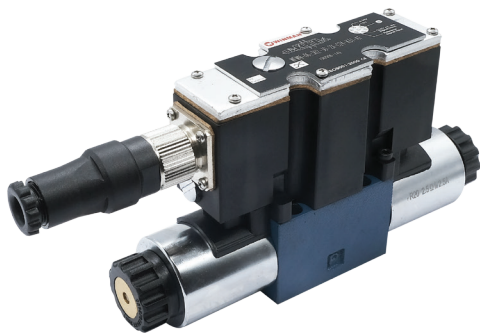


## Proportional directional valve (WFW-WFVN)



### Specification

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

Proportional solenoid valves

Direct operated spool without electrical position feedback

|                            |                 |
|----------------------------|-----------------|
| Type                       | WFW and WFVN    |
| Nominal sizes              | 6 and 10        |
| Series                     | 2X              |
| Maximum Operating pressure | 315 bar         |
| Maximum Flow               | 42L/min (DN 6)  |
| Maximum Flow               | 75L/min (DN 10) |

### Technical data

| Model                        | WFW                             | WFVN   |
|------------------------------|---------------------------------|--------|
| Installation position        | optional, preferably horizontal |        |
| Storage Temperature Range °C | -20~80                          |        |
| Ambient Temperature Range °C | -20~70                          | -20~50 |

Note :Please consult with us when the application needs higher requirement than the parameter shown below.

### Hydraulic

|                                                              |                                                                                                                             |                                |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Operating Pressure ( Bar)                                    | Ports A,B,P                                                                                                                 | 315                            |
|                                                              | Port T                                                                                                                      | 210                            |
| Nominal Flow (L/min)<br>When $q_{vnom}$ at $\Delta p=10$ bar | DN6                                                                                                                         | 7,15 and 26                    |
|                                                              | DN10                                                                                                                        | 30,60                          |
| Flow (Max. Permissible) (L/min)                              | DN6                                                                                                                         | 42 ( with double flow 40 ) 80  |
|                                                              | DN10                                                                                                                        | 75 ( with double flow 75 ) 140 |
| 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 ( mm <sup>2</sup> /s )                       | 20~380 ( 30~ 46 is preference)                                                                                              |                                |
| Hysteresis (%)                                               | ≤ 5                                                                                                                         |                                |
| Reversal span (%)                                            | ≤ 1                                                                                                                         |                                |
| Response sensitivity (%)                                     | ≤ 0.5                                                                                                                       |                                |
| Cleanliness                                                  | Maximum permissible degree of pressure fluid contamination to NAS 1638 to class 9 Recommended filter $\beta_{10} \geq 75$ . |                                |

### Electrical

| Model                                     | WFW <sup>1)</sup>                                                                                      | WFVN                                                                              |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Voltage Type                              | Direct Voltage                                                                                         |                                                                                   |
| WFVN                                      | Voltage input "A1" (V)                                                                                 | ±10                                                                               |
| Command signal                            | Current input "F1" (mA)                                                                                | 4~20                                                                              |
| Max. current per solenoid ( A )           | 2.5                                                                                                    | 2.5                                                                               |
| Solenoid coil Resistance ( Ω )            | cold value at 20°C                                                                                     | 6DN2                                                                              |
|                                           | cold value at 20°C                                                                                     | 6DN3                                                                              |
| Duty cycle ( % )                          | 100                                                                                                    |                                                                                   |
| Max.Coil temperature <sup>2)</sup> ( °C ) | up to150                                                                                               |                                                                                   |
| Electrical connection                     | socket as per DIN EN 175 301-803 and ISO 4400<br>with component plug to DIN EN 175301-803 and ISO 4400 | socket as per DIN EN 43 563-AM6-3<br>with component plug to DIN 43 563-BF6-3/Pg11 |
| Insulation of valve to DIN 40 050         | IP 65                                                                                                  |                                                                                   |

