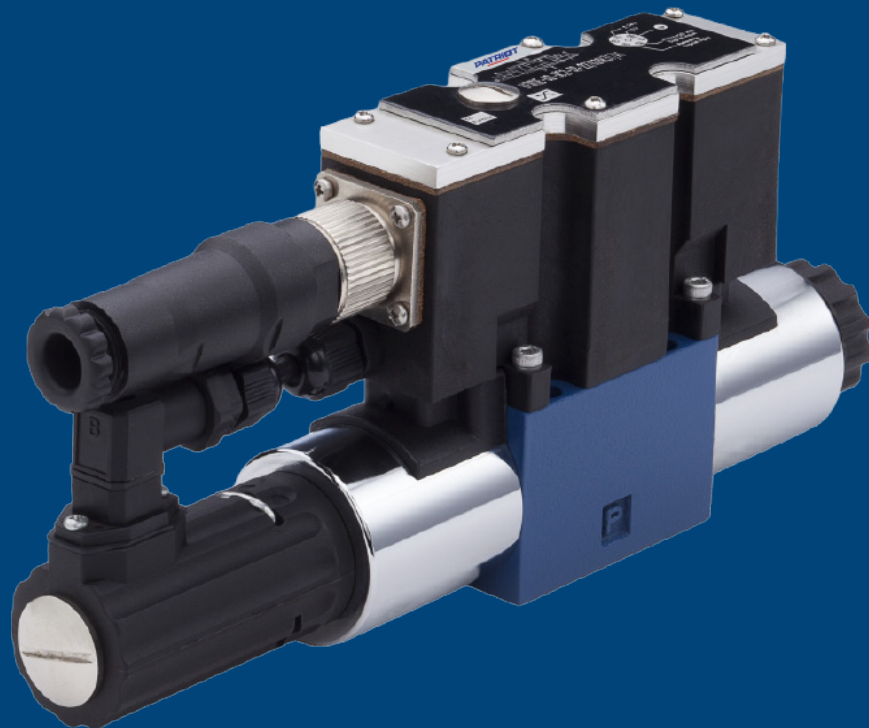




**PATRIOT**

**Proportional Directional Valve**

**PHDBFWE**



**Driven by Innovation**  
**Power Precision Performance**  
734-479-9641 [patriothyd.com](http://patriothyd.com)





# PHDBFWE Model Codes

Directional Proportional Valve

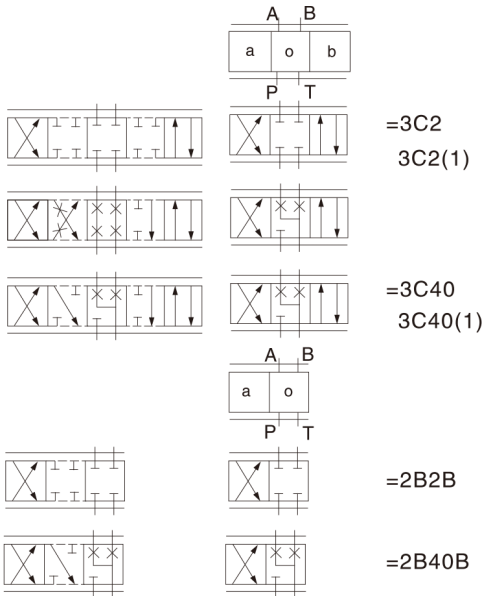
### Electronics

Omit - Without intergrated electronics  
 N - With intergrated electronics

### Frame Size

02 - DN 6  
 03 - DN 10

### Spools



With spool symbols: 3C2(1) and 3C40(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 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.

**Seals**  
 Omit - NBR seals  
 V - FPM seals

**Input**  
 A1 - Command value input  $\pm 10$   
 F1 - Command value input 4~20mA

**Electrical Connection**  
 K4 (BFWN) - DIN EN 175301-803

G24 - 24 VDC

2X - Series 20-29

### Nominal Flow @ P=10 bar

DN6  
 08 - 8 L/min  
 16 - 16 L/min  
 32 - 32 L/min

DN10  
 25 - 25 L/min  
 30 - 30 L/min  
 60 - 60 L/min





## PHDBFWE Technical data

Specification	PHDBFWE	PHDBFWNE
Installation position	optional, preferably horizontal	
Storage temperature range ( °C )	-20~80	
Ambient temperature range ( °C )	-20~70	-20~50

## PHDBFWE Testing data

Operating pressure ( bar )	Ports A, B, P	315		
	Port T	100		
Nominal flow $q_{vnom}$ Max at $p=10$ 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 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(30~46 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 permissible degree of pressure fluid contamination to NAS 1638 to class 9 Recommended filter $\beta_{10} \geq 75$ .			

