

## Proportional Directional Valve ( BFWE 2X )



The 4/2- and 4/3-way directly operated proportional directional valves, Spool with electrical position feedback. Type BFWE and BFWNE

Nominal size DN6 and DN10  
Component series 2X  
Maximum operating pressure 315bar  
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                    | BFWE                            | BFWNE  |
|----------------------------------|---------------------------------|--------|
| 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 )   | Ports A, B, P   | 315  |    |
|--|---|------|----|
|  | Port T  | 100  |    |
| Nominal flow<br>q <sub>vnom</sub> Max at p=10 bar ( L/min )                      | 6DN   | 8    | 16 |
|  | 10DN  | 25   | 50 |
| Flow (Max. Permissible) ( L/min )  | 6DN   | 80   |    |
|  | 10DN  | 180  |    |
| Pressure fluid   | Mineral oil (HL, HLP) to DIN 51 524; 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(30~46is 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 permissible degree of pressure fluid contamination to NAS 1638 to class 9 Recommended filter β <sub>10</sub> ≥ 75 . |      |    |

### Electrical

| Voltage type                               |                           | Direct voltage  |  |
|--|---------------------------|---|--|
| BFWN<br>Command signal                     | Voltage input "A1" ( V )  | ± 10  | ± 10   |
|  | 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 <sup>2)</sup> ( °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   |  |

## Proportional Directional Valve ( BFWE 2X )

### Control electronics

| BFW (type)                    | Analogue amplifier in Eurocard format <sup>1)</sup> |                      | Details refer to proportional amplifier |       |
|-------------------------------|---|----------------------|---|-------|
|                               | Digital amplifier in Eurocard format <sup>2)</sup>  |                      | Details refer to proportional amplifier |       |
| BFWN (type)                   | Analogue command value module                       |                      | Integrated into the valves A1.4         |       |
| Supply voltage                | BFWE <sup>1)</sup><br>BFWNE                         | Rated voltage        | VDC                                     | 24    |
|                               |   | Lower limiting value | V                                       | 21/22 |
|                               |   | Upper limiting value | V                                       | 35    |
| Amplifier current consumption |   | I <sub>max</sub>     | A                                       | 2     |
|                               |   | Max. impulse current | A                                       | 3     |

1) With HOYEA 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

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 BFW(type)  
BFWN(type)  
A1 Command value input ± 10V  
F1 Command value input 4~20mA

Electrical connection  
BFW (type)  
<sup>2)</sup>K4 with plug component DIN EN 175301-803  
BFWN(type)  
<sup>2)</sup>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 p = 10 bar

| DN | Flow (L/min) |
|----|--------------|
| 6  | 8            |
| 6  | 16           |
| 10 | 32           |
| 10 | 32           |
| 10 | 25           |
| 10 | 25           |
| 10 | 50           |
| 10 | 50           |
| 10 | 75           |
| 10 | 75           |

With spool symbols: 3C2(1) and 3C40(1)  
P → A: q<sub>vmax</sub> B → T: q<sub>vmax</sub>/2  
P → B: q<sub>vmax</sub>/2 A → T: q<sub>vmax</sub>

Note:  
With spools 3C40 and 2B40B, 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.

## Proportional Directional Valve (BFWE 2X)

### Model description

Directional Proportional valve without integrated electronics

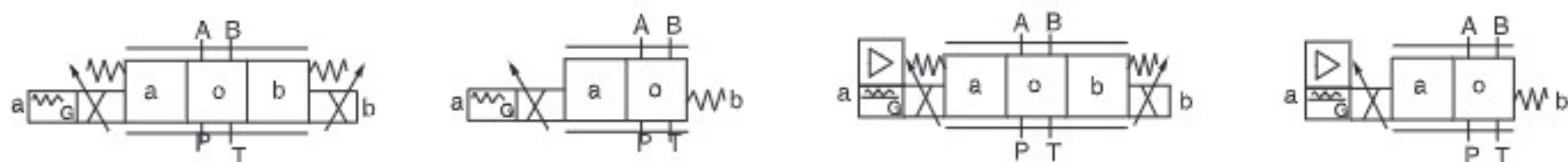
Directional Proportional valve with integrated electronics

Model BFWE...

Model BFWE...2B2B (2B40B)

Model BFWNE...

Model BFWNE...2B2B (2B40B)



