OEM HYDRAULICS

Proportional Valve Series

Proportional Directional Valve（BFW/BFWN）

The built–in 4/2–and 4/3–way directly operated
Proportional solenoid valves
Direct operated spool without electrical position feedback
Type BFW and BFWN
Nominal sizes 6 and 10
Series 2X
Maximum operating pressure 315bar
Maximum flow 42L/min (DN6)
Maximum flow 75L/min (DN10)

Technical data (Please consult with us when the application needs higher requirement than the parameter shown below)

Model	BFW	BFWN
Installation position	optional, preferably horizontal	
Storage temperature range (℃)	–20~80	
Ambient temperature range (℃)	–20~70	–20~50

Hydraulic

Operating pressure (bar)	PortsA,B,P	315
	Port T	210
Nominal flow When q_{vnom} at △p=10 bar (L/min)	DN6	7，15 and 26
	DN10	30，60
Flow (Max. Permissible) (L/min)	DN6	42（with double flow 42）80
	DN10	75（with double flow 75）140
Pressure fluid		Mineral oil (HL, HLP) to DIN 51 524;For other fluid please consult with us.
Fluid temp. Range (℃)		–20~80(+40~+50 is preference)
Viscosity range (mm^2/s)		20~380(30~46 is preference)
Hysteresis (%)		≤5
Reversal error (%)		≤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			BFW[1)]	BFWN
Voltage type			Direct voltage	
BFWN 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 ℃		6DN2	10DN2
	Max. warm value		6DN3	10DN3
Duty cycle		(%)	100	
Max.Coil temperature[2)]		(℃)	up to150	
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 (BFW/BFWN)

Control electronics

BFW (type)	Analogue amplifier in Eurocard format[3]		Details refer to proportional amplifier	
	Digital amplifier in Eurocard format[3]		Details refer to proportional amplifier	
BFWN (type)	Analogue command value module		Integrated into the valves	
Supply voltage	Nominal voltage	VDC	24	
	BFWN Lower limiting value	V	21/22	19
	BFW[1] Upper limiting value	V	35	
Amplifier current consumption	I_{max}	A	1.8	1.8
	Max. impulse current	A	3	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

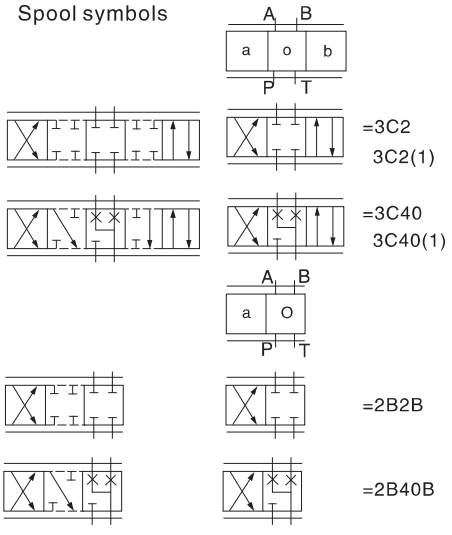
BFW – ＊ – ＊ – ＊ – ＊ – ＊ – 2X – G24 – ＊ – ＊ – ＊ – ＊ – ＊ ＊

Directional proportional valve

No code Without integrated electronics
N With integrated electronics

02 DN 6
03 DN 10

Spool symbols



With spool symbols：3C2(1)and 3C40(1)
P → A： q_{vmax} B →T:$q_{vmax}/2$
P → B： $q_{vmax}/2$ A →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.

Further details in clear text

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

No code BFW(type)
BFWN(type)
A1 Command value input ± 10V
F1 Command value input4~20mA

Electrical connection For BFW (type)
[2]K4 with plug component DIN EN 175301–803
See page A.1.3
BFWN (type)
[2]K31 with plug component DIN 43 650–AM2
See page A.1.4

Special protection
No code Without special protection
[1]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 □p = 10 bar

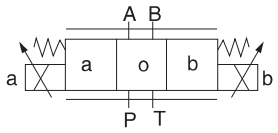
DN 6
07 7 L/min
15 15 L/min
30 26 L/min
DN 10
30 30 L/min
60 60 L/min

1.Other types of electrical protection on request 2.Only for DN6：for versian “3C40”sea water resistant only state “K31”!

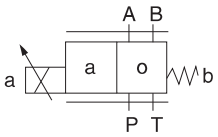
Proportional Directional Valve (BFW/BFWN)

Model description

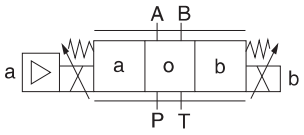
Model BFW···



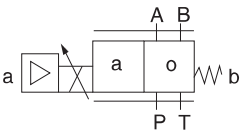
Model BFW···2B2B (2B40B)



Model BFWN···



Model BFWN···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 BFW) or integrated control electronics (type BFWN).

Design:

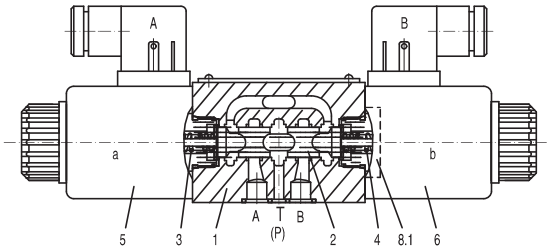
The valves basically consist of:

—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:

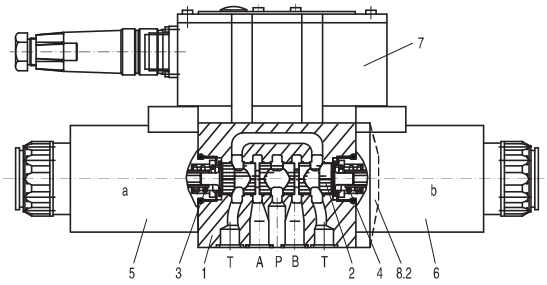
— When solenoids (5 and 6) do not work, the control spool (2) is held in the central position by compression springs (3 and 4)
— Direct actuation of the control spool (2) by energising a proportional solenoid E.g. When the solenoid "b" power is on (6)
→ The control spool (2) is moved to the left in proportion 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 BFW–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 "a".
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 BFWN–03···2x/···

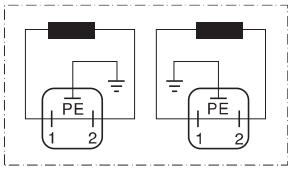


Note for type BFW–02···2X/···:
Draining of tank line is to be avoided. With the appropriate installation conditions, a back pressure valve is to be installed (back pressure approx. 2 bar).

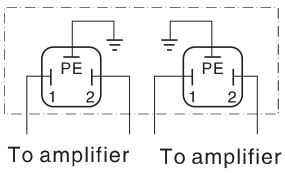
Electrical connection, plug–in connectors

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

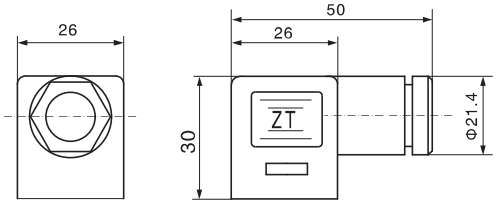
Connection on component plug



Connection on plug–in connector



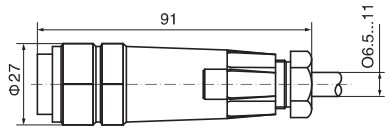
Plug–in connector: CECC 75 301–803–A002FA–H3D08–G/DIN EN 175 301–803 and ISO 4400

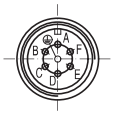


Proportional Directional Valve (BFW/BFWN)