## PHDBFWE Two Spool Info

### Note for type PHDBFW-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).





## PHDBFWE Electrical

Voltage type		Direct voltage	
BFWN	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 <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	

## PHDBFWE Electronic Controls

PHDBFWE (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	
PHDBFNW (type)		Analogue command value module		Integrated into the valves A1.4	
Supply voltage	BFWNE <sup>1)</sup> BFWNE	Rated voltage	VDC	24	
		Lower limiting value	V	21/22	19.4
		Upper limiting value	V	35	
Amplifier current consumption		I <sub>Max</sub>	A	2	2
		Max. impulse current	A	3	3



## PHDBFWE Functions

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 BFWNE) or integrated control electronics (type BFWNE)

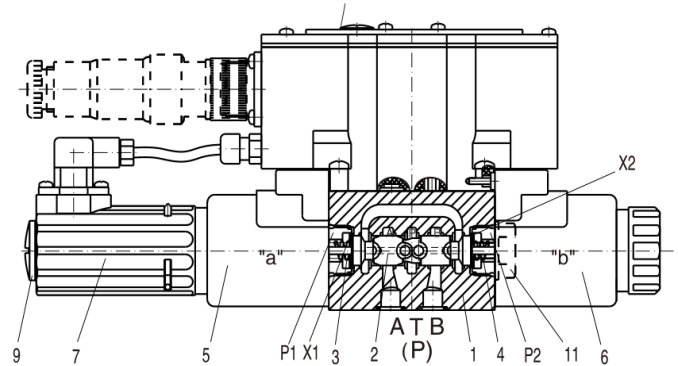
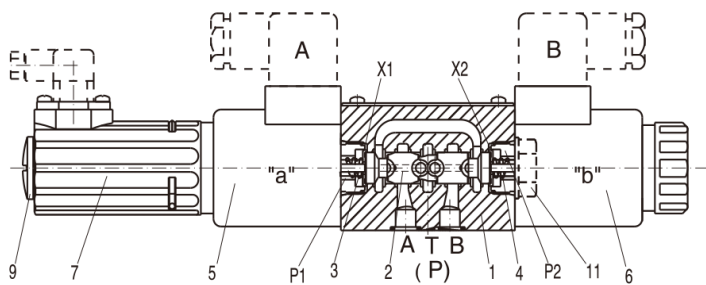
### Design:

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)



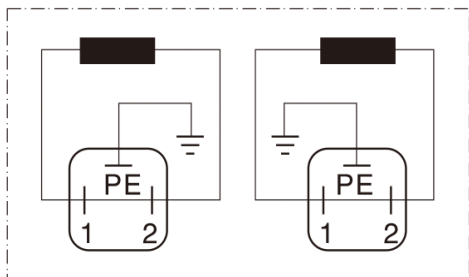


## PHDBFWE Plug Data

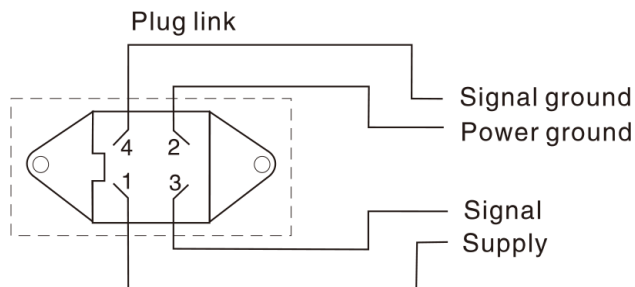
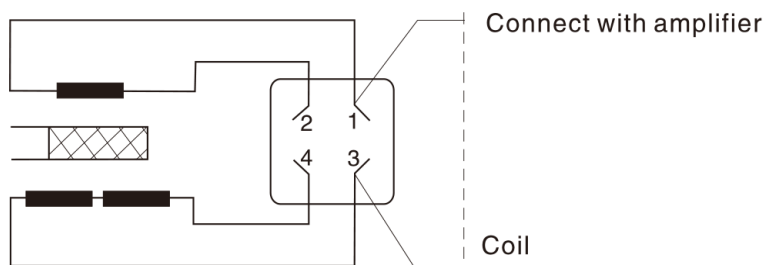
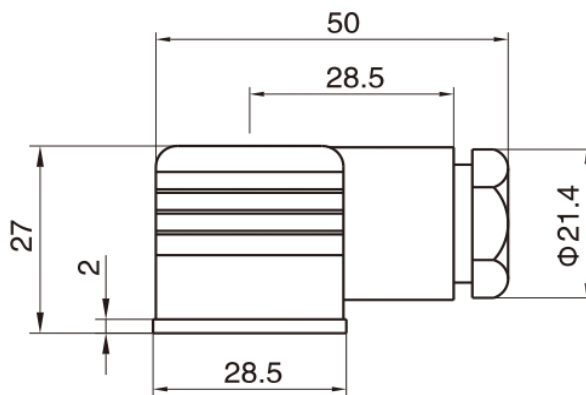
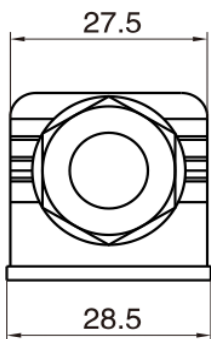
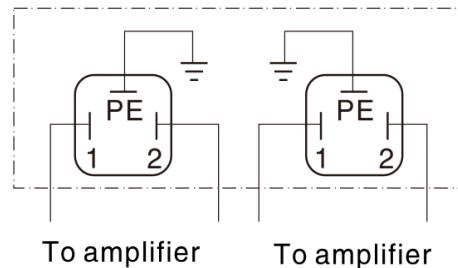
PHDBFWE type (Without integrated electronics not for version "J"=sea water resistant)