## Proportional directional valve (WFW-WFVN)

### Control electronics

|                               |                                                     |     |                                         |     |
|-------------------------------|-----------------------------------------------------|-----|-----------------------------------------|-----|
| WFW (type)                    | Analogue amplifier in Eurocard format <sup>3)</sup> |     | Details refer to proportional amplifier |     |
|                               | Digital amplifier in Eurocard format <sup>3)</sup>  |     | Details refer to proportional amplifier |     |
| WFVN (type)                   | Analogue command value module                       |     | Integrated into the valves              |     |
| Supply Voltage                | Nominal voltage                                     | VDC | 24                                      |     |
|                               | WFVN Lower limiting value                           | V   | 21/22                                   | 19  |
|                               | WFW <sup>1</sup> Upper limiting value               | V   | 35                                      |     |
| Amplifier current consumption | / max                                               | A   | 1.8                                     | 1.8 |
|                               | 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

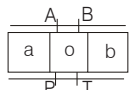
**WFW** — \* — \* — \* — \* — **2X** — **G24** — \* — \* — \* — \* — \*

Directional proportional valve

No code without integrated electronics  
N With integrated electronics

02 DN 6  
03 DN 10

Spool symbols



=302  
302(1)

=3040  
3040(1)

=2828

=28408

With spool symbols : 302(1) and 3040(1)  
 $P \rightarrow A: q_{vmax}$     $B \rightarrow T: q_{vmax}/2$   
 $P \rightarrow B: q_{vmax}/2$     $A \rightarrow T: q_{vmax}$

Note:  
 With spools 3040 and 28408, 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.

Further details in clear text

Omit Nitrile rubber sealing  
 V NBR seals suitable for mineral oil (HL, HLP) to DIN 51 524

No code      WFW( type)  
                   WFVN( type)

A1 Command value input  $\pm 10V$   
 F1 Command value input 4~20mA

Electrical connection For  
 WFW( type)  
<sup>2)</sup>K4 with plug component DIN EN 175301-803  
 See page 3  
 WFVN( type)  
<sup>2)</sup>K31 with plug component DIN 43 650-AM2  
 See page :4

Special protection  
 No code      Without special protection  
<sup>1)</sup>J      Seawater-resistant( only for DN6)

24V    24 VDC

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

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

|    |          |
|----|----------|
|    | DN 6     |
| 07 | 7 L/min  |
| 15 | 15 L/min |
| 30 | 26 L/min |
|    | DN 10    |
| 30 | 30 L/min |
| 60 | 60 L/min |

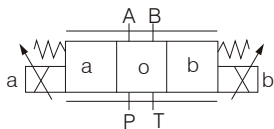
1. Other types of electrical protection on request

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

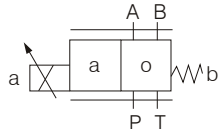
## Proportional directional valve (WFW-WFVN)

### Model description

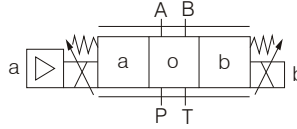
**Model WFW...**



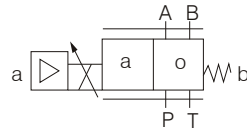
**Model WFW...2828 ( 28408 )**



**Model WFVN...**



**Model WFVN... 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 WFW) or integrated control electronics (type WFVN).

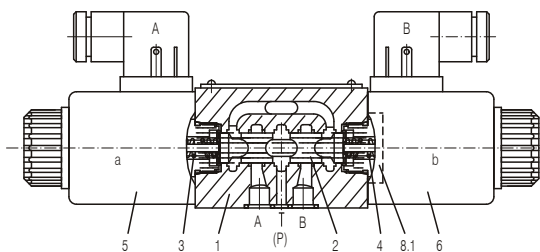
#### Design:

- 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)

#### Function:

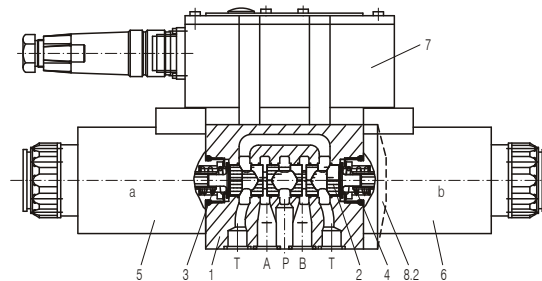
- When solenoids (5 and 6) do not work, the control spool (2) is held in the central position by compression springs (3 and 4)
- Direct actuation of the control spool (2) by energising a proportional solenoid E.g. When the solenoid "b" power is on (6)
- The control spool (2) is moved to the left in proportion 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)

**Model WFW-02...2x/...**



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 " ".  
 For DN6 valve, there is a plug (8.1) fixed in the second solenoid, but for DN10, it is a cover (8.2) instead.