Electrical connection, plug–in connectors

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

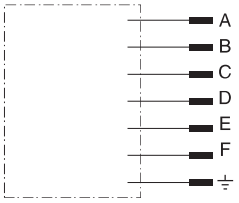




Plug–in connector:
DIN 43 563–BF6–3/Pg11

Integrated electronics for type BFWN

Pin allocation of the component plug

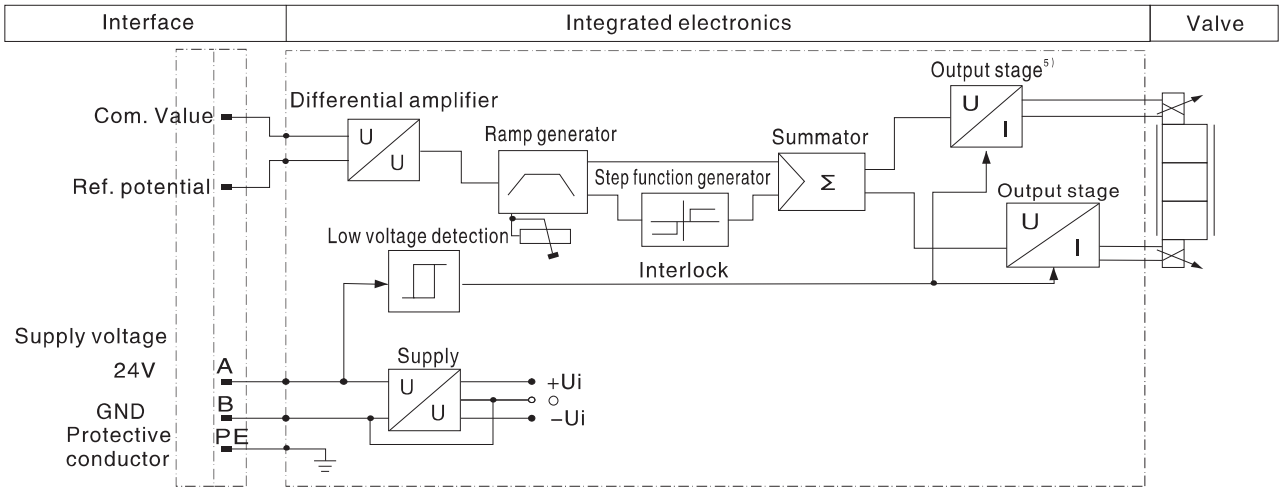


	Contact	Signal
Supply voltage	A B	24VDC(19~35VDC) GND
	C	n.c.(1)
Differential amplifier input	D E	Com. value (±10V/4–20mA) reference potential
	F	n.c.(1)

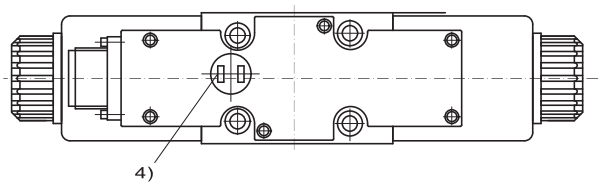
Com. value: Positive command value (0 to 10 V or 12 to 20 mA) at D and reference potential to E causes flow from P to A and B to T.
Negative command value (0 to 10 V or 12 to 4 mA) at D and reference potential to E causes flow from P to B and A to T.
For valves with a solenoid on side "a" (spool variants 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^2
–up to 50 m cable length type LiYCY 5 x 1.0 mm^2
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 Tup and Tdown
5) Output stages current regulated
6) Low voltage detection is not carried out for component type BFWN–03–2X

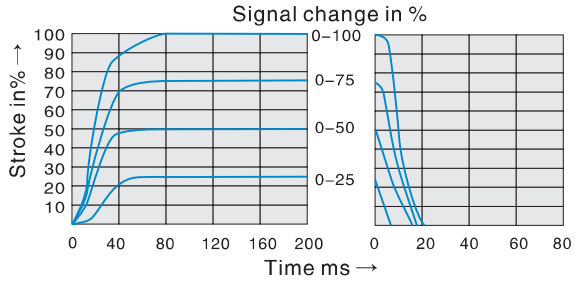


Proportional Directional Valve (BFW/BFWN)

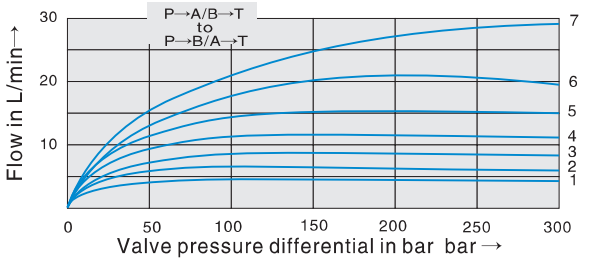
Characteristic curves

DN6

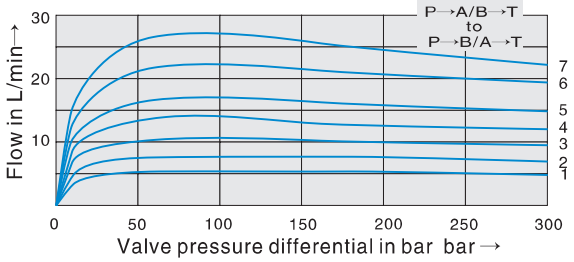
Transient functions with stepped form of electrical input signa



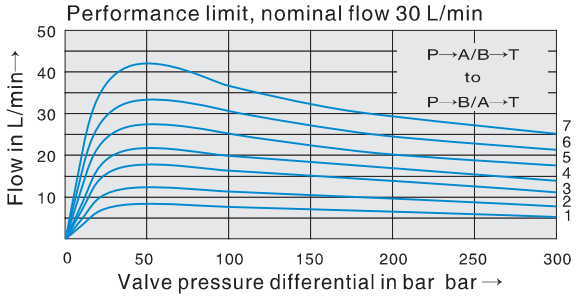
Performance limit, nominal flow 7 L/min



Performance limit, nominal flow 15 L/min



Performance limit, nominal flow 30 L/min

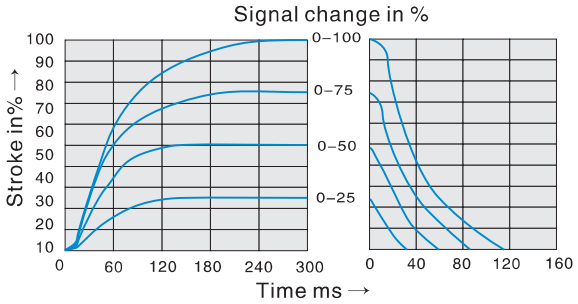


1 Com. Value=40%
2 Com. Value=50%
3 Com. Value=60%
4 Com. Value=70%
5 Com. Value=80%
6 Com. Value=90%
7 Com. Value=100%

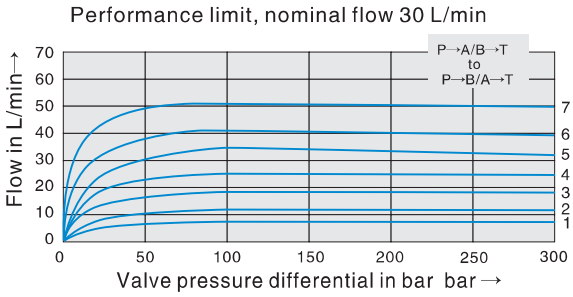
If the performance limits are exceeded, then the movement of spool will be unstable.

DN10

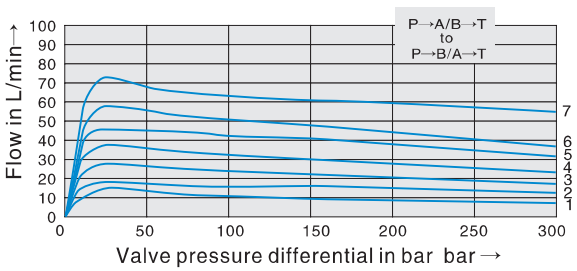
Transient functions with stepped form of electrical input signa



Performance limit, nominal flow 30 L/min



Performance limit, nominal flow 60 L/min



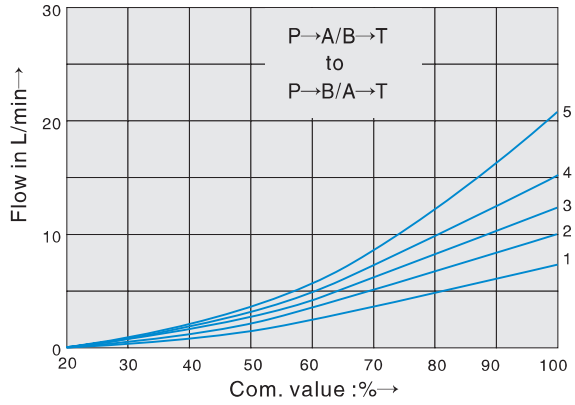
1 Com. Value=40%
2 Com. Value=50%
3 Com. Value=60%
4 Com. Value=70%
5 Com. Value=80%
6 Com. Value=90%
7 Com. Value=100%

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

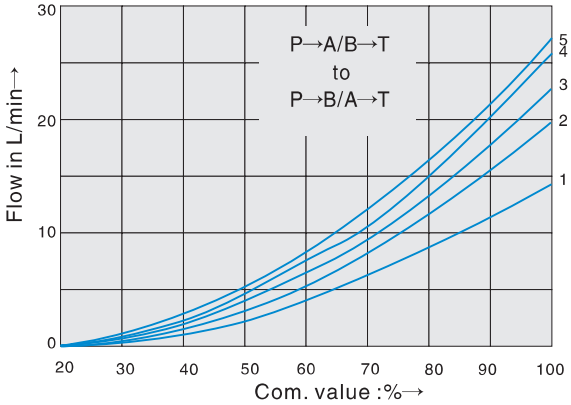
Proportional Directional Valve (BFW/BFWN)