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



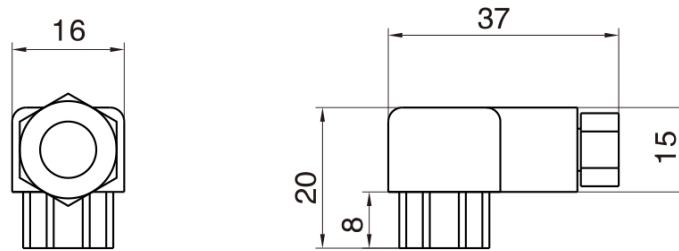
Mating connector 4-role connector cable

Suggestion: the length of the wire is expected to be 50 meters, type LiYCY 4\*0.25mm<sup>2</sup>

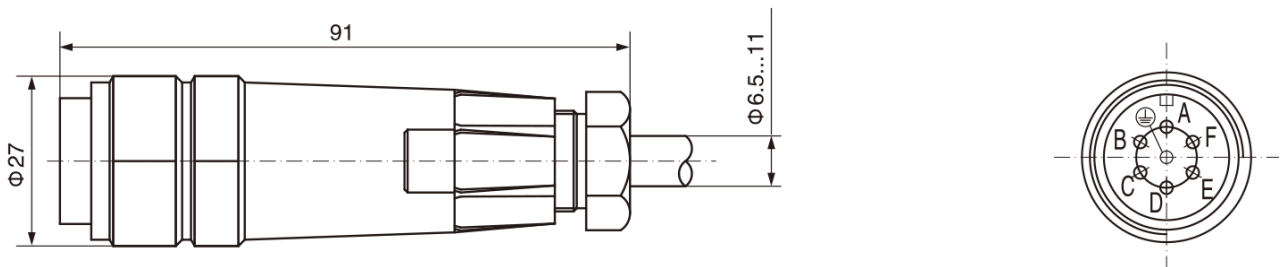
Connect shield to PE only on the supply side.



## PHDBFWE Plug Data



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





## PHDBFWE Pin Allocation

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	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; $R_o > 50K\Omega$	Link to F; $R_o < 10\Omega$
Differential amplifier input	D	Com. Value $\pm 10V$ ; $R_o > 50K\Omega$	Com. Value $4\cdots 20mA$ ; $R_o > 100\Omega$
	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.

