24 VDC

2X Component series 20 to 29 (20 to 29 unchanged installation and connection dimensions)

Nominal flow at valve differential pressure $\Delta p = 10$ bar

DN 6	
08	8 L/min
16	16 L/min
32	32 L/min
DN 10	
25	25 L/min
50	50 L/min
75	75 L/min

1. Other types of electrical protection on request

2. Only for Dn6 for version "3040" sea water resistant only state "K31" !

Proportional directional valve (WFWN 2X)

Model description

Directional Proportional valve without integrated electronics

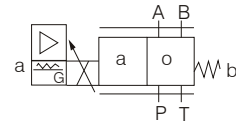
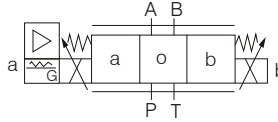
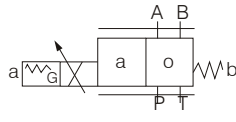
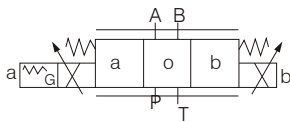
Directional Proportional valve with integrated electronics

Model WFWN...

Model WFWN...2828 (28408)

Model WFWNE...

Model WFWNE...2828 (28408)



Structure and function description, section

The 4/2-way and 4/3-way proportional directional valves are designed as direct-operated components for subplate mounting. They are actuated by means of proportional solenoid with central removable coil. The solenoid are controlled either by external control electronics (type WFWN) or integrated control electronics (type WFWNE)

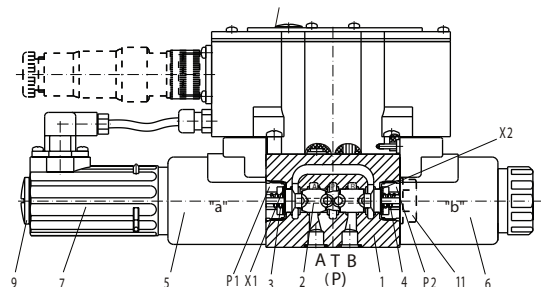
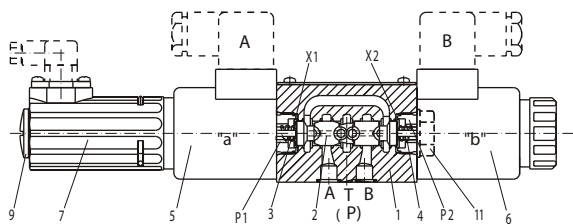
Design:

The valves basically consist of:

- Body (1) with mounting surface
- Control spool (2) with compression springs (3 and 4)
- Solenoids (5 and 6) with central coil
- Optional integrated electronics (7)
- integrated amplifier(8) available
- mechanical zero adjust via (9)
- WFWNW electro zero adjust via (10)

Function:

- When solenoids (5 and 6) do not work, the control spool (2) is held in the central position by compression springs (3 and 4)
- Direct actuation of the control spool (2) by energising a proportional solenoid E.g. When the solenoid "b" power is on (6) The control spool (2) is moved to the left in proportion to the electrical input signal connection from P to A and B to T via orifice-like crosssections with progressive flow characteristics
- When the solenoid power is off (6) The control spool (2) is returned to the central position by compression spring (3)



Valve with 2 spool positions:

In theory, the function of this valve is the same to the valve with 3 positions. However, the valves with 2 positions are only fitted with solenoid " 5 ". Instead of the 2nd proportional solenoid a plug (11) is fitted with a cover for DN 6 or for DN 10 (11).