Characteristic curves (measured with HLP46, Qoil = 40 ± 5℃) DN6

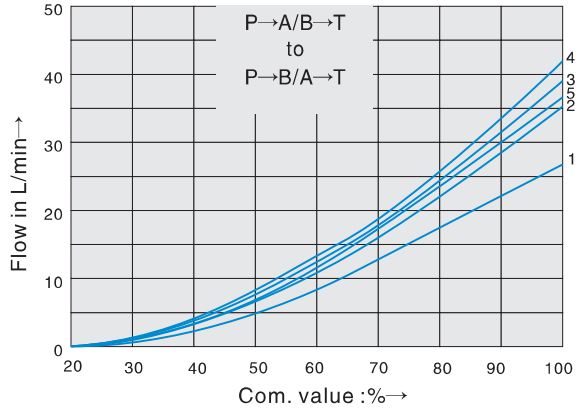
7 l/min nominal flow at differential pressure 10 bar



15 l/min nominal flow at differential pressure 10 bar



30 l/min nominal flow at differential pressure 10 bar

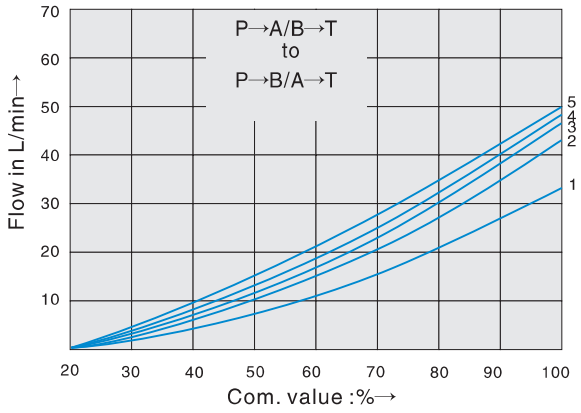


1 △p=10 bar Constant
2 △p=20 bar Constant
3 △p=30 bar Constant
4 △p=50 bar Constant
5 △p=100 bar Constant

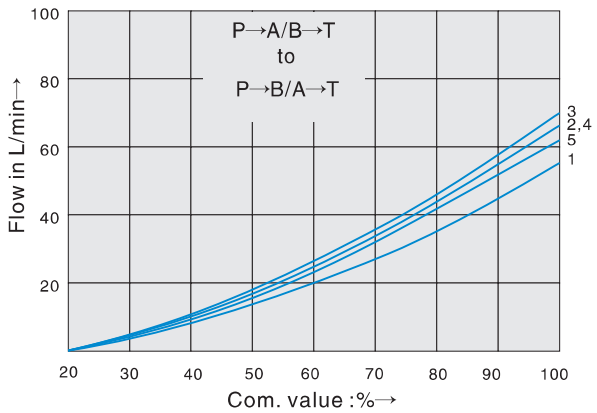
△p= Valve pressure differential
(inlet pressure P_p minus load
pressure P_L and minus return pressure P_T)

Characteristic curves (measured with HLP46, Qoil = 40 ± 5℃) DN10

30 l/min nominal flow at differential pressure 10 bar



60 l/min nominal flow at differential pressure 10 bar



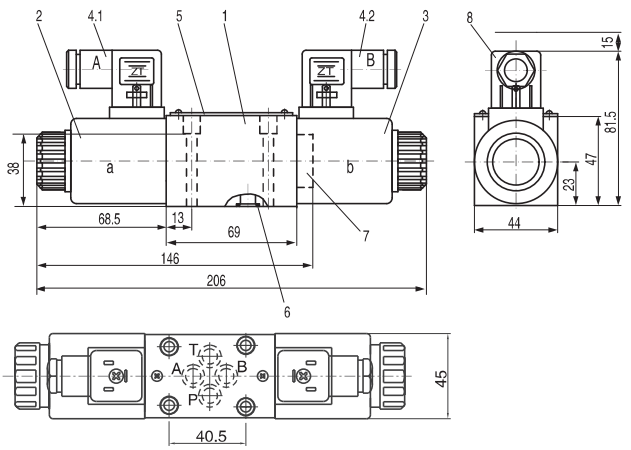
1 △p=10 bar Constant
2 △p=20 bar Constant
3 △p=30 bar Constant
4 △p=50 bar Constant
5 △p=100 bar Constant

△p= Valve pressure differential
(inlet pressure P_p minus load
pressure P_L and minus return pressure P_T)

Proportional Directional Valve（BFW/BFWN）

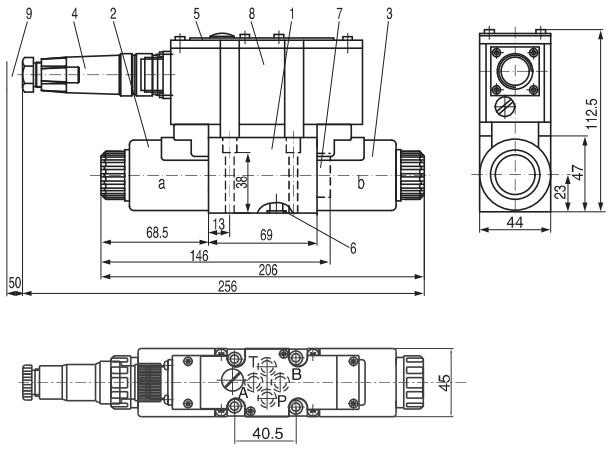
Unit dimensions

BFW–02 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，IS04401 (and) CETOP–RP 121 H

BFWN–02···/···K31···V type

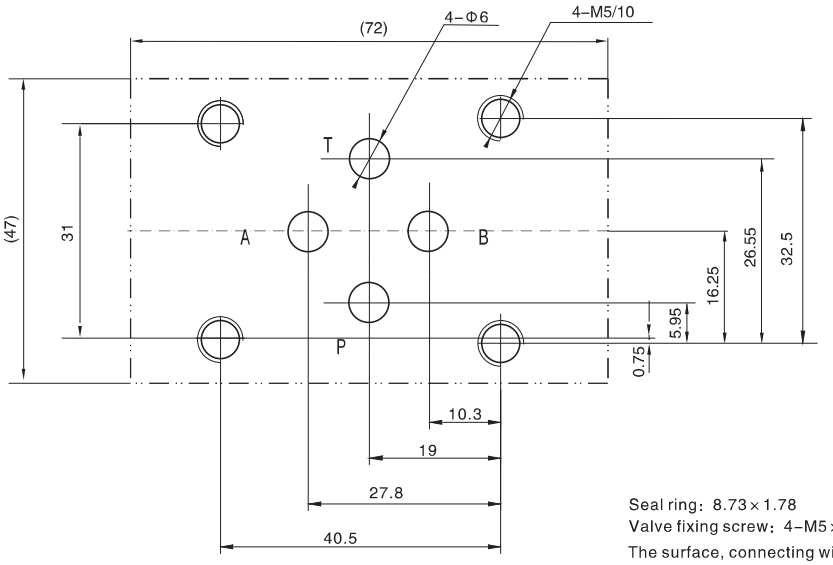


1 Valve body
2 Proportional solenoid “a”
3 Proportional solenoid “b”
4 Plug–in connector to E DIN 43 563–BF6–3/Pg11
5 Nameplate
6 8.73 x 1.78 O Identical seal rings for ports A, B, P and T
7 Plug for valves with one solenoid （2 switched positions, spool type 2B2B or 2B40B)
8 Integrated electronics
9 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 DIN 912–12.9；M_A=8.9 Nm

Subplate size

BFW–02
BFWN–02

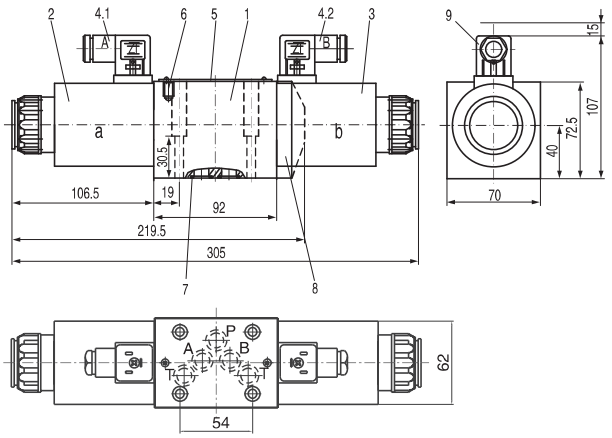


Seal ring：8.73×1.78
Valve fixing screw：4–M5×45–12.9(GB70–85)
The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100mm flatness.