### 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 BFWE) or integrated control electronics (type BFWNE)

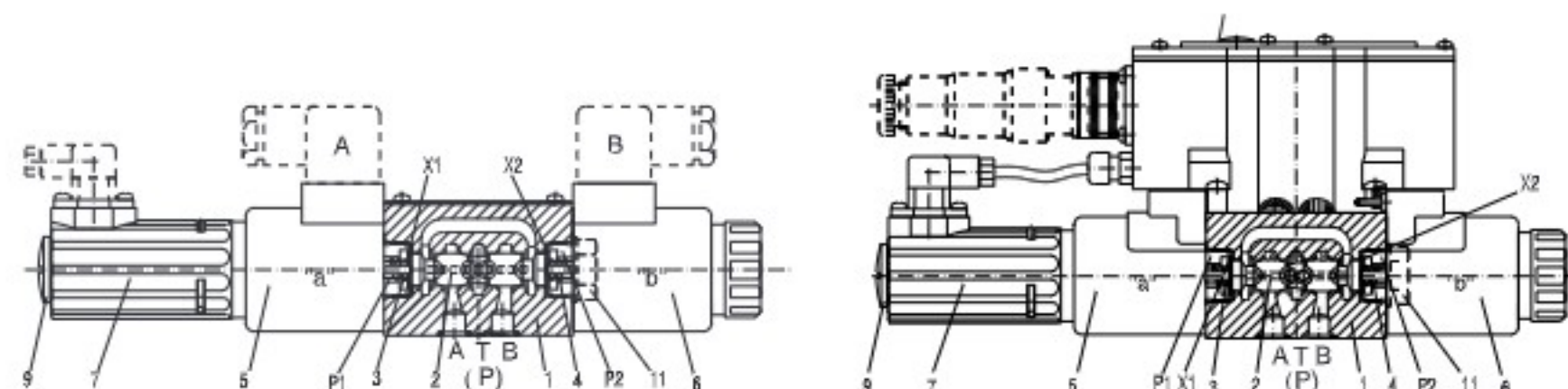
#### Design:

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)
- BFWNW 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 "a" (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 BFW-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).

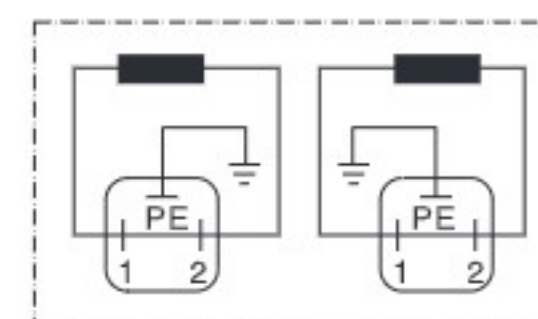
## Proportional Directional Valve (BFWE 2X)

### Electrical connection, plug-in connectors

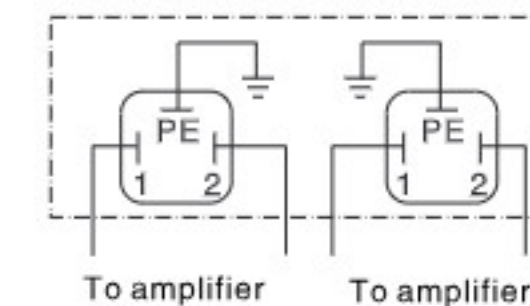
BFWE type (Without integrated electronics not for version "J"=sea water resistant)