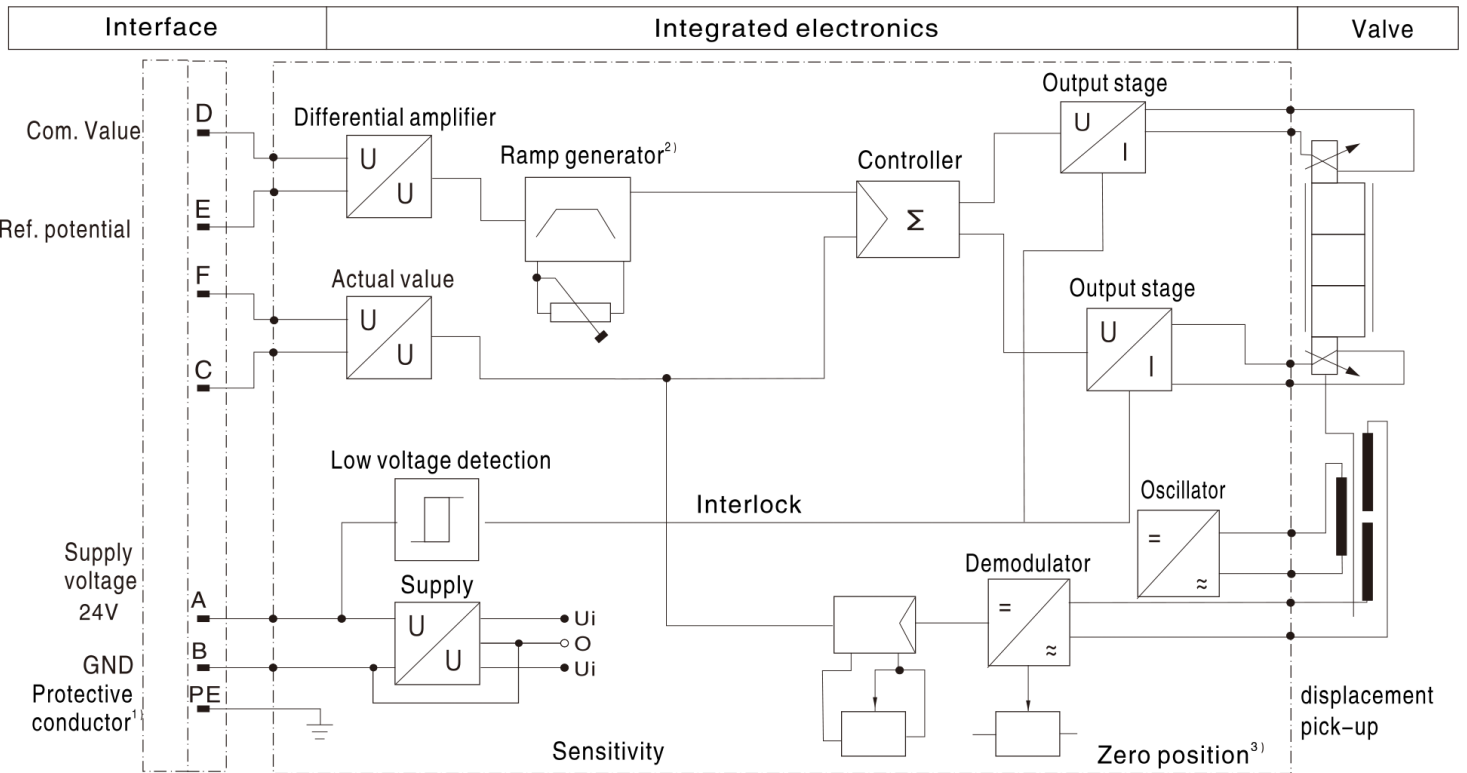
**Actual value :** The actual value (0~10V or 12mA) on the F.C enables the connection from port P to port A.

**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



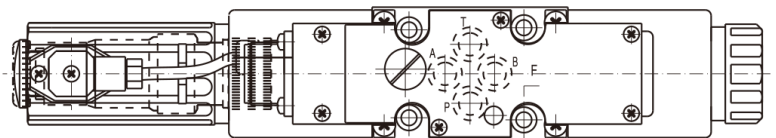
# PHDBFWE Circuit Diagram



## Introductions:

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

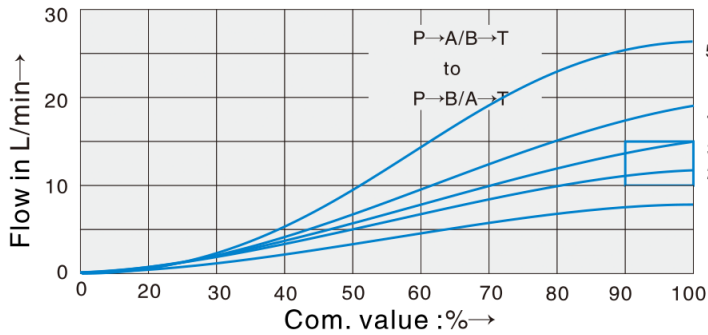
1. Contacts PE should be linked to the low-temperature subject and valve body.
2. Ramp time could be adjustable within the scope 0~02.5s outside, as well as  $T_{up}$  and  $T_{down}$ .
3. Zero point outside is adjustable.
4. output end is the current output
5. Zero point can be set from the outside