Note for type WFW-02 2X/ :

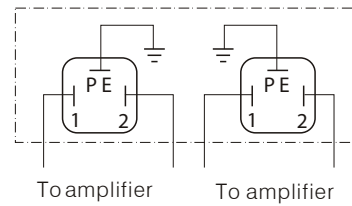
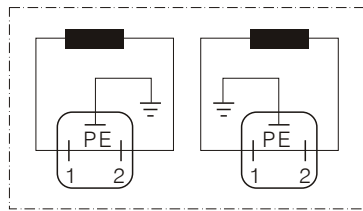
Draining of tank line is to be avoided. With the appropriate installation conditions, a back pressure valve is to be installed (back pressure approx. 2 bar).

Proportional directional valve (WFWN 2X)

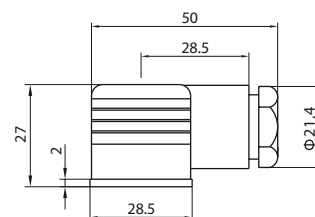
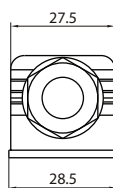
Electrical connection, plug-in connectors

WFWN type (Without integrated electronics not for version "J"= sea water resistant)

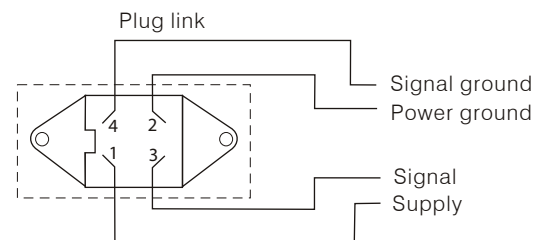
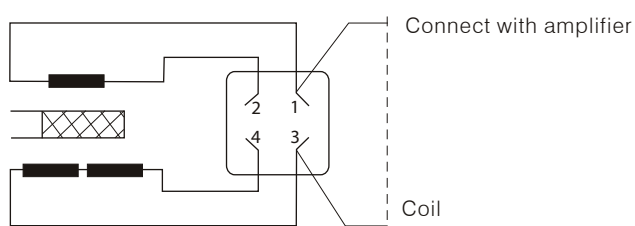
Plug-in connector: CECC 75 301-803-A002FA-H3D08-G/DIN EN 175 301-803 (and) ISO 4400



Outlook size of plug-in connector



Inductive position transducer

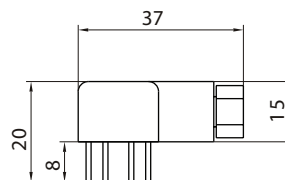
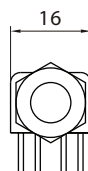


Mating connector 4-role
connector cable

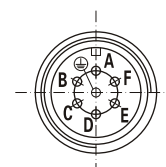
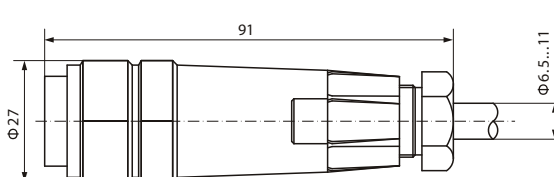
Suggestion: the length of the wire is expected to be 50 meters, type LiYCY 4*0.25mm²

Connect shield to PE only on the supply side.

Outlook size of plug-in connector



Plug-in connector: the plug-in connector should be met with the standard: DIN EN 175 201-804



Proportional directional valve (WFWN 2X)

Pin allocation of the component plug

	Plug-in connector	A1 Connector type A1	Connector type F1
Supply	A	24VDC ($u(t) = 19.4 \sim 35V$); $i_{max} = 2A$	
Voltage	B	0V	
Reference potential (actual value)	C	Link to F; $R_e > 50 K \Omega$	Link to F; $R_e 50 K < 10 \Omega$
Differential amplifier input	D	Com. value $\pm 10V$; $R_e > 50 K \Omega$	Com. Value 4...20mA; $R_e > 100 \Omega$
	E	Reference potential set value	
Measuring the output (actual value)	F	Actual value $\pm 10V$, (Current limiter 5mA)	
	PE	Link to the valve body and low-temperature subjects	

Com. value : Positive command value (0 to 10 V or 12 to 20 mA) at D and reference potential to E causes flow from P to A and B to T. Negative command value (0 to 10 V or 12 to 4 mA) at D and reference potential to E causes flow from P to B and A to T. For valves with a solenoid on side a (spool variants EA and WA) a positive command value at D and reference potential to E (NS 6: 4 to 20 mA and NS 10: 12 to 20 mA) causes flow from P to B and A to T.