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

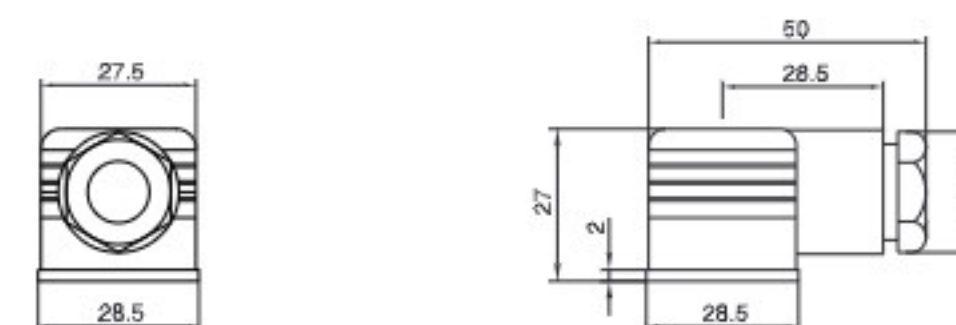
Connection on component plug



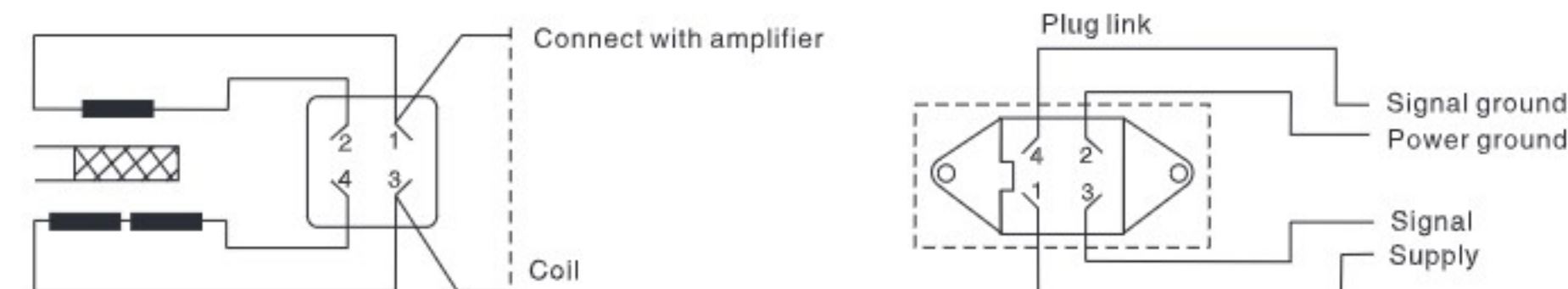
Connection on plug-in connector



### Outlook size of plug-in connector

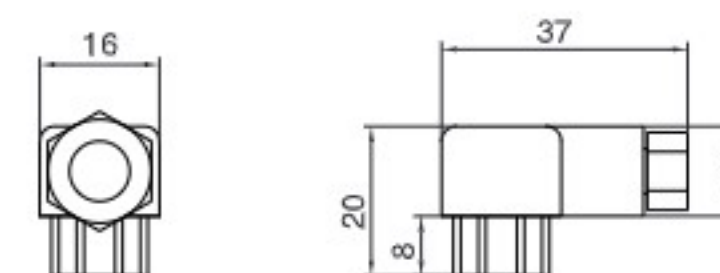


### Inductive position transducer

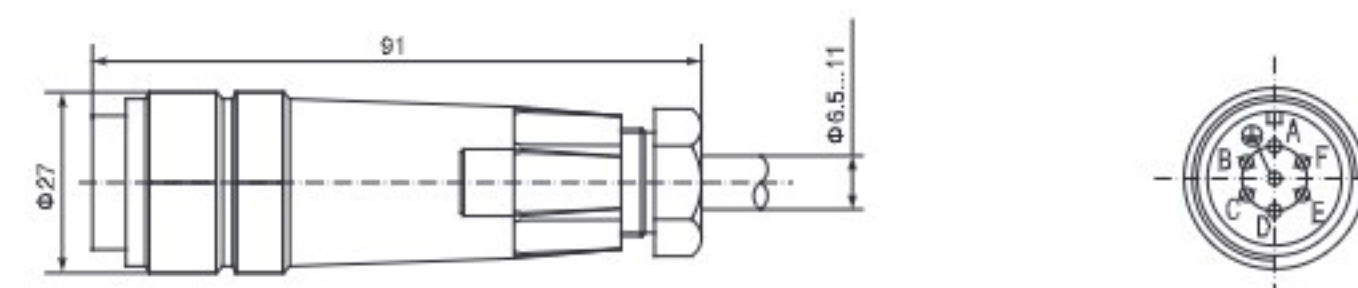


Mating connector 4-role connector cable  
Suggestion: the length of the wire is expected to be 50 meters, type LiYCY 4\*0.25mm<sup>2</sup>  
Connect shield to PE only on the supply side.

### 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 ( BFWE 2X )

## Pin allocation of the component plug

|                                     | Plug-in connector | A1 Connector type A1                                | Connector type F1                    |
|-------------------------------------|-------------------|---|--------------------------------------|
| Supply voltage                      | A                 | 24VDC(u(t)=19.4~35V); $I_{max}=2A$                  |                                      |
| Reference potential (actual value)  | B                 | 0V  |                                      |
| Differential amplifier input        | C                 | Link to F; $R_c > 50K\Omega$                        | Link to F; $R_c < 10\Omega$          |
| Measuring the output (actual value) | D                 | Com. Value $\pm 10V$ ; $R_c > 50K\Omega$            | Com. Value 4~20mA; $R_c > 100\Omega$ |
|                                     | 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 |                                      |