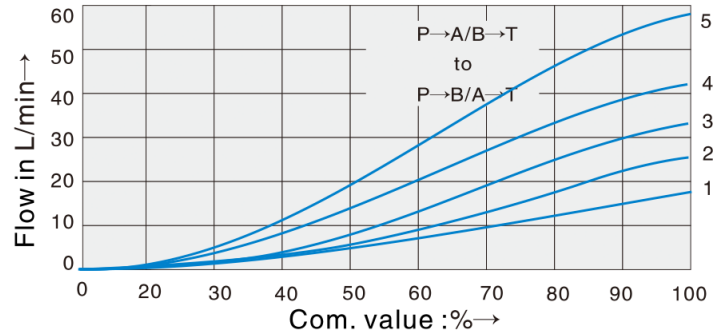


# PHDBFWE Curves

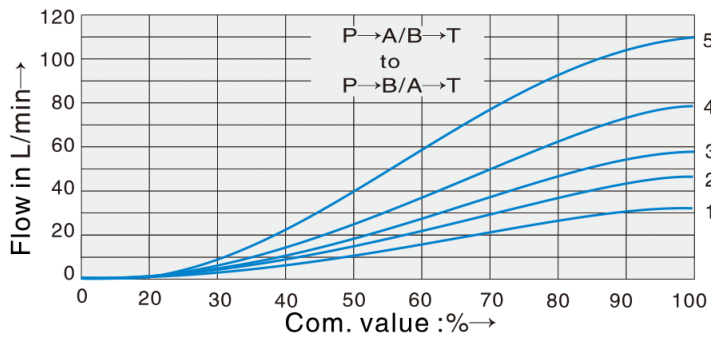
8 l/min nominal flow at differential pressure 10 bar



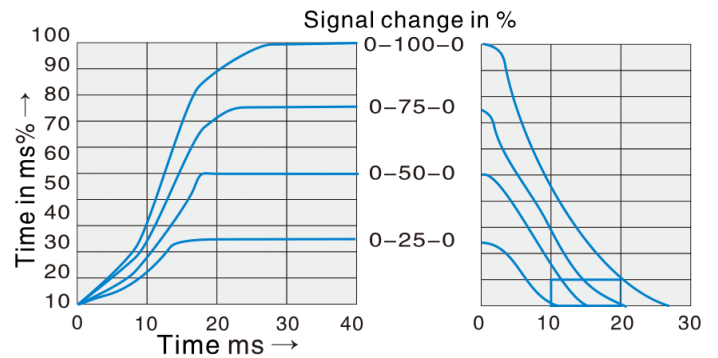
16 l/min nominal flow at differential pressure 10 bar



32 l/min nominal flow at differential pressure 10 bar



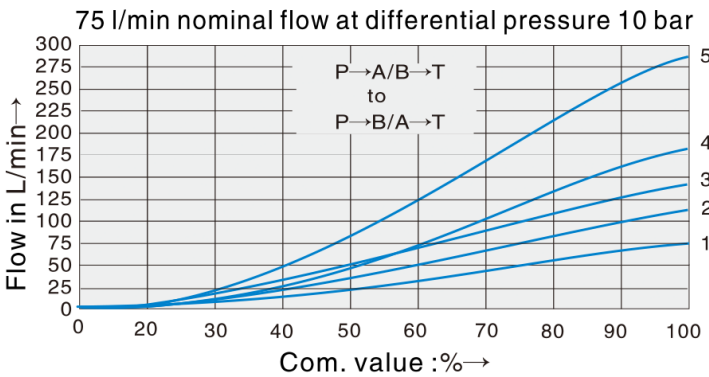
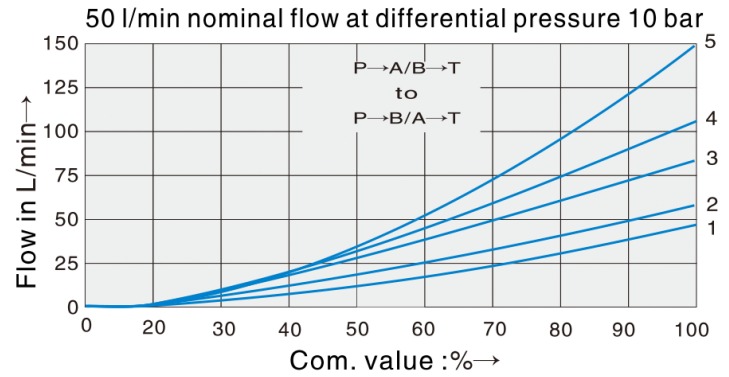
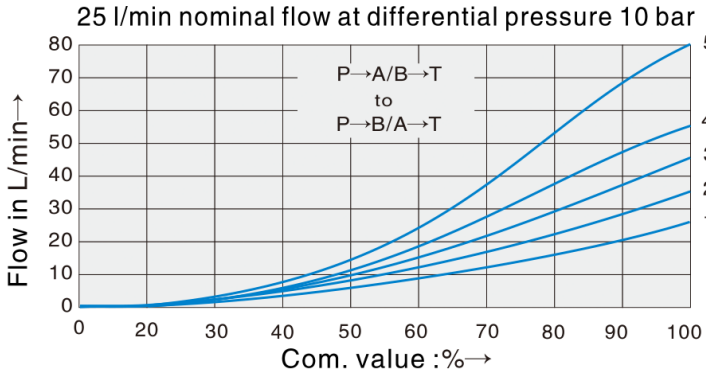
Transient function with stepped form of electrical input signal