Proportional Directional Valve（BFW/BFWN）

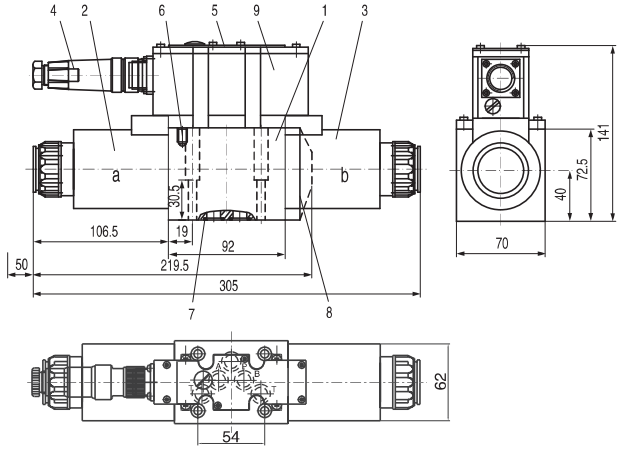
Unit dimensions

BFW–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，IS04401 (and) CETOP–RP 121 H

BFWN–03 type

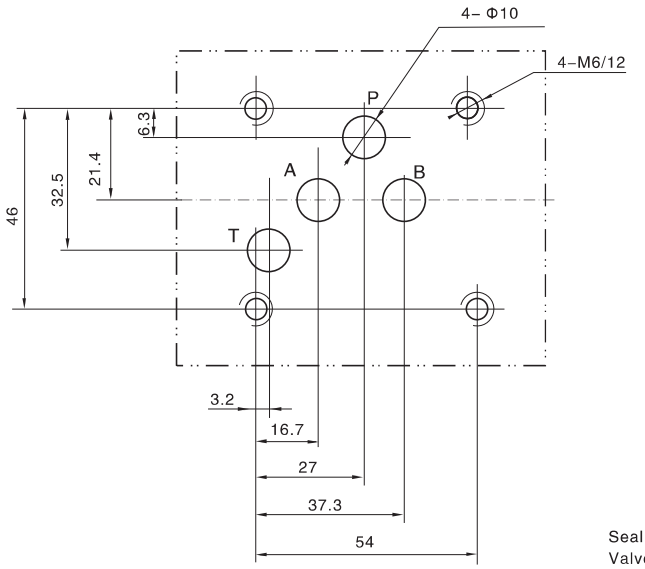


1 Valve body
2 Proportional solenoid “a”
3 Proportional solenoid “b”
4 Plug–in connector, to E DIN43563–BF6–3/Pg11
5 Nameplate
6 Valve deflation screw
7 12 x 2 I O dentical seal rings for ports A, B, P and T
8 Plug for valves with one solenoid （2 positions, spool type 2B2B or 2B40B)
9 Integrated electronics
10 Space required for theconnection cable and to remove the plug–in connector
11 Machined valve mounting surface, connection location to DIN 24 340A,IS04401(and)CETOP–RP 121 H

Mounting plate: please refer to below drawing
Subplates：Valve fixing screws：4 M6x 40 DIN 912–12.9；M_A=15.5 Nm

Subplate size

BFW–03
BFWN–03



Seal ring：8.73 x 1.78
Valve fixing screw：4–M5 x 45–12.9(GB70–85)
The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100mm flatness.

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 (℃)	–20~80	
Ambient temperature range (℃)	–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} 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 (^{0}C)		–20~80(+40~+50 is preference)		
Viscosity range (mm^2/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_{10}≥75 。			

Electrical

Voltage type			Direct voltage	
BFWN 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 ℃		6DN2.7	10DN3.7
	Max. warm value		6DN4.05	10DN5.55
Duty cycle (%)			100	
Max.Coil temperature[2] (℃)			up to150	
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[3]		Details refer to proportional amplifier	
		Digital amplifier in Eurocard format[3]		Details refer to proportional amplifier	
BFWN (type)		Analogue command value module		Integrated into the valvesA1.4	
Supply voltage	BFWE[1] BFWNE	Rated voltage	VDC	24	
		Lower limiting value	V	21/22	19.4
		Upper limiting value	V	35	
Amplifier current consumption		I_{Max}	A	2	2
		Max. impulse current	A	3	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

BFW – * – E – * – * – * – * – 2X – G24 – * – * – * *

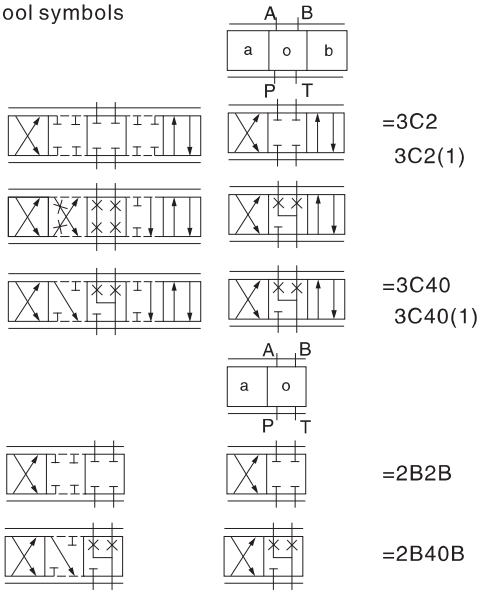
Proportional directional valve

No code Without integrated electronics
N With integrated electronics

Spool with displacement sensor

02 DN 6
03 DN 10

Spool symbols



With spool symbols：3C2(1)and 3C40(1)
P → A：q_{vmax} B →T:$q_{vmax}/2$
P → B：$q_{vmax}/2$ A →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.

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 input4~20mA

Electrical connection
BFW (type)
[2]K4 with plug component DIN EN 175301–803
BFWN(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 □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

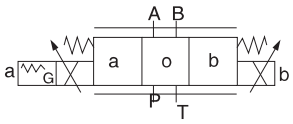
Proportional Directional Valve (BFWE 2X)

Model description

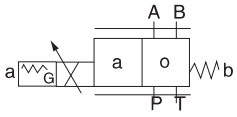
Directional Proportional valve without integrated electronics

Directional Proportional valve with integrated electronics

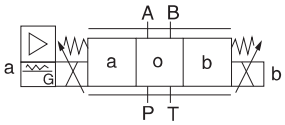
Model BFWE···



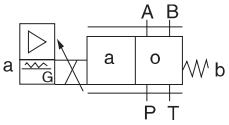
Model BFWE···2B2B (2B40B)



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)

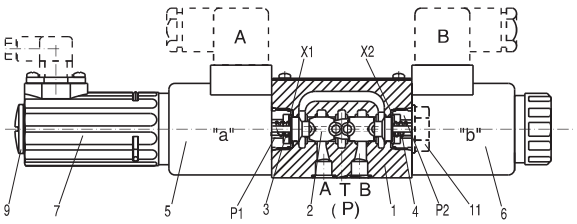
Design:

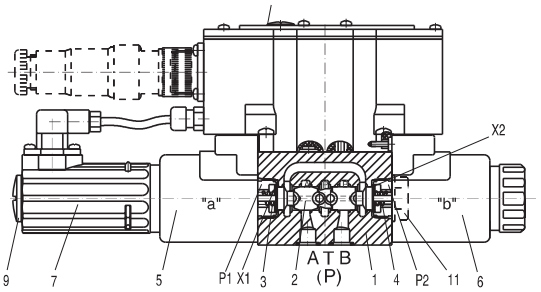
The valves basically consist of:

— 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 onlyfitted 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).