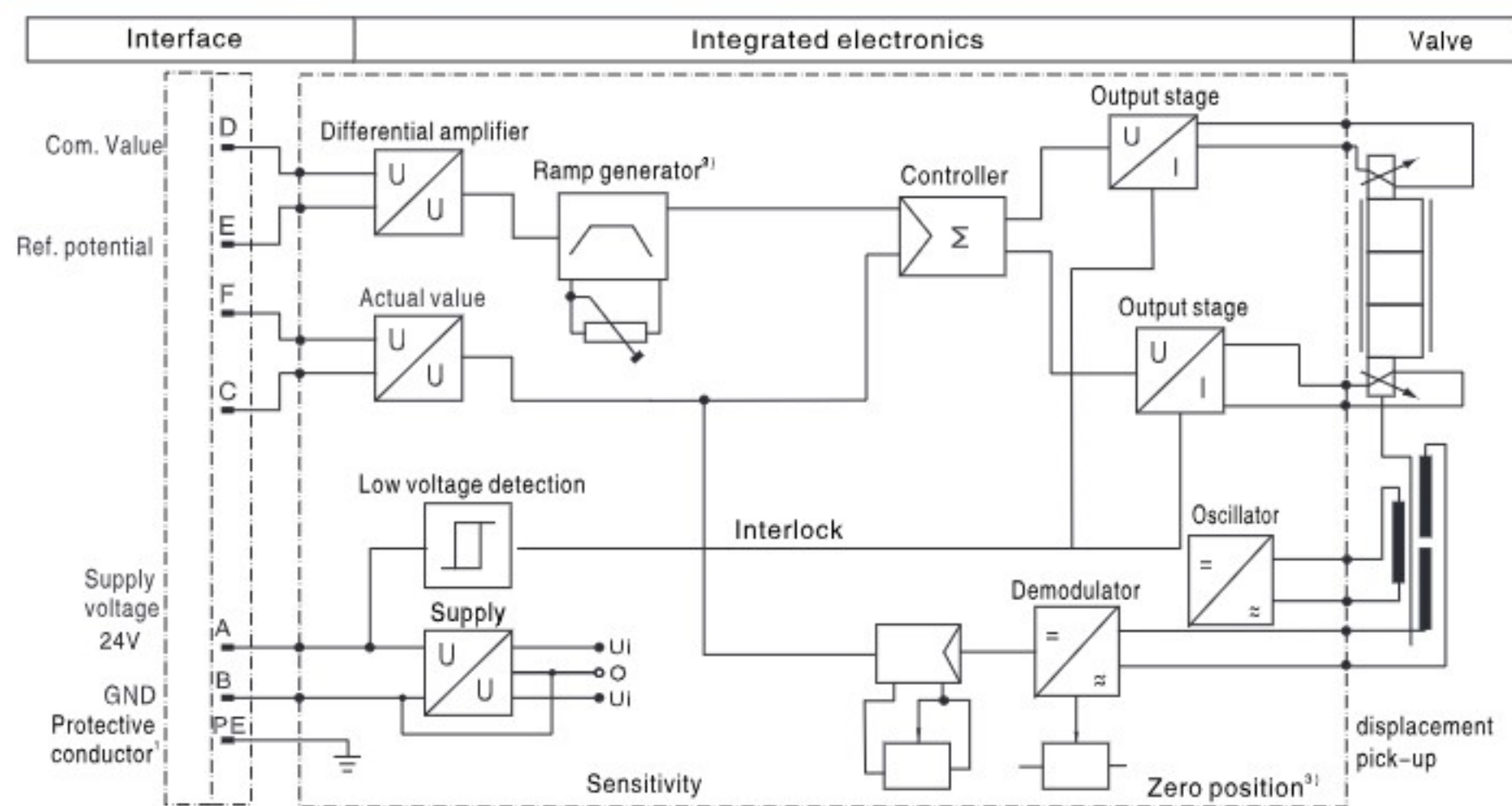
Com. value : Positive command value (0 to 10 V or 12 to 20 mA) at D and reference potential to E causes flow from P to A and B to T. Negative command value (0 to -10 V or 12 to 4 mA) at D and reference potential to E causes flow from P to B and A to T. For valves with a solenoid on side "a" (spool