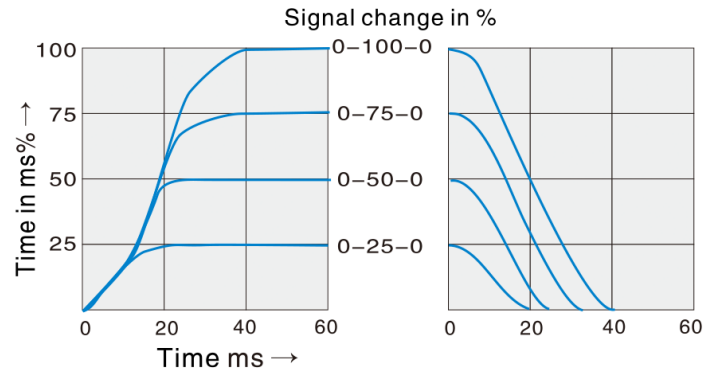
- 1  $\Delta p=10$  bar Constant
- 2  $\Delta p=20$  bar Constant
- 3  $\Delta p=30$  bar Constant
- 4  $\Delta p=50$  bar Constant
- 5  $\Delta p=100$  bar Constant

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

# PHDBFWE Curves



Transient function with stepped form of electrical input signal



- 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

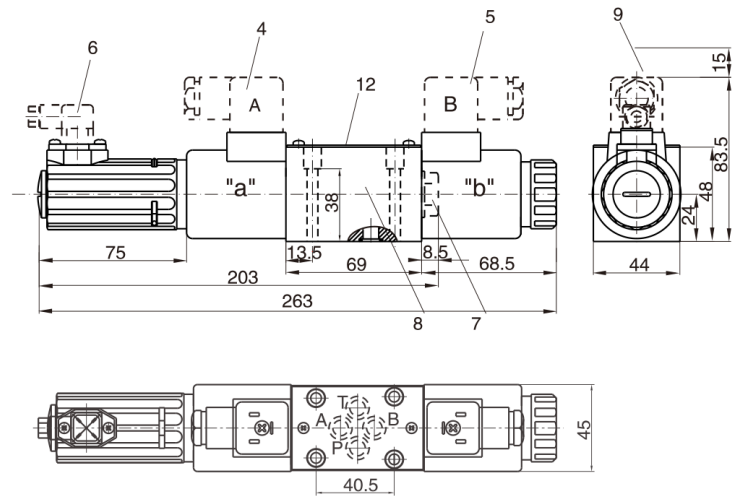
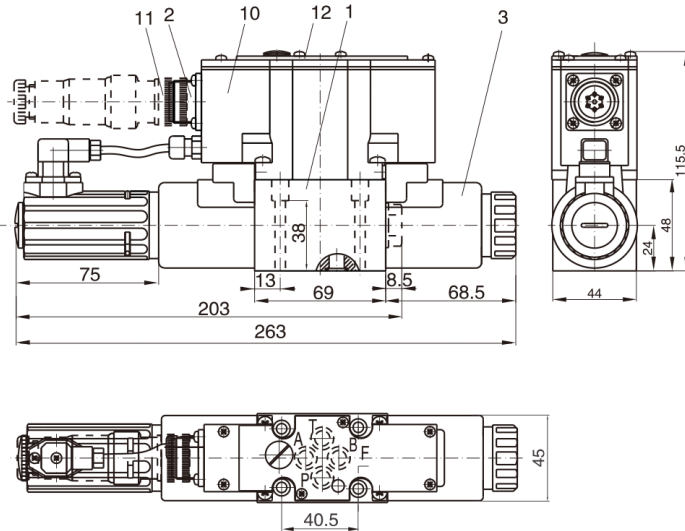
$\Delta p$ = Valve differential pressure  
(inlet pressure  $P_p$  minus load  
pressure  $P_L$  and minus return pressure  $P_T$ )