**Model WFVN-03...2x/...**



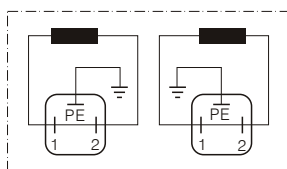
#### Note for type WFW-02 2X/ :

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).

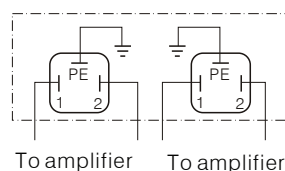
### Electrical connectio, plug-in connectors

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

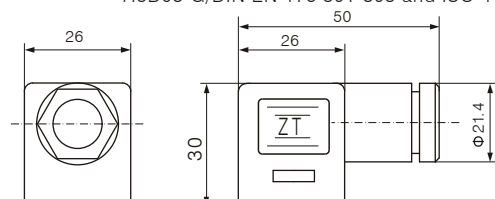
Connection on component plug



Connection on plug-in connector



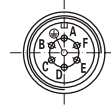
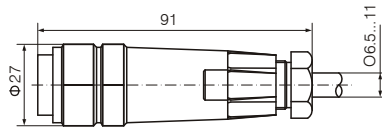
Plug-in connector: CECC 75 301-803-A002FA-H3D08-G/DIN EN 175 301-803 and ISO 4400



## Proportional directional valve (WFW-WFVN)

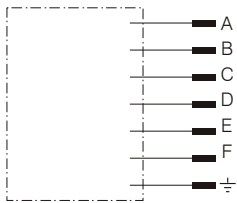
### Electrical connection, plug-in connectors

For type WFWN (with integrated electronics (OBE) and for version "J" = sea water-resistant) Plug-in connector see the block circuit diagram below



Plug-in connector:  
DIN 43 563-BF6-3/Pg11

Integrated electronics for type WFWN  
Pin allocation of the component plug



| WFW (type)                   | Contact | Signal                                                 |
|------------------------------|---------|--------------------------------------------------------|
| Supply voltage               | A       | 24VDC(19~35VDC)<br>GND                                 |
|                              | B       |                                                        |
|                              | C       | n.c. <sup>(1)</sup>                                    |
| Differential amplifier input | D       | Com. value ( $\pm 10V/4-20mA$ )<br>reference potential |
|                              | E       |                                                        |
|                              | F       | n.c. <sup>(1)</sup>                                    |

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 2B2B and 2B40B) 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.

Recommendation:

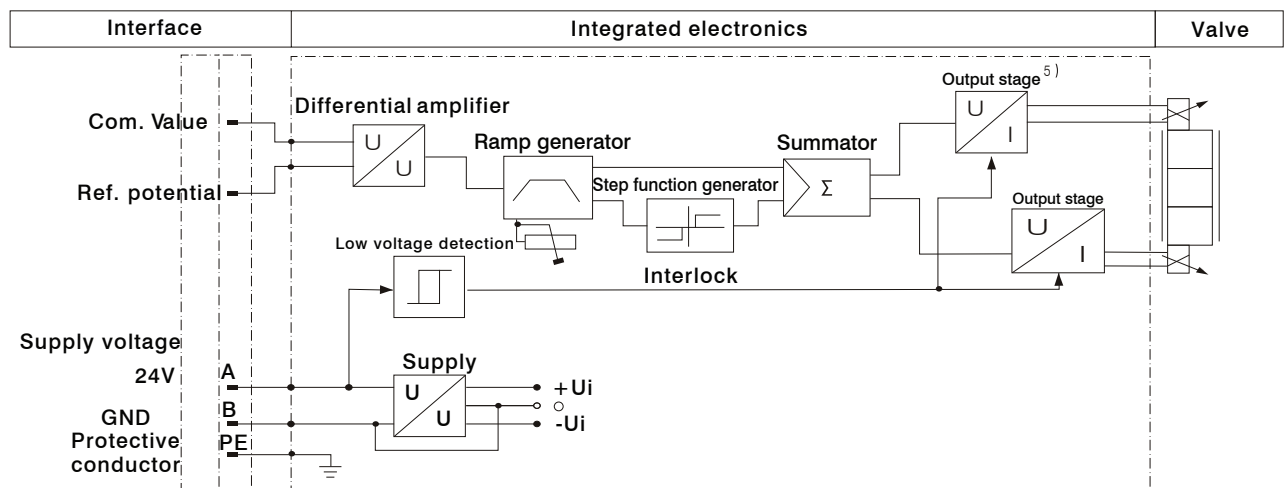
-up to 25 m cable length type LiYCY 5 x 0.75 mm<sup>2</sup>