Actual value : The actual value (0~10V or 12mA) on the F.C enables the connection from port P to port A.

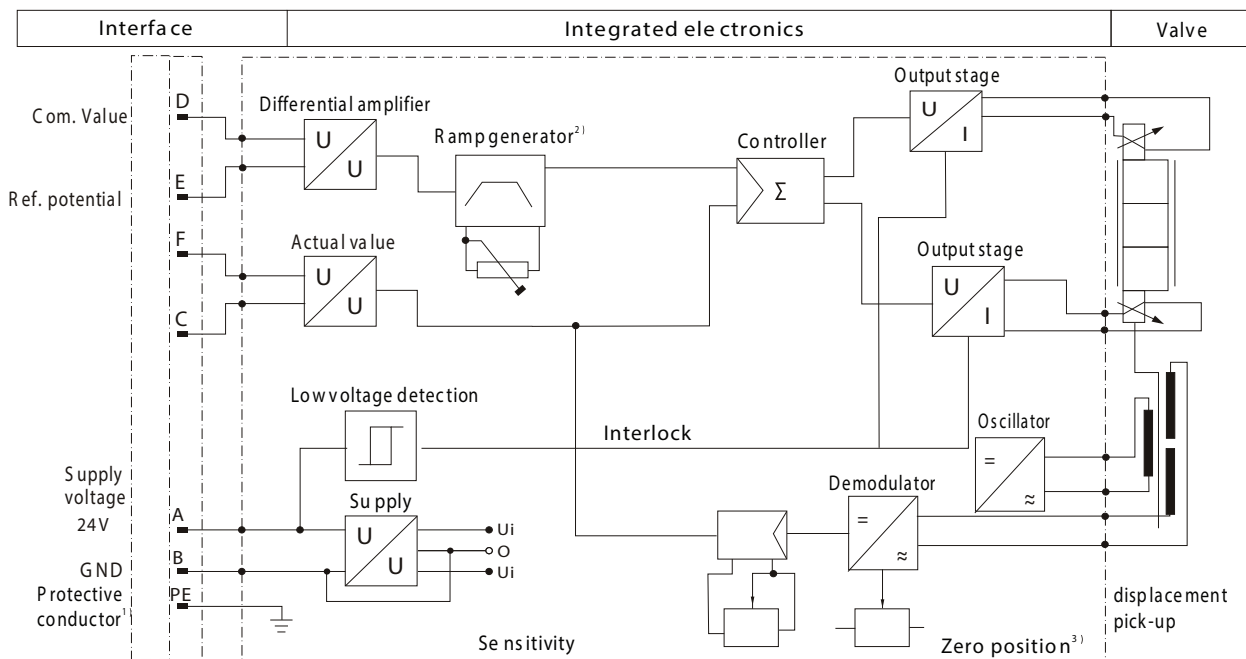
Connection cable : Recommendation:

-up to 25 m cable length type LiYCY 5 x 0.75 mm²

-up to 50 m cable length type LiYCY 5 x 1.0 mm² External diameter 6.5 to 11 mm

Connect screen to PE only on the supply side

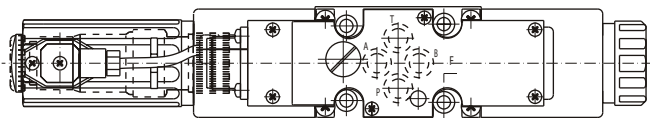
Block circuit diagram / connection allocation



Introductions :

The electrical signal launched from controlled amplifier (e.g.actual value) must not be used for the safety protection of the switch device.