## PHDBFWE 02 Dimensions

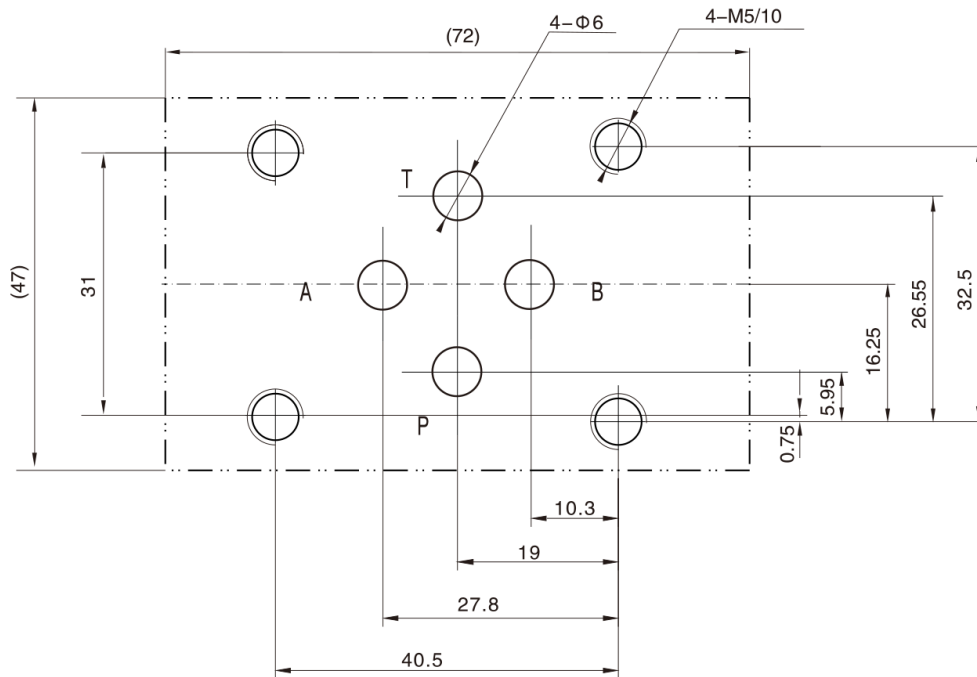
PHDBFWNE-02

PHDBFWE-02



- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Valve body</li> <li>2. Proportional solenoid "a" with inductive displacement pick-up</li> <li>3. Proportional solenoid "b"</li> <li>4. Gray plug-in connector "A" according to the standard of DIN EN 175 301-803</li> <li>5. Black plug-in connector "B" according to the standard of DIN EN 175 301-803</li> <li>6. Socket with inductive displacement pick-up</li> <li>7. For single-solenoid-controlled valve end lever, spool type 2B2B or 2B40B</li> </ul> | <ul style="list-style-type: none"> <li>8. Identical seal ring 8.73*1.78 (used for ports A, B, P, T)</li> <li>9. Space for taking off the plug-in connector</li> <li>10. Built-in amplifier</li> <li>11. The socket corresponds with DIN EN 175 201-804</li> <li>12. Nameplate</li> <li>13. Machined valve mounting surface, Connection location to DIN 24 340A, ISO4401 (and) CETOP-RP 121 H</li> </ul> |
|--|---|

## PHDBFWE 02 Subplate



Subplates: G341/01(G1/4) G342/01(G3/8) G502/01(G1/2)