variants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

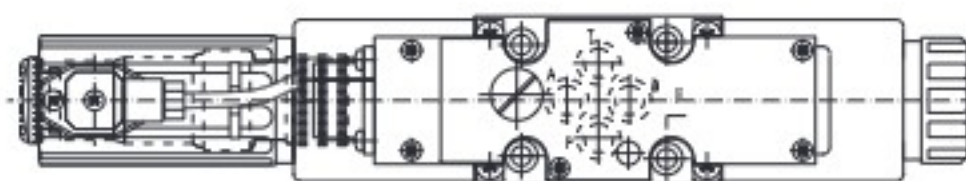
## Block circuit diagram / connection allocation



### Introductions:

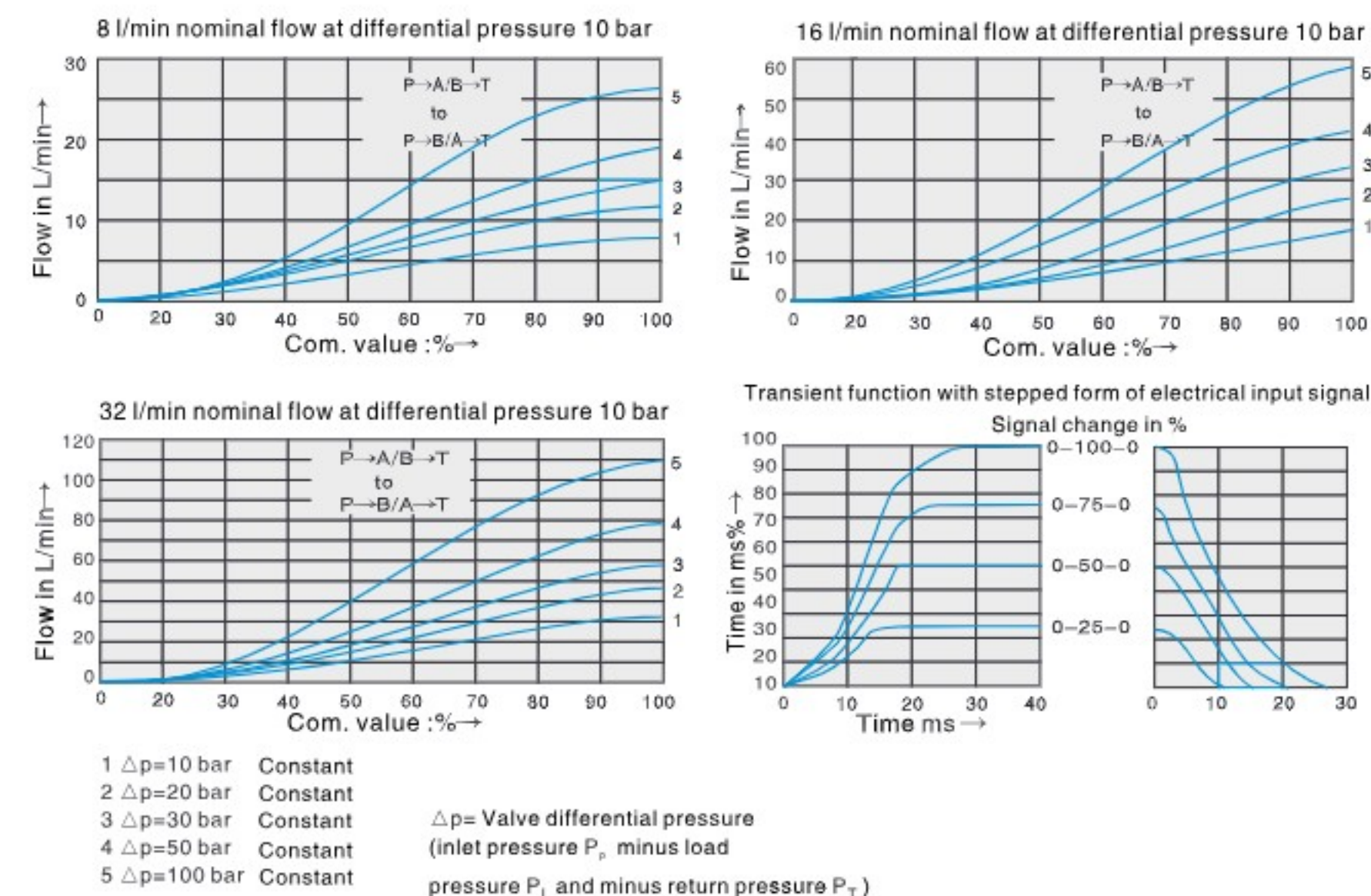
The electrical signal launched from controlled amplifier (e.g. actual value) must not be used for the safety protection of the switch device.