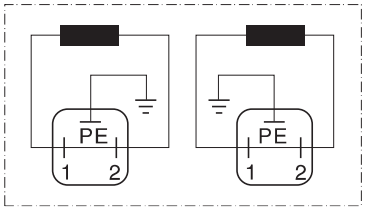
Proportional Directional Valve (BFWE 2X)

Electrical connection, plug–in connectors

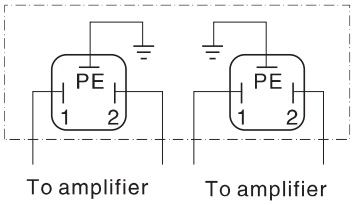
BFWE type (Without integrated electronics not for version "J"=sea water resistant)

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

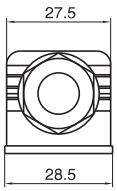
Connection on component plug

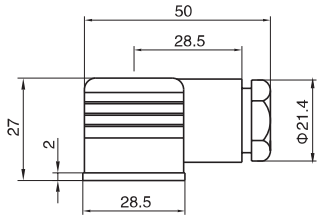


Connection on plug–in connector

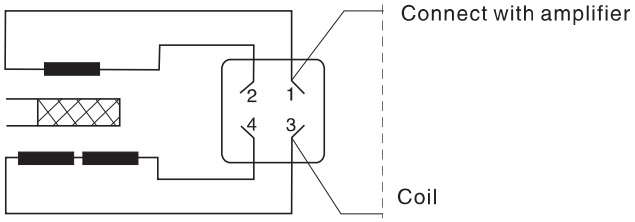


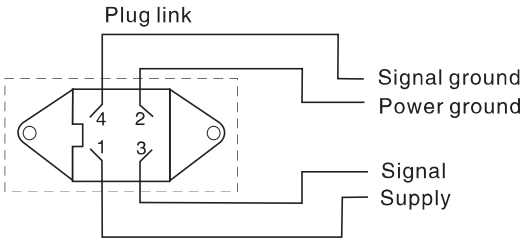
Outlook size of plug–in connector





Inductive position transducer



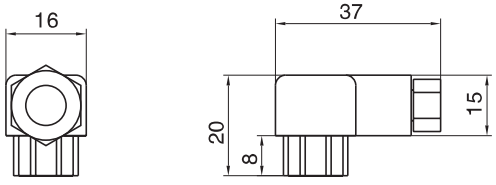


Mating connector 4–role
connector cable

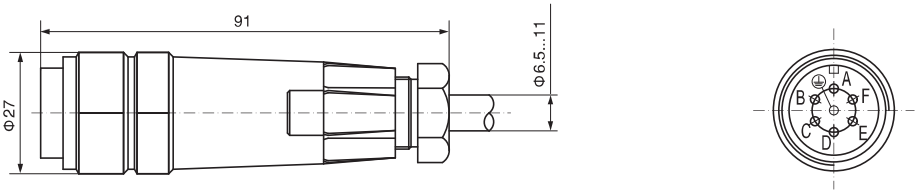
Suggestion: the length of the wire is expected to be 50 meters,type LiYCY 4*0.25mm^2

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

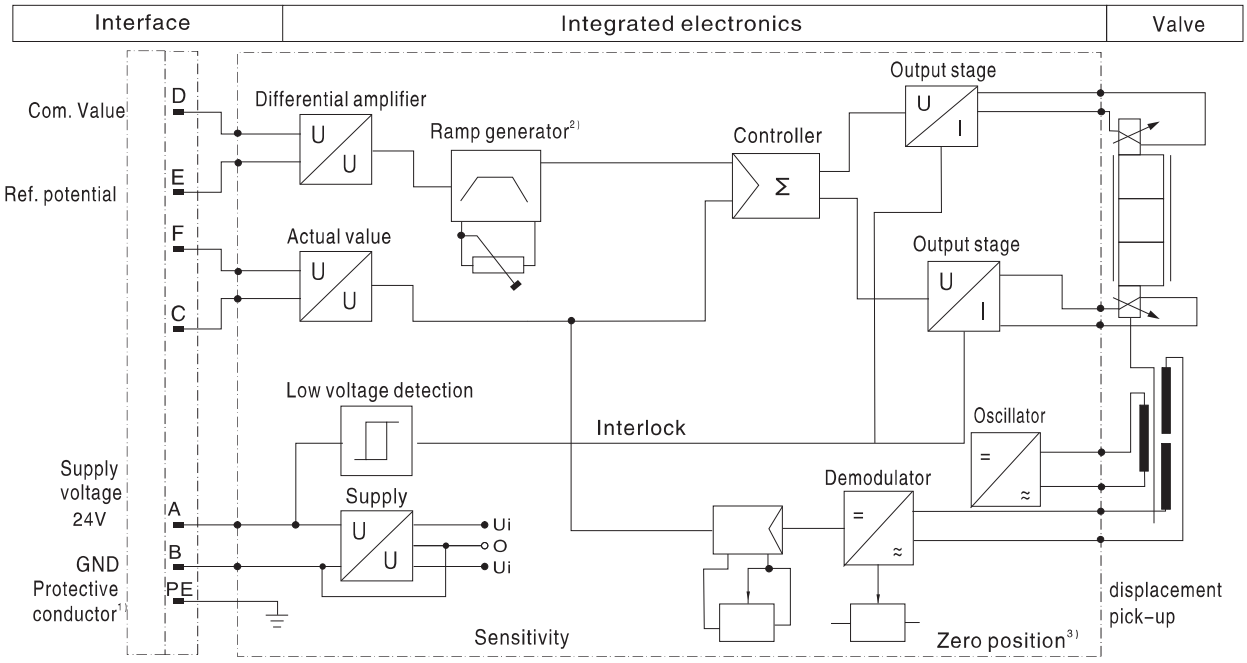
	Plug-in connector	A1 Connector type A1	Connector type F1
Supply	A	24VDC(u(t)=19.4~35V);/$_{max}$=2A	
voltage	B	0V	
Reference potential(actual value)	C	Link to F; R_e>50KΩ	Link to F; R_e<10Ω
Differential amplifier input	D	Com. Value ± 10V;R_e>50KΩ	Com. Value 4···20mA; R_e>100Ω
	E	Reference potential set value	
Measuring the output (actual value)	F	Actual value ± 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.

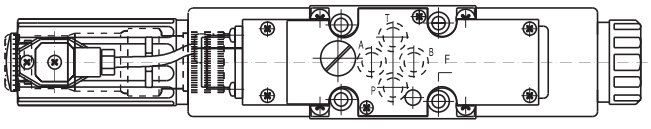
Connection cable： Recommendation:
-up to 25 m cable length type LiYCY 5 x 0.75 mm^2
-up to 50 m cable length type LiYCY 5 x 1.0 mm^2 External diameter 6.5 to 11 mm
Connect screen to PE only on the supply side

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.

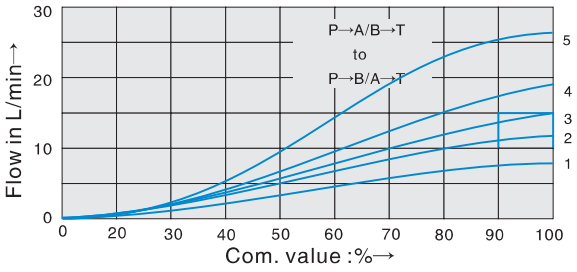
1.Contacts PE should be linked to the low-temperature subject and valve body.
2.Ramp time could be adjustable within the scope 0~02.5s outside, as well as T_{up} and T_{down}.
3.Zero point outside is adjustable.
4.output end is the current output
5.Zero point can be set from the outside



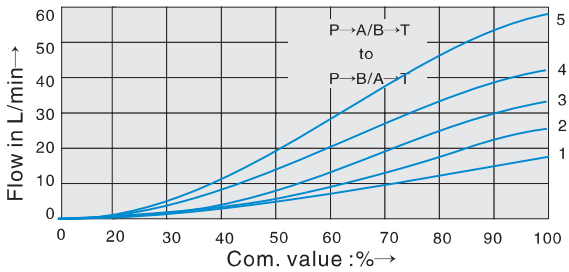
Proportional Directional Valve (BFWE 2X)

Characteristic curves (measured with HLP46, Qoil = 40 ± 5℃) DN6

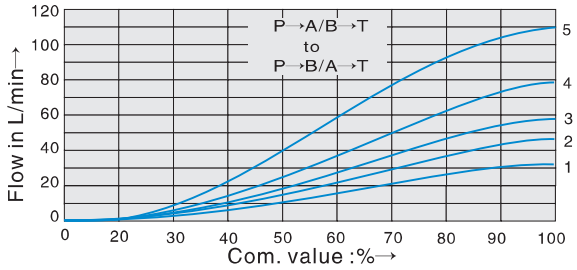
8 l/min nominal flow at differential pressure 10 bar



16 l/min nominal flow at differential pressure 10 bar

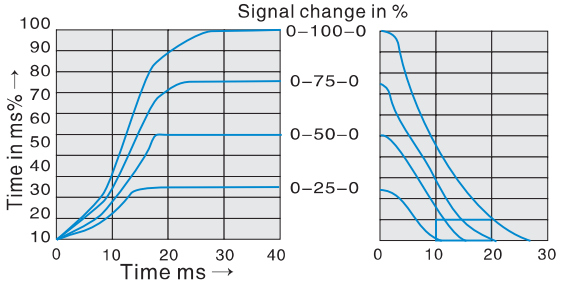


32 l/min nominal flow at differential pressure 10 bar



Transient function with stepped form of electrical input signal

Signal change in %

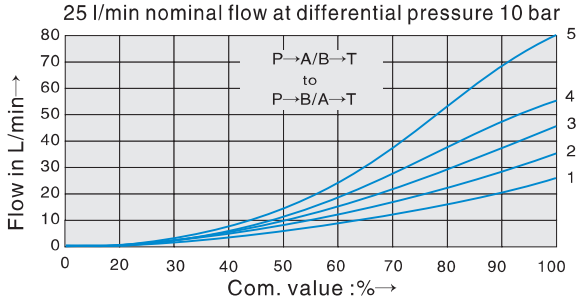


1 △p=10 bar Constant
2 △p=20 bar Constant
3 △p=30 bar Constant
4 △p=50 bar Constant
5 △p=100 bar Constant