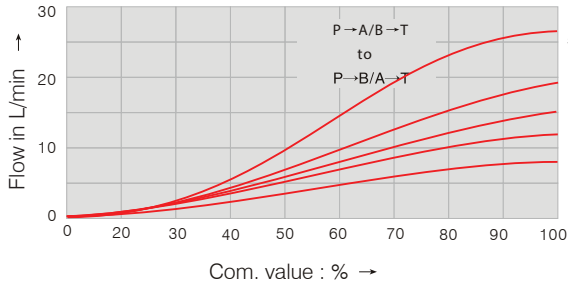
- 1.Contacts PE should be linked to the low-temperature subject and valve body.
- 2.Ramp time could be adjustable within the scope 0~02.5s outside, as well as T_{up} and T_{down} .
- 3.Zero point outside is adjustable.
- 4.output end is the current output
- 5.Zero point can be set from the outside



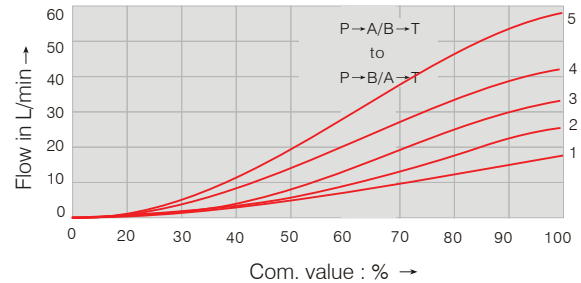
Proportional directional valve (WFWN 2X)

Characteristic curves (measured with HLP46, Coil = $40 \pm 5^\circ\text{C}$)DN6

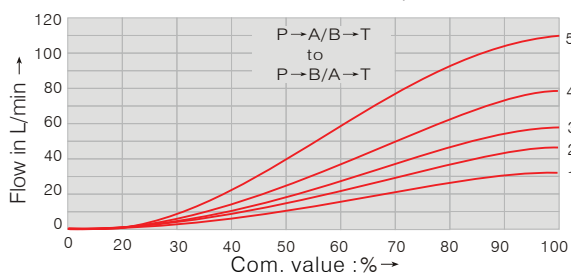
8 l/min nominal flow at differential pressure 10 bar



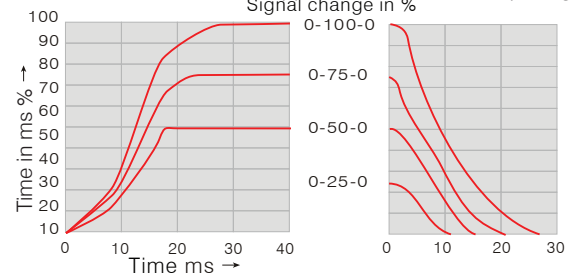
16 l/min nominal flow at differential pressure 10 bar



32 l/min nominal flow at differential pressure 10 bar



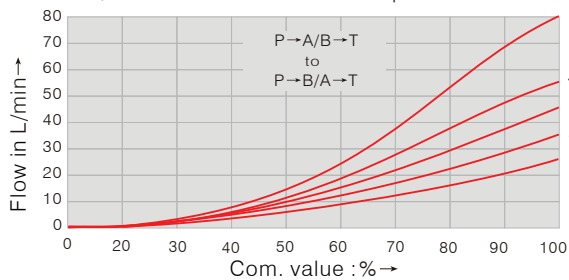
Transient function with stepped form of electrical input signal