1. Contacts PE should be linked to the low-temperature subject and valve body.
2. Ramp time could be adjustable within the scope 0~0.2.5s 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

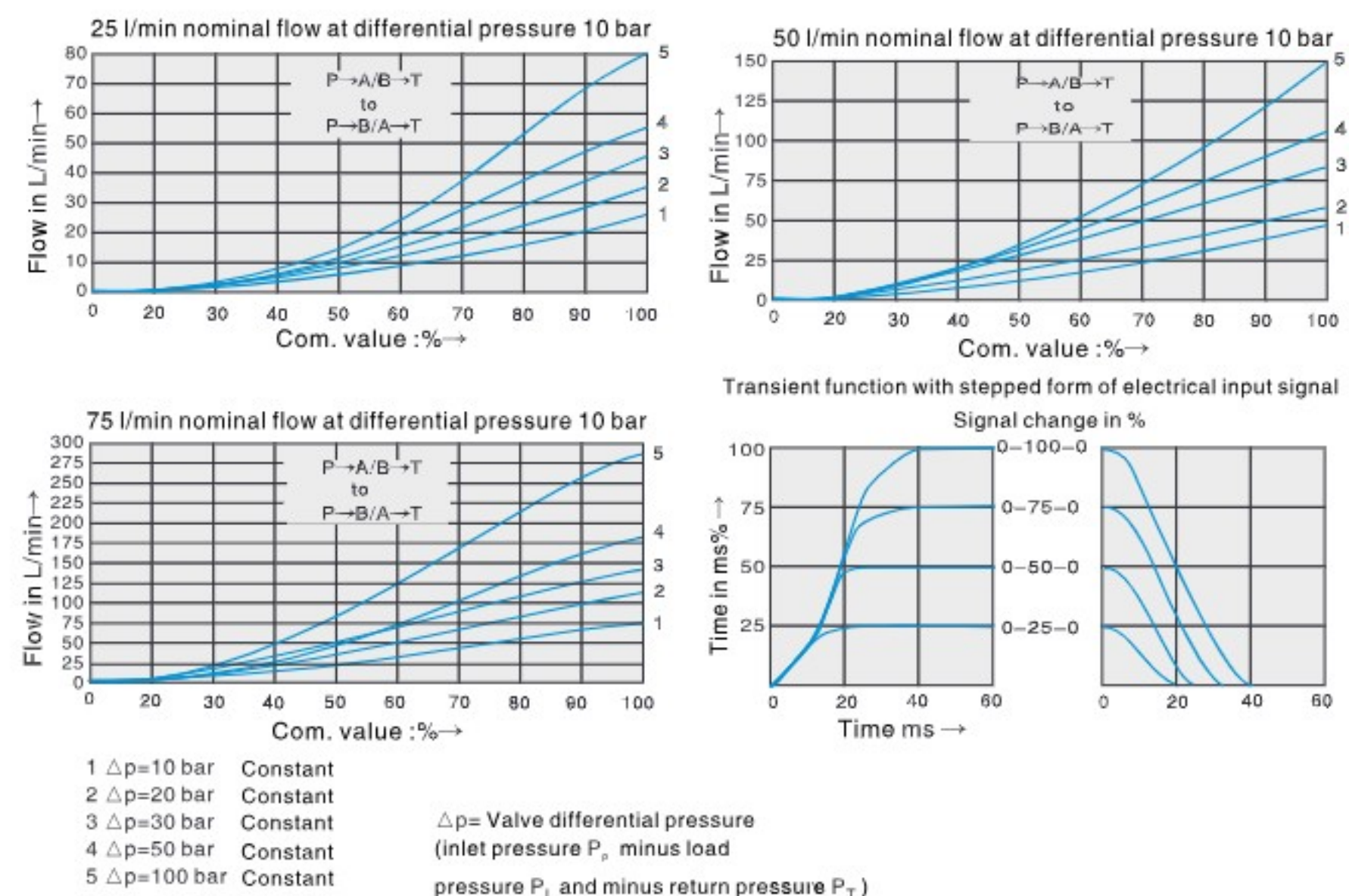


# Proportional Directional Valve ( BFWE 2X )

## Characteristic curves (measured with HLP46, Qoil = 40 ± 5°C) DN6

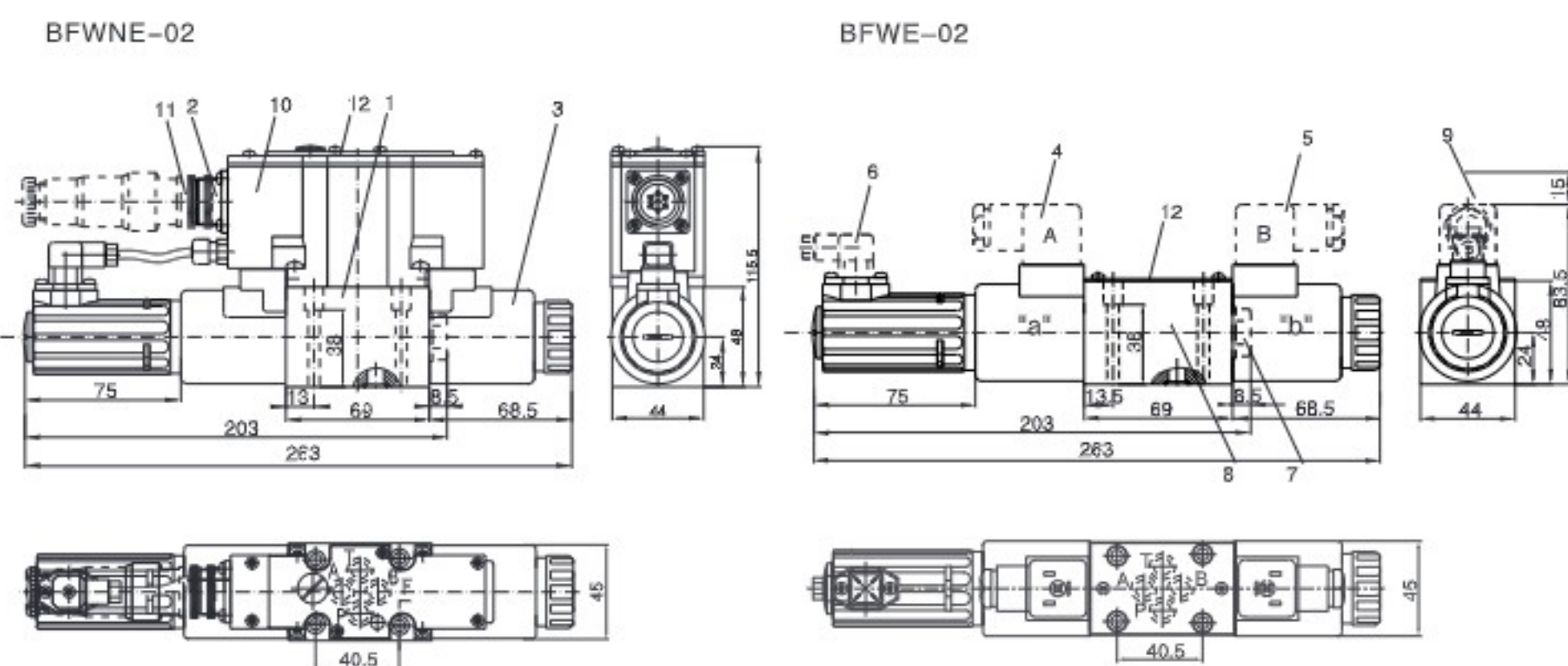


## Characteristic curves (measured with HLP46, Qoil = 40 ± 5°C) DN10



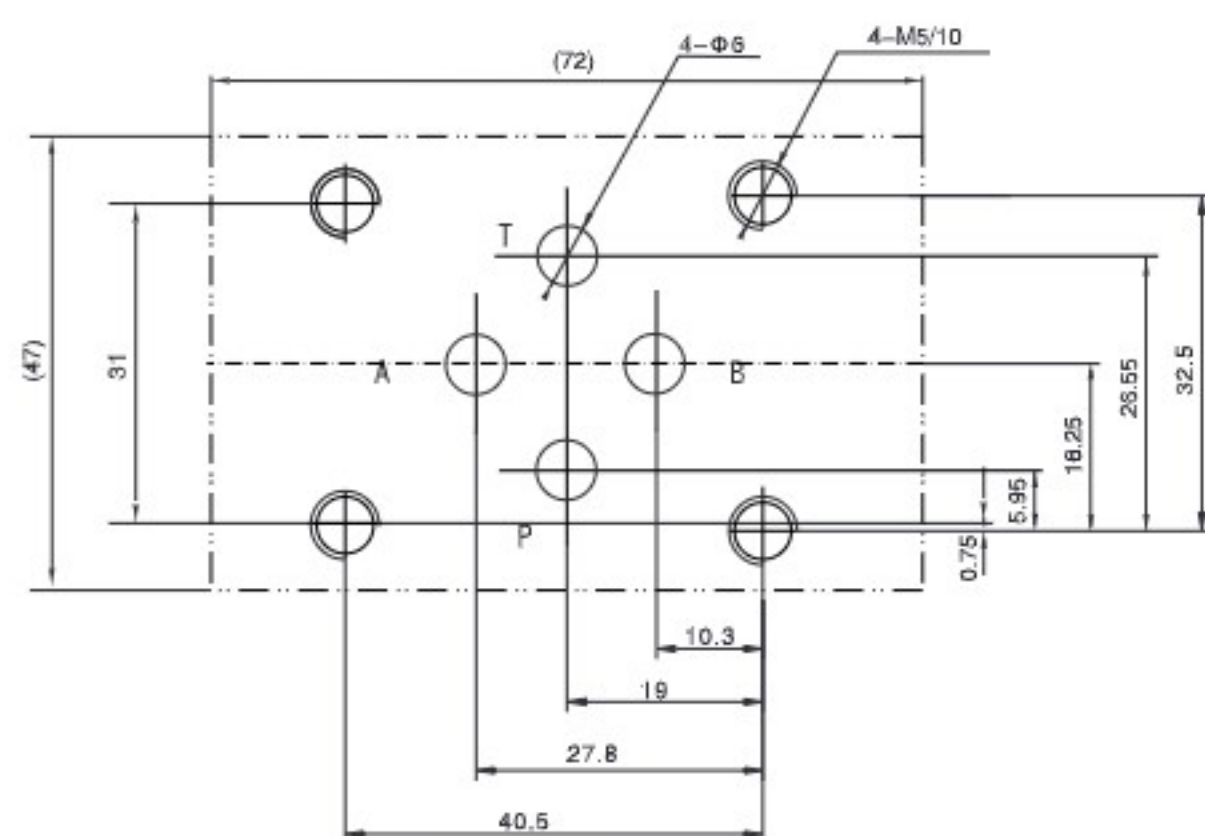
## Proportional Directional Valve (BFWE 2X)

### Unit dimensions



- 1. Valve body
- 2. Proportional solenoid "a" with inductive displacement pick-up
- 3. Proportional solenoid "b"
- 4. Gray plug-in connector "A" according to the 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 lever, 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-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