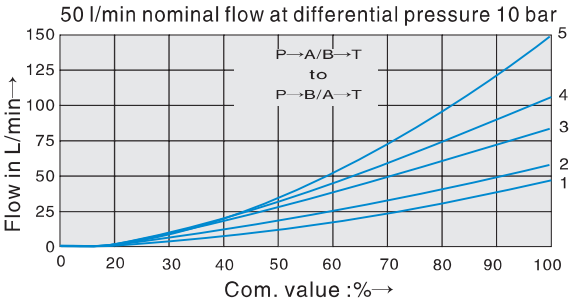
△p= Valve differential pressure
(inlet pressure P_p minus load
pressure P_L and minus return pressure P_T)

Characteristic curves (measured with HLP46, Qoil = 40 ± 5℃) DN10

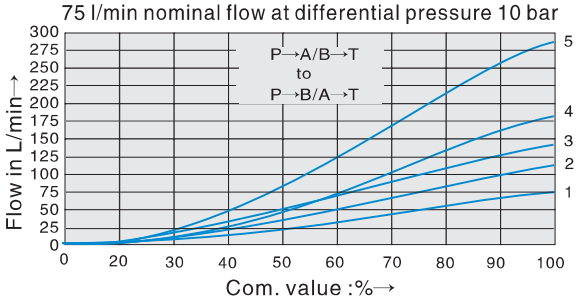
25 l/min nominal flow at differential pressure 10 bar



50 l/min nominal flow at differential pressure 10 bar

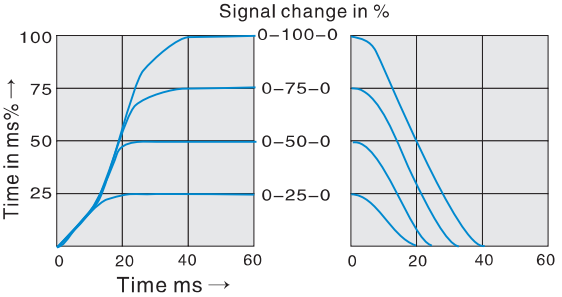


75 l/min nominal flow at differential pressure 10 bar



Transient function with stepped form of electrical input signal

Signal change in %



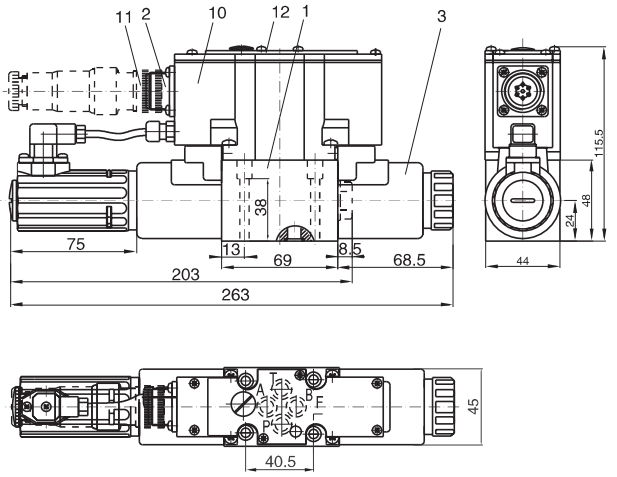
1 △p=10 bar Constant
2 △p=20 bar Constant
3 △p=30 bar Constant
4 △p=50 bar Constant
5 △p=100 bar Constant

△p= Valve differential pressure
(inlet pressure P_p minus load
pressure P_L and minus return pressure P_T)

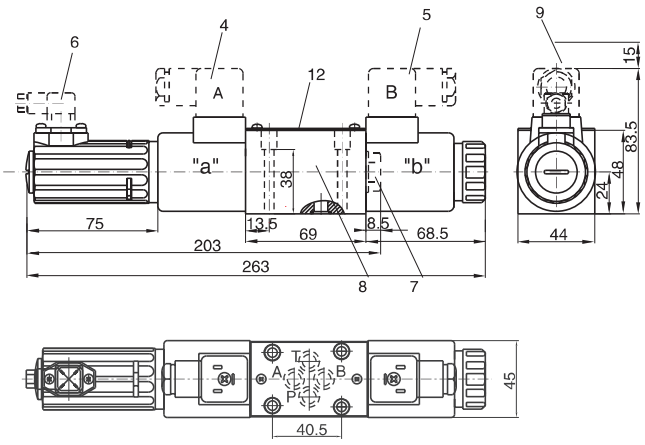
Proportional Directional Valve（BFWE 2X）

Unit dimensions

BFWNE–02

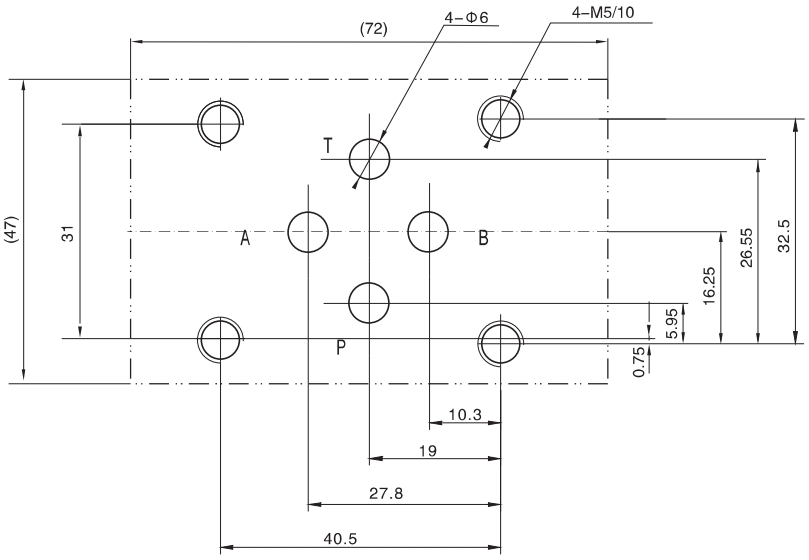


BFWE–02



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 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–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

Subplate size

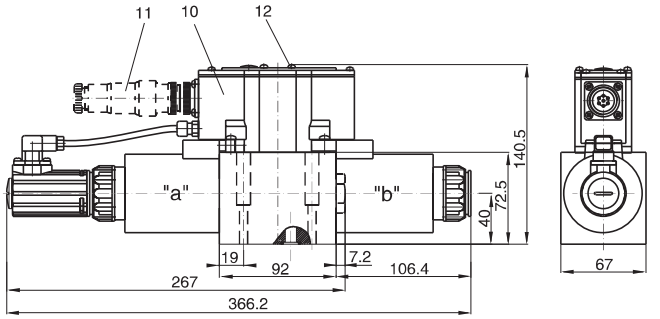


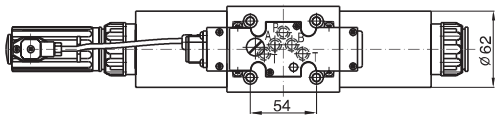
Subplates： G341/01(G1/4) G342/01(G3/8) G502/01(G1/2)
Valve fixing screws：4–M5x45 DIN 912–10.9；M_A=8.9 Nm
The surface, connecting with the valve, should be Ra0.8 roughness, and 0.01/100mm flatness.