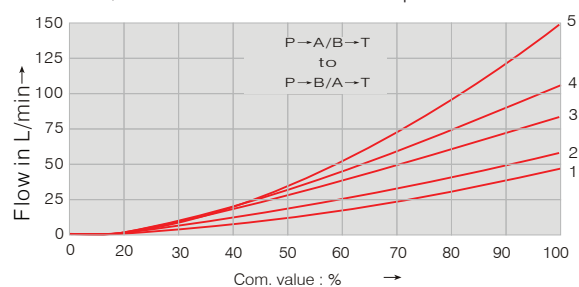
- | | | |
|----------------------|----------|---|
| 1 $\Delta p=10$ bar | Constant | Δp =Valve pressure differential
(inlet pressure P_p minus load
pressure P_L and minus return pressure P_T) |
| 2 $\Delta p=20$ bar | Constant | |
| 3 $\Delta p=30$ bar | Constant | |
| 4 $\Delta p=50$ bar | Constant | |
| 5 $\Delta p=100$ bar | Constant | |

Characteristic curves (measured with HLP46, Coil = $40 \pm 5^\circ\text{C}$)DN10

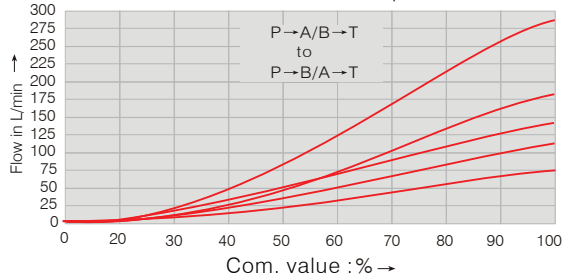
25 l/min nominal flow at differential pressure 10 bar



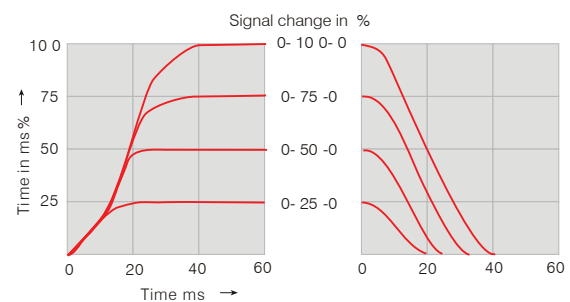
50 l/min nominal flow at differential pressure 10 bar



75 l/min nominal flow at differential pressure 10 bar



Transient function with stepped form of electrical input signal

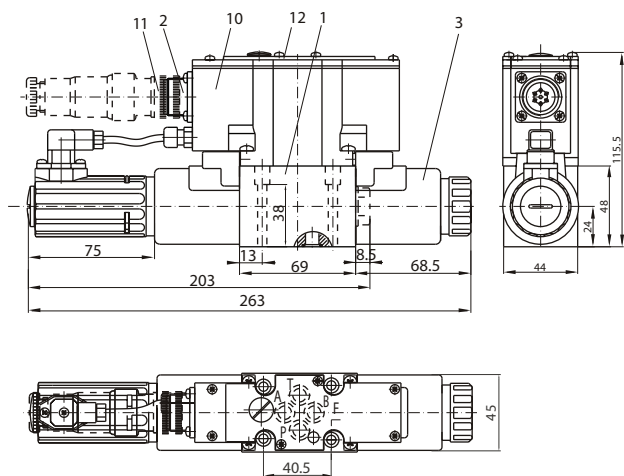


- | | | |
|----------------------|----------|---|
| 1 $\Delta p=10$ bar | Constant | Δp =Valve pressure differential
(inlet pressure P_p minus load
pressure P_L and minus return pressure P_T) |
| 2 $\Delta p=20$ bar | Constant | |
| 3 $\Delta p=30$ bar | Constant | |
| 4 $\Delta p=50$ bar | Constant | |
| 5 $\Delta p=100$ bar | Constant | |