-up to 50 m cable length type LiYCY 5 x 1.0 mm<sup>2</sup>

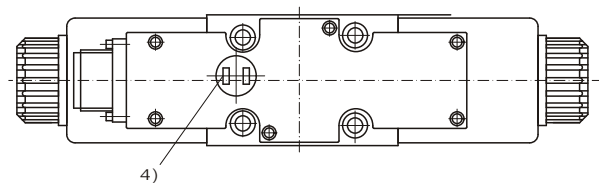
External diameter 6.5 to 11 mm

Connect screen to PE only on the supply side

### Block circuit diagram / connection allocation



- 1) Contacts C and F must not be connected!
- 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 2.5 s; the same applies for T<sub>up</sub> and T<sub>down</sub>
- 5) Output stages current regulated
- 6) Low voltage detection is not carried out for component type WFWN-03-2X

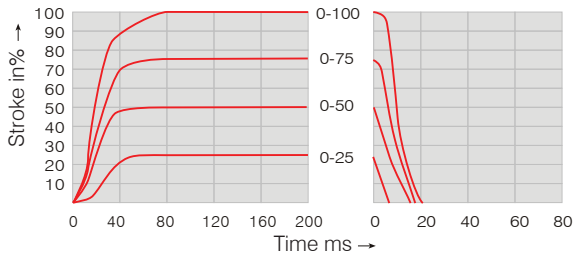


## Proportional directional valve (WFW-WFVN)

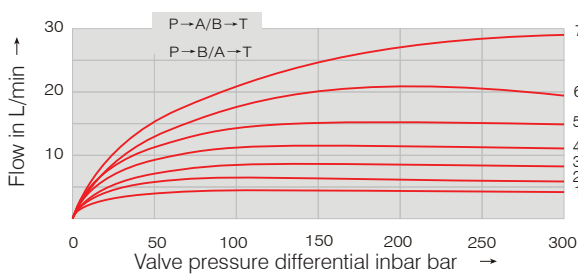
### Characteristic curves

6DN

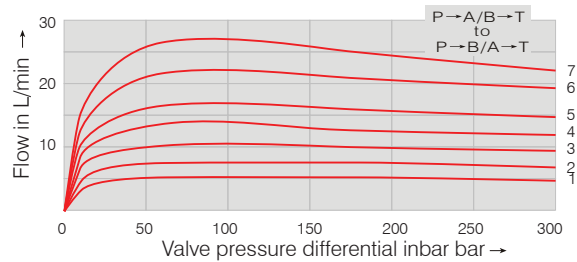
Transient functions with stepped form of electrical input signal  
Signal change in %



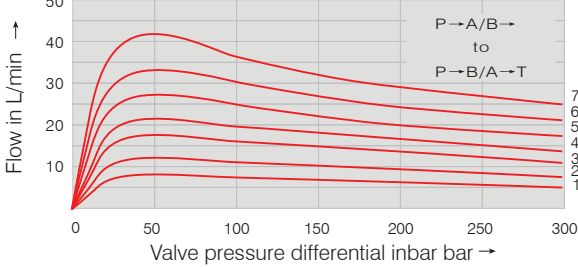
Performance limit, nominal flow 7 L/min



Performance limit, nominal flow 15 L/min



Performance limit, nominal flow 30 L/min

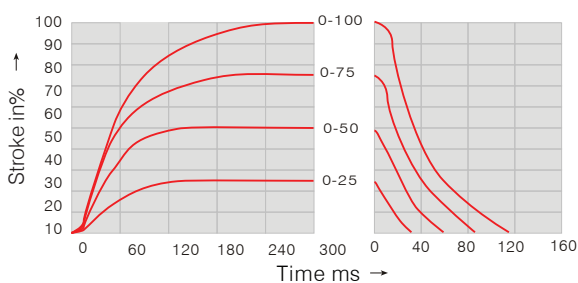


- 1 Com. Value=40%
- 2 Com. Value=50%
- 3 Com. Value=60%
- 4 Com. Value=70%
- 5 Com. Value=80%
- 6 Com. Value=90%
- 7 Com. Value=100%