Proportional Directional Valve (BFWE 2X)

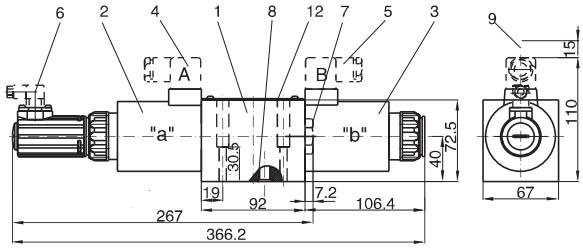
Unit dimensions

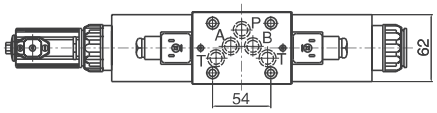
BFWNE–03





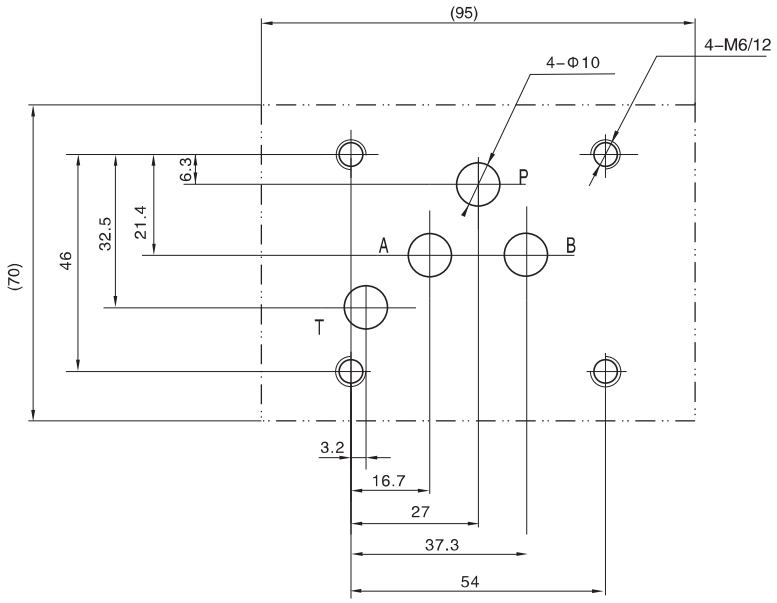
BFWE–03





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 lover, spool type 2B2B or 2B40B
8. Identical seal ring12*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

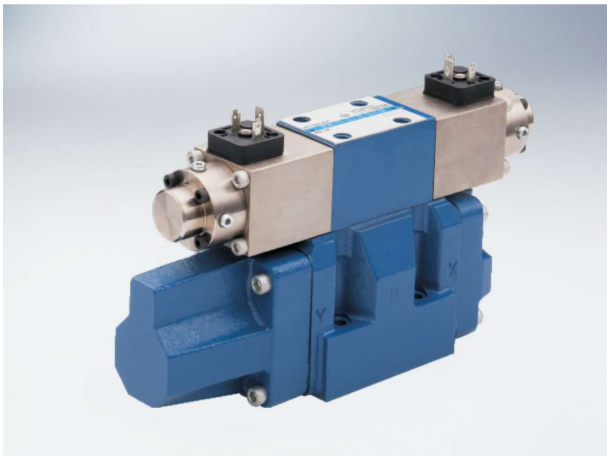
Subplate size



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.

Proportional Electro-hydraulic Directional Valve (BFWH)

Technical specification



BFWH electro-hydraulic proportional directional valve is a 2-stage valve with a pilot. It is controlled by a proportional solenoid and converts the electrical signal into a fuild pressure signal to control the flow rate and directions in the hydraulic system.

Specification		03	04	06
Maximum pressure (MPa)		31.5		
Return pressure (MPa)	T(For extl disch)	< 25		
	T(For intl disch)	< 3		
	Port Y	< 3		
Maximum flow (l/min)		85	150	325
Hysteresis (%)		< 6		
Repeatability (%)		< 3		
Rated current (mA)		800		
Hydraulic fluid		Mineral oil, phosphate-ester		
Viscosity (mm^2/s)		2.8~100		
Fluid temp. (^{0}C)		-20~70		
Coil resistance (Ω)		19.5		
Cleanliness	Filter is recommended for the highest fluid pollution degree;the lowest specific filtration resistance according to ISO 4406 (C) 20/18/15.			

Model instruction

BFWH - * - * - * - * - 50 *

Proportional electro-hydraulic directional valve

Specification
03 DN 10
04 DN 16
06 DN 25

Symbol: (See BFW)

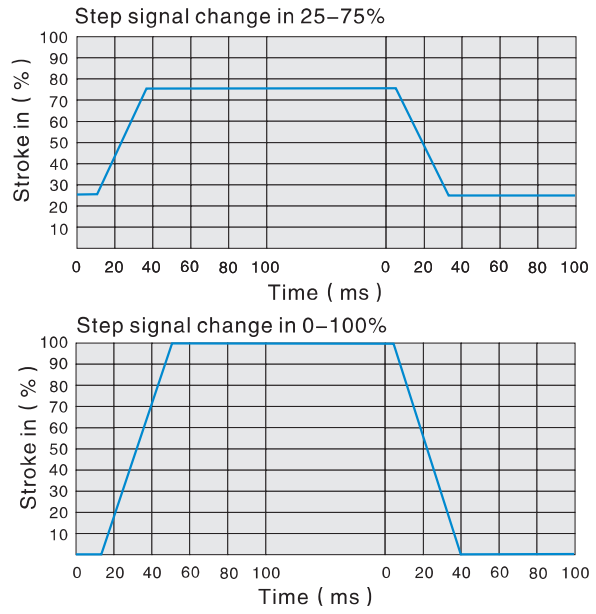
Control oil:
Omit Intl cntrl intl disch
X Extl cntrl intl disch
Y Intl cntrl extl disch
XY Extl cntrl extl disch

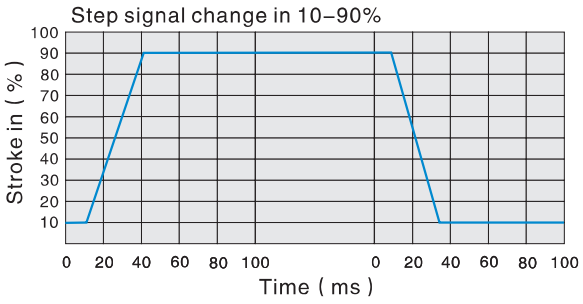
Nominal flow
(based on 1MPa pressure drop)
03 Specification
25 25 l/min
50 50 l/min
85 85 l/min
04 Specification
100 100 l/min
150 150 l/min
06 Specification
270 270 l/min
325 325 l/min

Design serial number

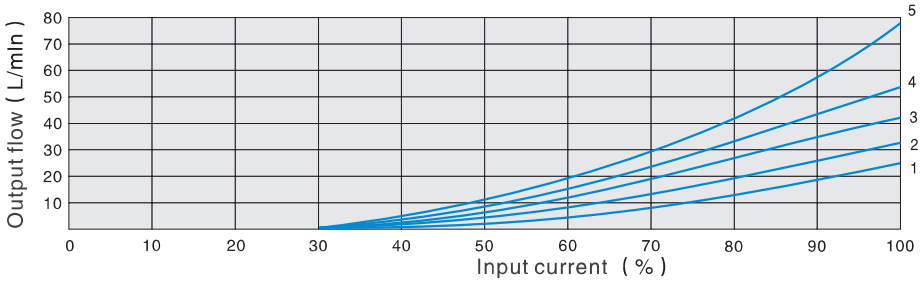
Remarks

03 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)

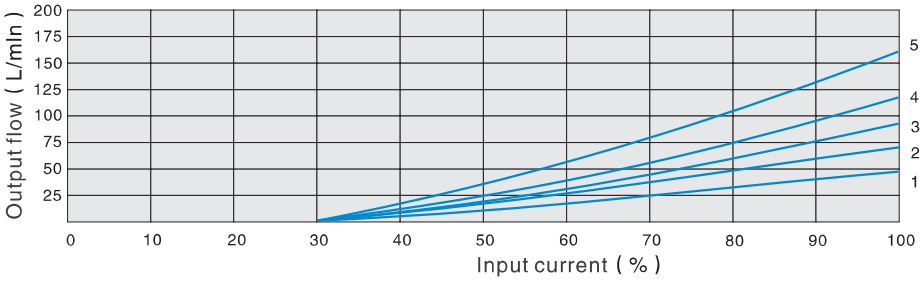




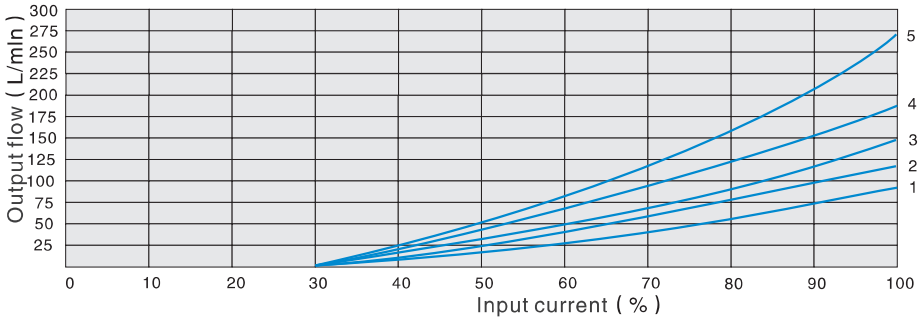
03 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)



25L/min nominal flow at differential pressure .
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant



50L/min nominal flow at differential pressure.
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