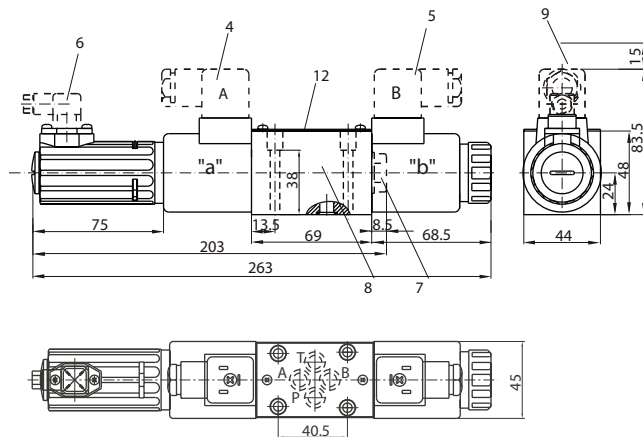
Proportional directional valve (WFWN 2X)

Unit dimensions

WFWNE-02



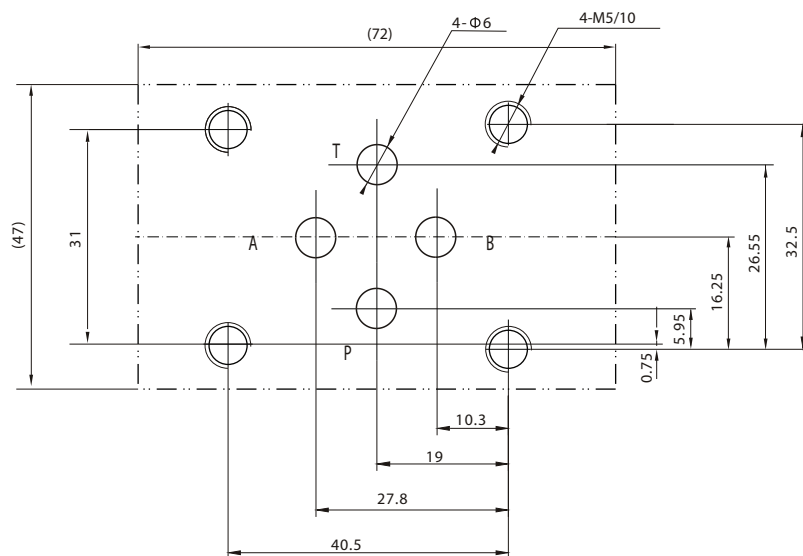
WFWE-02



- 1 Valve body
- 2 Proportional solenoid "a" with inductive displacement pick-up
- 3 Proportional solenoid "b"
- 4 Gary plu-in connector "A" according standard of DIN EN 175 301-803
- 5 Black plug in connector "B" according to the standard of DIN EN 175 301-803
- 6 Socket with inductive displacement pick-up
- 7 For single- solenoid- controlled valve end lover, spool type 2B2B or 2B40B

8. Identical seal ring 8.73*1.78(used for ports A,B,P,T)
- 9.Space for taking off the plug-in connector
10. Built-inamplifier
11. The socket corresponds with DIN EN 175 201-804
12. Nameplate
13. Machined valve mounting surface, Connection location to DIN 24 340A, ISO4401(and) CETOP-RP 121 H

Subplate Size



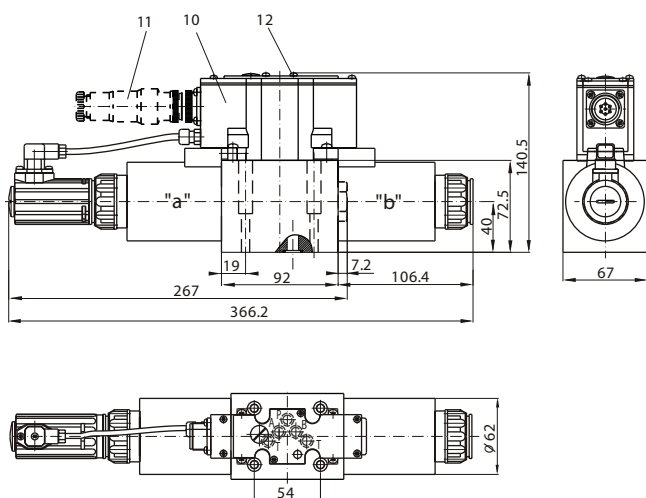
Subplates: G341/01(G1/4) G342/01(G3/8) G502/01(G1/2)
 Valve fixing screws: 4-M5x45 DIN 912-10.9; $M_s=8.9\text{Nm}$

The surface, connecting with the valve, should be
 Ra0.8 roughness, and 0.01/100mm flatness.