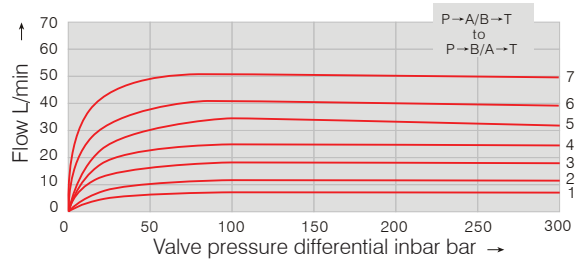
If the performance limits are exceeded, then the movement of spool will be unstable.

10DN

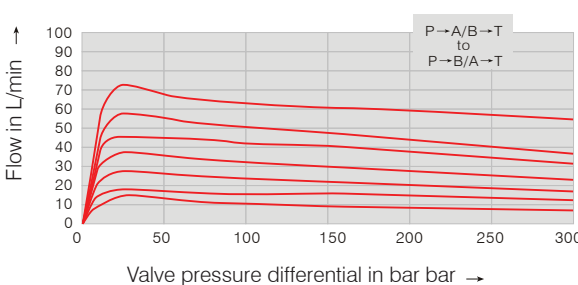
Transient functions with stepped form of electrical input signal  
Signal change in %



Performance limit, nominal flow 30 L/min



Performance limit, nominal flow 60 L/min



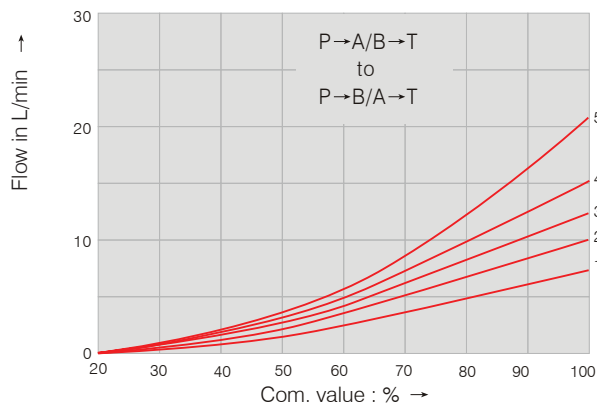
- 1 Com. Value=40%
- 2 Com. Value=50%
- 3 Com. Value=60%
- 4 Com. Value=70%
- 5 Com. Value=80%
- 6 Com. Value=90%
- 7 Com. Value=100%

If the performance limits are exceeded, then the movement of spool will be unstable.

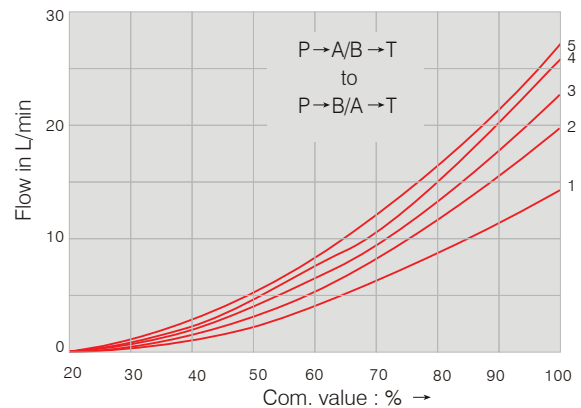
## Proportional directional valve (WFW-WFVN)