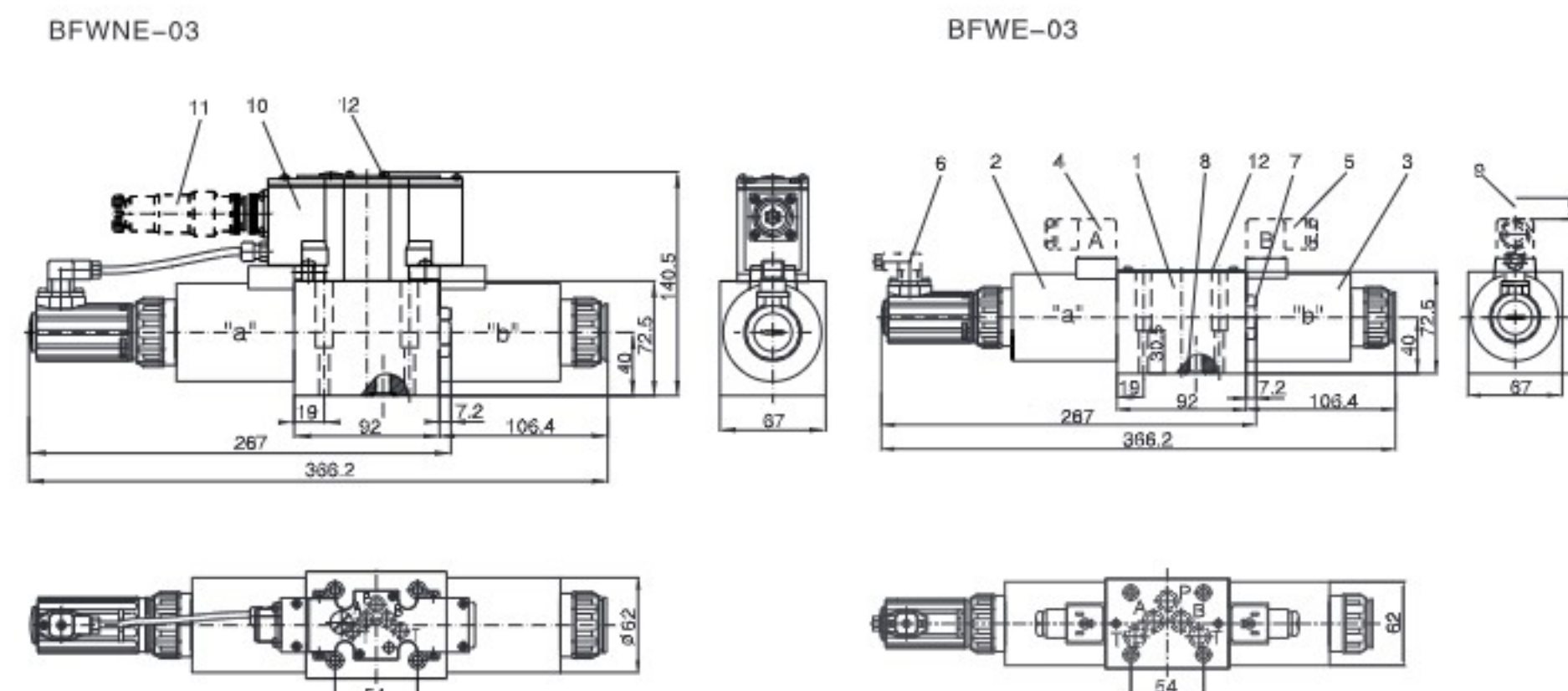
### Subplate size



Subplates: G341/01(G1/4) G342/01(G3/8) G502/01(G1/2)  
 Valve fixing screws: 4-M5x45 DIN 912-10.9;  $M_t=8.9$  Nm  
 The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100mm flatness.

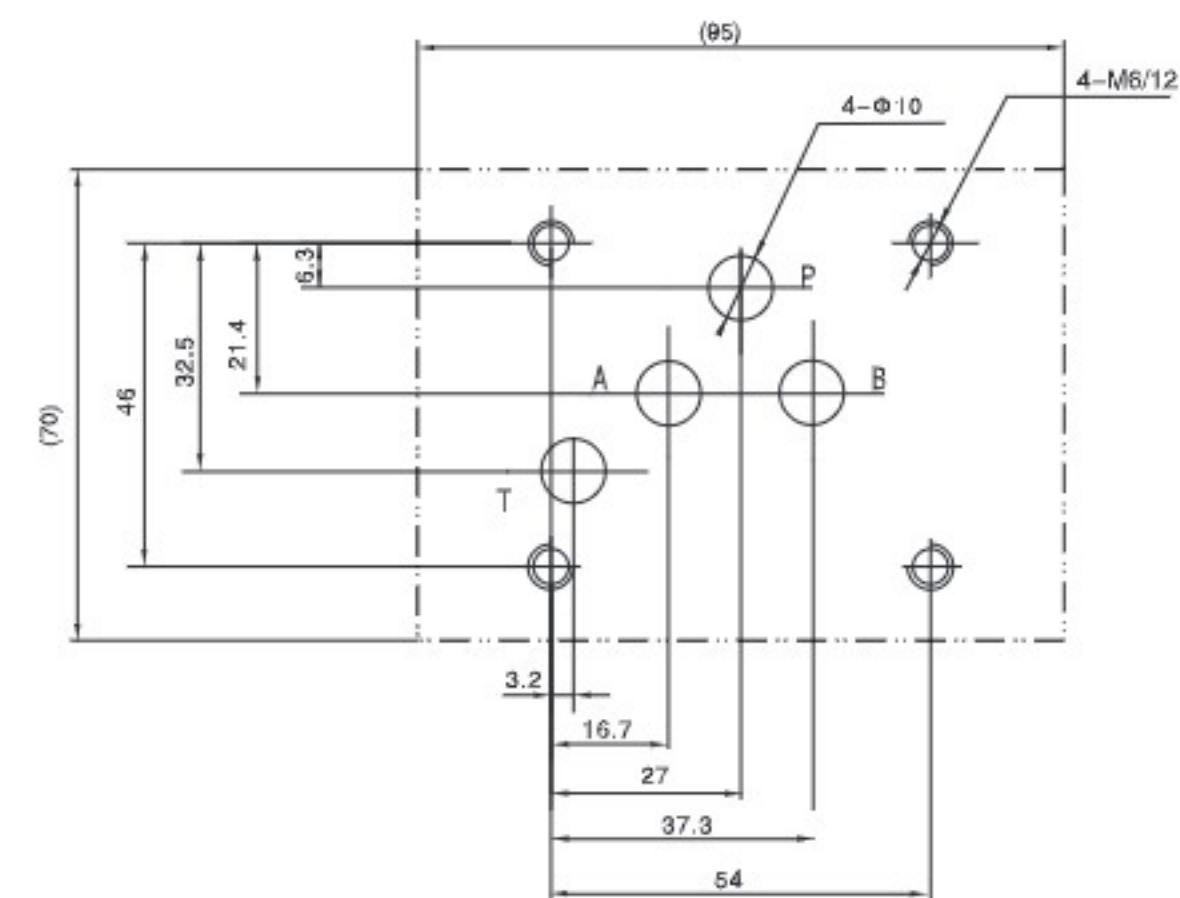
## Proportional Directional Valve (BFWE 2X)

### Unit dimensions



- 1. Valve body
- 2. Proportional solenoid "a" with inductive displacement pick-up
- 3. Proportional solenoid "b"
- 4. Gray plug-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 end lever, spool type 2B2B or 2B40B
- 8. Identical seal ring 12\*2 (used for ports A, B, P, T)
- 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 DIN 912-10.9;  $M_t=8.9$  Nm  
 The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100mm flatness.