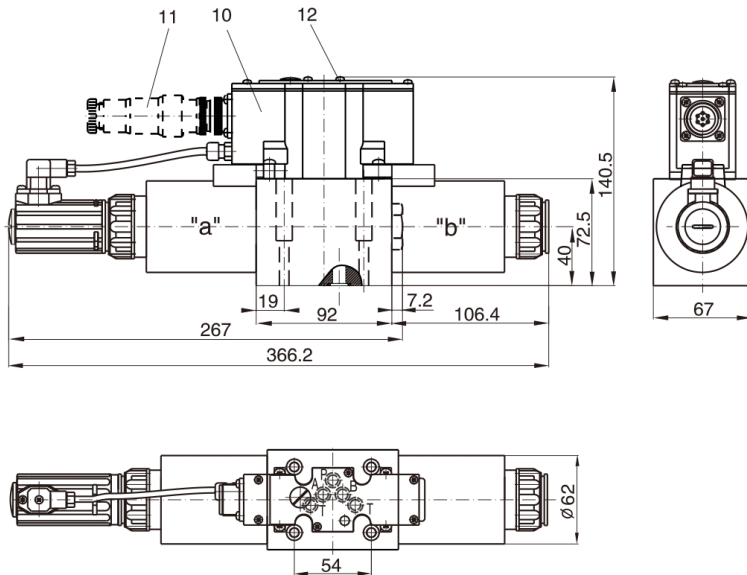
Valve fixing screws: 4-M5x45 DIN 912-10.9;  $M_A=8.9$  Nm

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

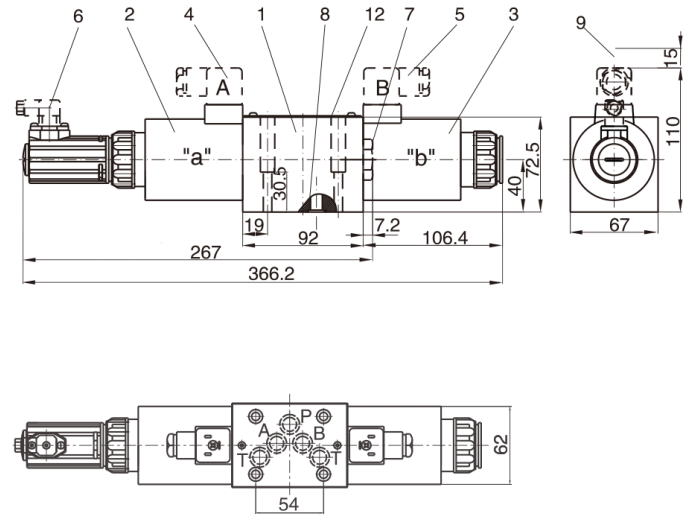


## PHDBFWE 03 Dimensions

PHDBFWE-03



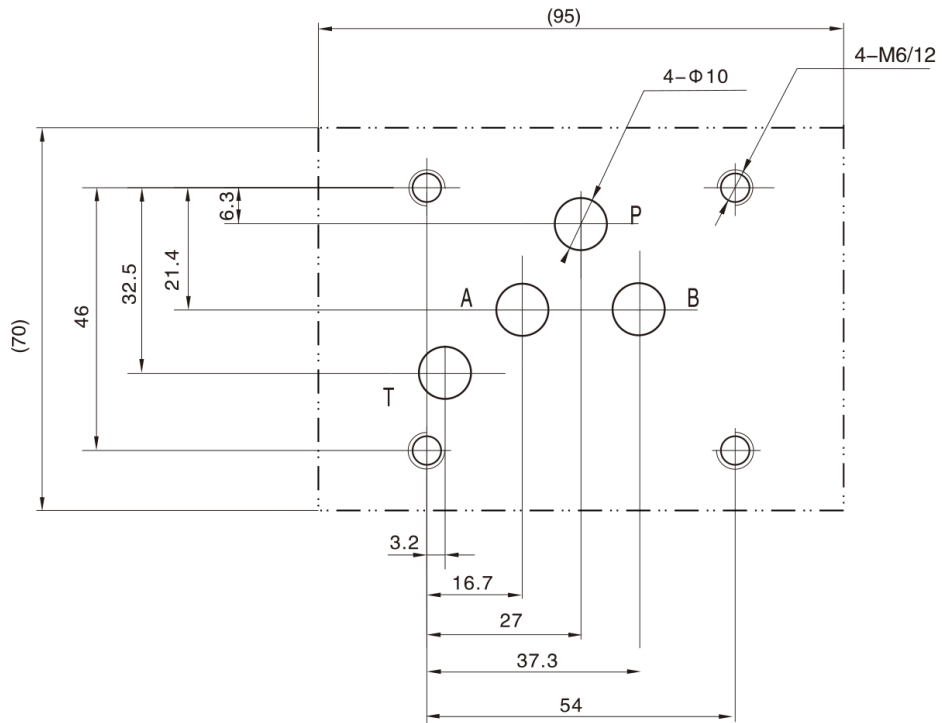
PHDBFWE-03



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, IS04401 (and) CETOP-RP 121 H

# PHDBFWE 03 Subplate



Valve fixing screws: 4-M6x40 DIN 912-10.9;  $M_A=8.9$  Nm

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