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

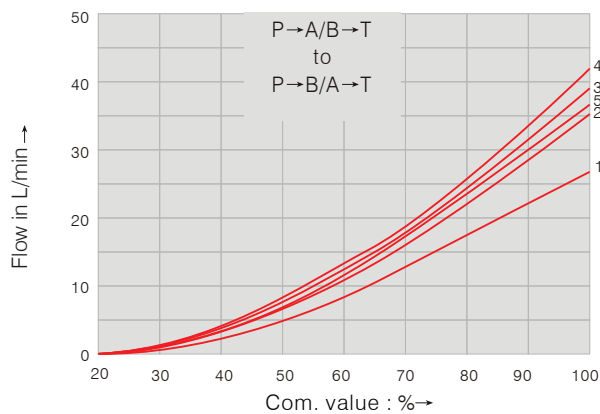
7 l/min nominal flow at differential pressure 10 bar



15 l/min nominal flow at differential pressure 10 bar



30 l/min nominal flow at differential pressure 10 bar

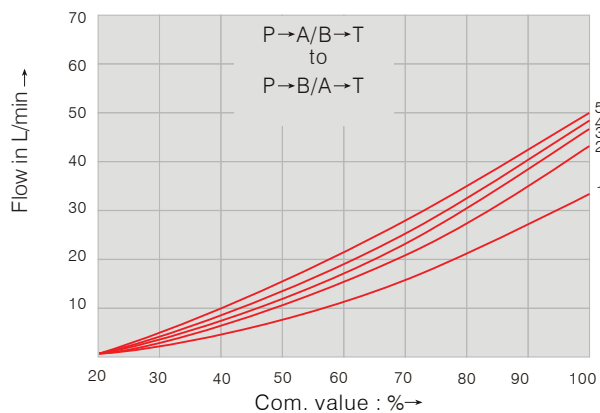


- 1  $\Delta p = 10$  bar Constant
- 2  $\Delta p = 20$  bar Constant
- 3  $\Delta p = 30$  bar Constant
- 4  $\Delta p = 50$  bar Constant
- 5  $\Delta p = 100$  bar Constant

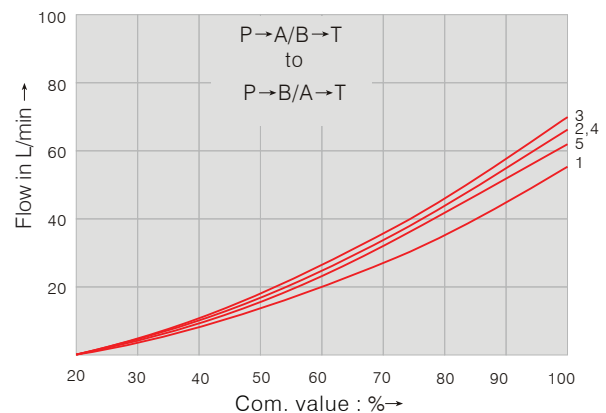
$\Delta p$  = Valve pressure differential  
(inlet pressure  $P_P$  minus load  
pressure  $P_L$  and minus return pressure  $P_T$ )

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

30 l/min nominal flow at differential pressure 10 bar



60 l/min nominal flow at differential pressure 10 bar



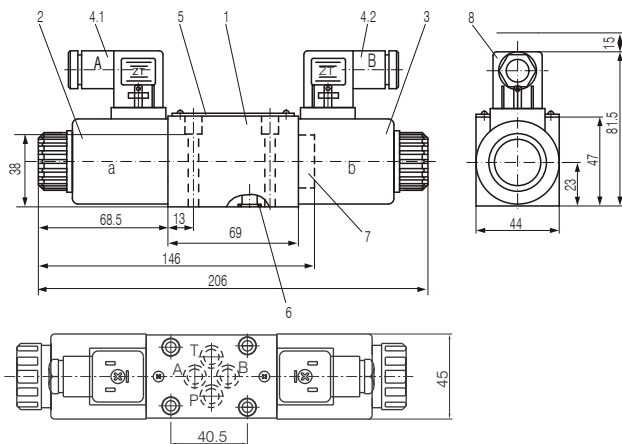
- 1  $\Delta p = 10$  bar Constant
- 2  $\Delta p = 20$  bar Constant
- 3  $\Delta p = 30$  bar Constant
- 4  $\Delta p = 50$  bar Constant
- 5  $\Delta p = 100$  bar Constant

$\Delta p$  = Valve pressure differential  
(inlet pressure  $P_P$  minus load  
pressure  $P_L$  and minus return pressure  $P_T$ )