Proportional directional valve (WFWN 2X)

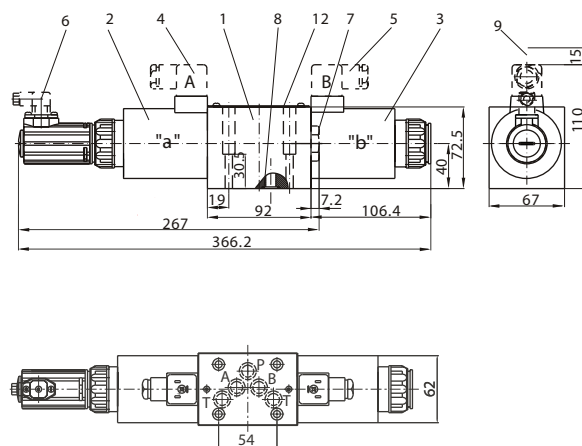
Unit dimensions

WFWNE-03



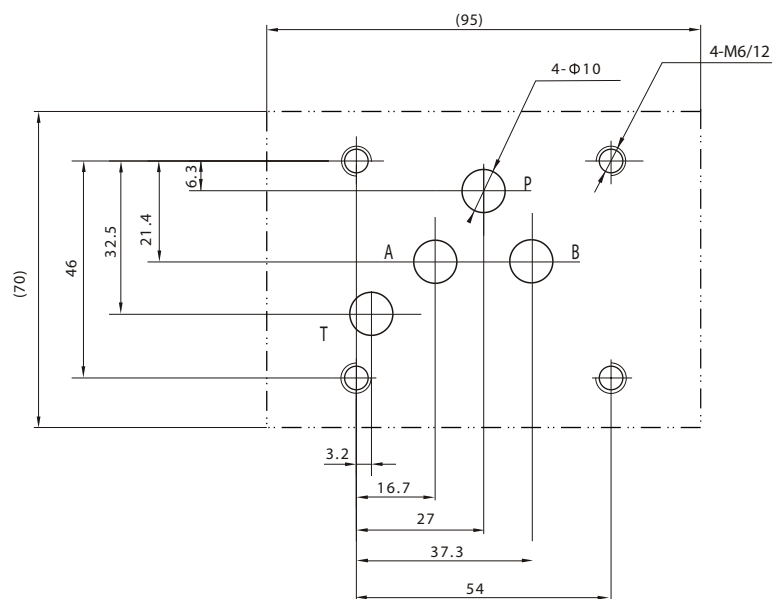
- 1 Valve body
- 2 Proportional solenoid "a" with inductive displacement pick up
- 3 Proportional solenoid "b"
- 4 Gray plu-in connector "A" according to the standard of DIN EN 175 301-803, place another order
- 5 Black plug-in connector "B" according to the standard of DIN EN 175 301-803, place another order
- 6 Socket with inductive displacement pick-up
- 7 For single-solenoid-controlled valve endlover, spool type 2B2B or 2B40B

WFWN-03



8. Identical seal ring 12*2(used for ports A,B,PT)
9. Space for taking off the plug-in connector
10. Built-in amplifier
11. The socket corresponds with DIN EN 175 201-804
12. Nameplate
13. Machined valve mounting surface, Connection location to DIN 24 340A ISO4401 (and) CETOP-RP 121 H

Subplate Size



Valve fixing screws: 4-M6x40 DIN9 12-10.9; $M_A=8.9\text{Nm}$

The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100mm flatness.