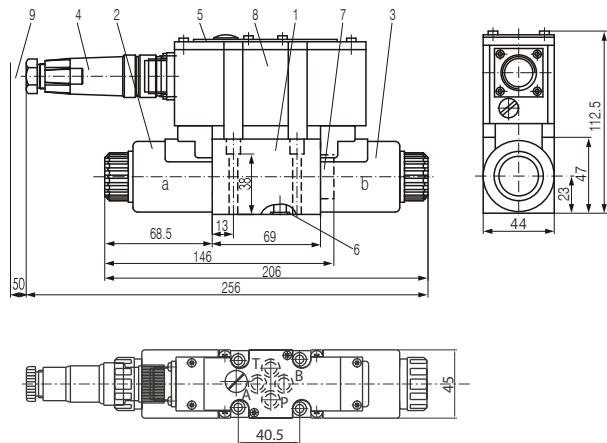
## Proportional directional valve (WFW-WFVN)

### Unit dimensions

**WFW-02 type**



**WFVN-02 .../... K31 ...V type**



- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 4.2 Plug-in connector, colour black, separate order
- 5 Nameplate
- 6 8.73 x 1.78 I seal rings for ports A, B, P and T
- 7 Plug for valves with one solenoid 2 positions spool type 2B2B or 2B40B)
- 8 Space required to remove the plug-in connector
- 9 Machined valve mounting surface, connection location to DIN 24 340A, ISO4401 (and) CETOP-RP 121 H

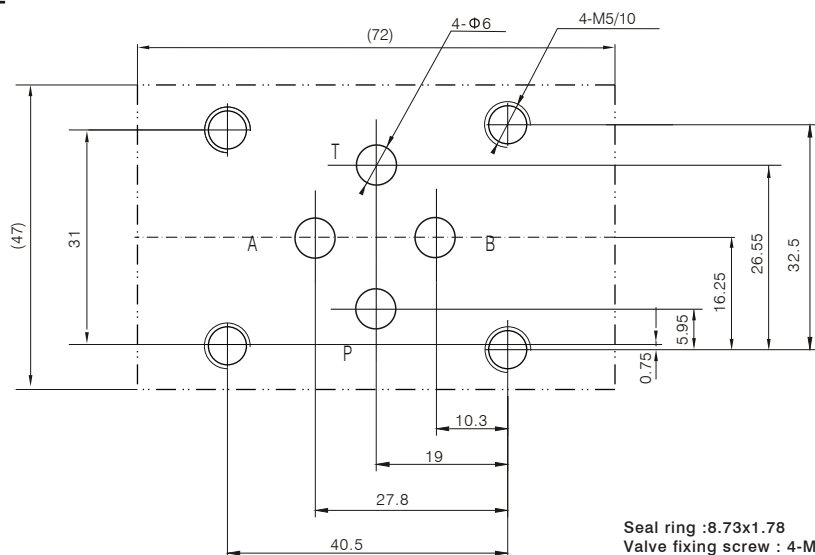
- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Plug-in connector to E DIN 43563-BF6-3/Pg11
- 5 Nameplate
- 6 8.73 x 1.78 O Identical seal rings for ports A, B, P and T
- 7 Plug for valves with one solenoid 2 switched positions, spool type 2B2B or 2B40B)
- 8 Integrated electronics
- 9 Space required for the connection cable and to remove the plug-in connector
- 10 Machined valve mounting surface, connection location DIN 24 340A, ISO 440 and CETOP-RP 121 H

Mounting plate: please refer to below drawing

Subplates: Valve fixing screws : 4-M5x 45 D IN 912-12.9;  $M_A = 8.9 \text{ Nm}$

### Subplate Size

**WFW-02  
WFVN-02**

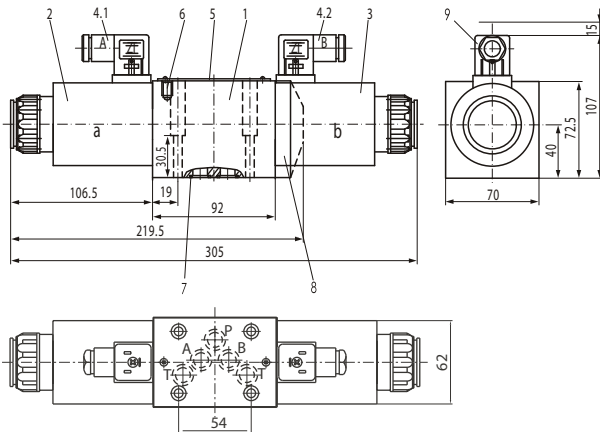


Seal ring : 8.73x1.78  
 Valve fixing screw : 4-M5x45-12.9(GB70-85)  
 The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100 mm flatness.

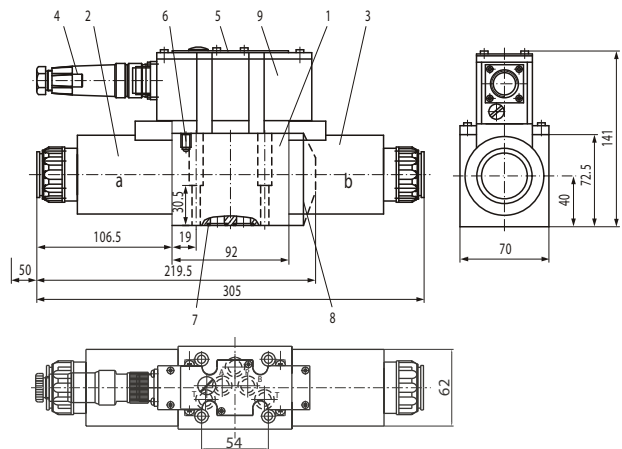
## Proportional directional valve (WFW-WFVN)

### Unit dimensions

WFW-03 type



WFVN-03 type



- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 4.2 Plug-in connector, colour black, separate order
- 5 Nameplate
- 6 Valve deflation screw
- 7 12 x 2 seal rings for ports A, B, P and T
- 8 Plug for valves with one solenoid 2 positions, spool type 2B2B or 2B40B)
- 9 Space required to remove the plug-in connector
- 10 Machined valve mounting surface, connection location to DIN 24 340A, ISO4401 (and) CETOP-RP 121 H

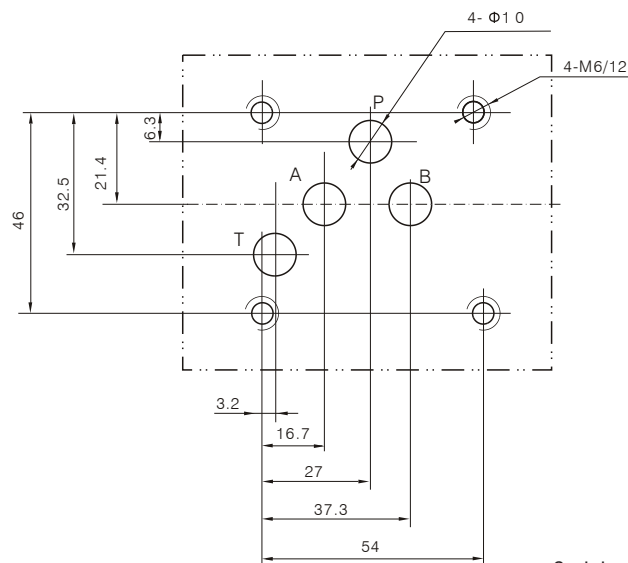
Mounting plate: please refer to below drawing

Subplates: Valve fixing screws : 4  $\uparrow$  M6x 40 DIN 912-12.9;  $M_A = 15.5$  Nm

- 1 Valve body
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Plug-in connector to E DIN 43563-BF6-3/Pg11
- 5 Nameplate
- 6 Valve deflation screw
- 7 12 x 2 I O identical seal rings for ports A, B, P and T
- 8 Plug for valves with one solenoid (2 positions, spool type 2B2B or 2B40B)
- 9 Integrated electronics
- 10 Space required for the connection cable and to remove the plug-in connector
- 11 Machined valve mounting surface, connection location to DIN 24 340A, ISO4401 (and) CETOP-RP 121 H)

### Subplate Size

WFW-03  
WFVN-03



Seal ring : 8.73x1.78

Valve fixing screw : 4-M5x45-12.9(GB70-85)

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