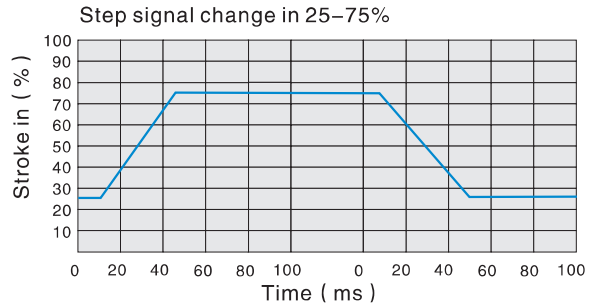


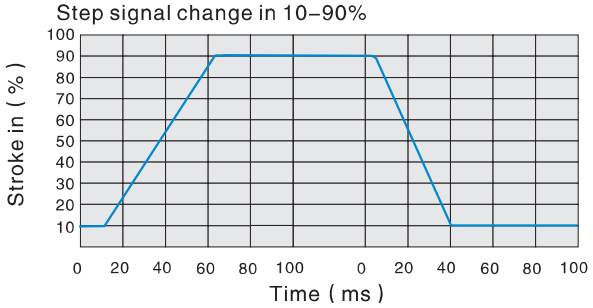
85L/min nominal flow at differential pressure.
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

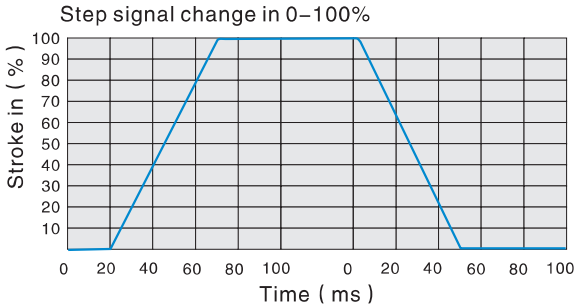
Pv=Valve differential pressure (input pressure minus load pressure and feedback pressure)

Proportional Electro-hydraulic Directional Valve (BFWH)

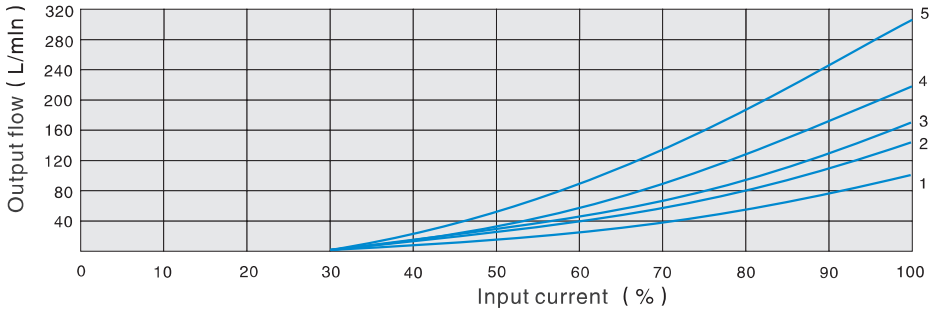
04 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)



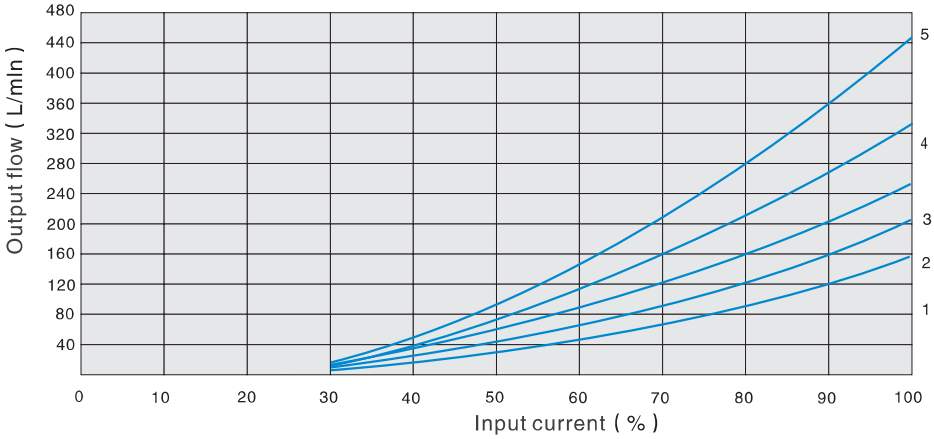




04 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)



100L/min nominal flow at differential pressure .
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

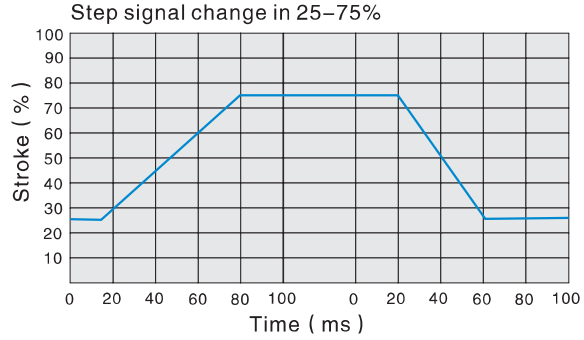


150L/min nominal flow at differential pressure.
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

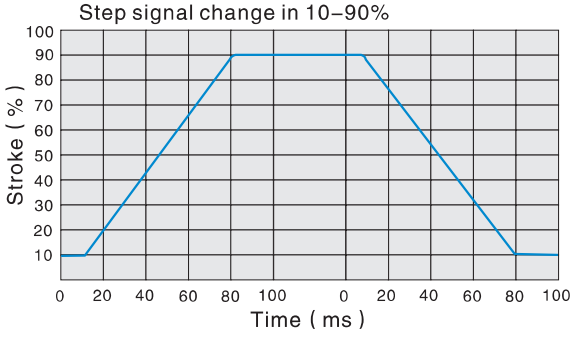
Pv=Valve differential pressure (input pressure minus load pressure and feedback pressure)

06 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)

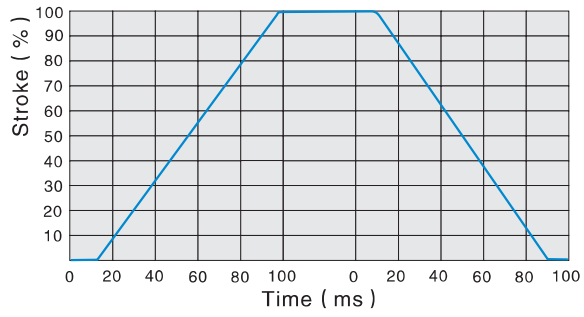
Step signal change in 25–75%



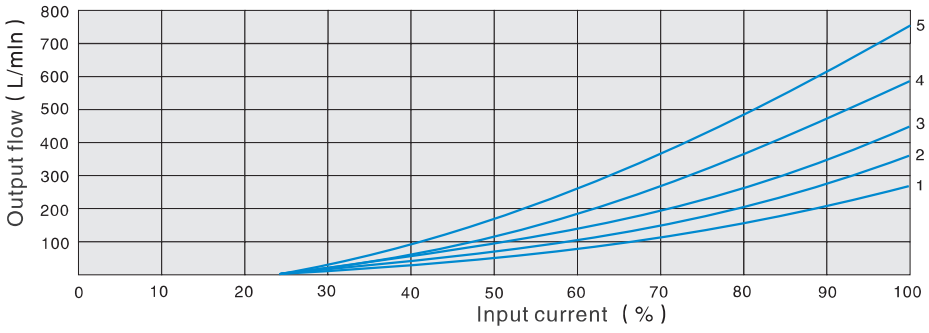
Step signal change in 10–90%



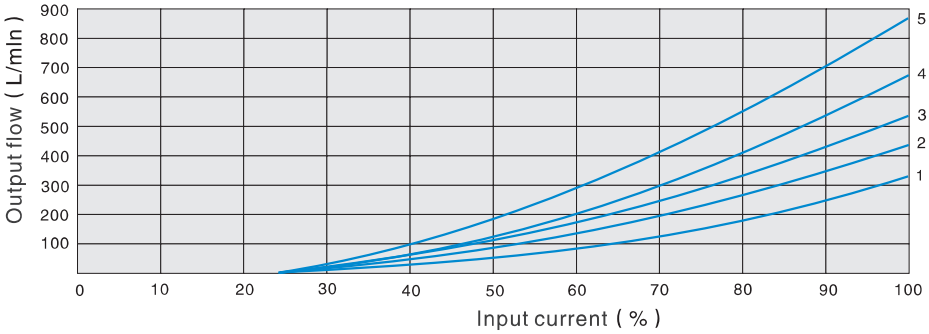
Step signal change in 0–100%



06 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)



270L/min nominal flow at differential pressure .
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

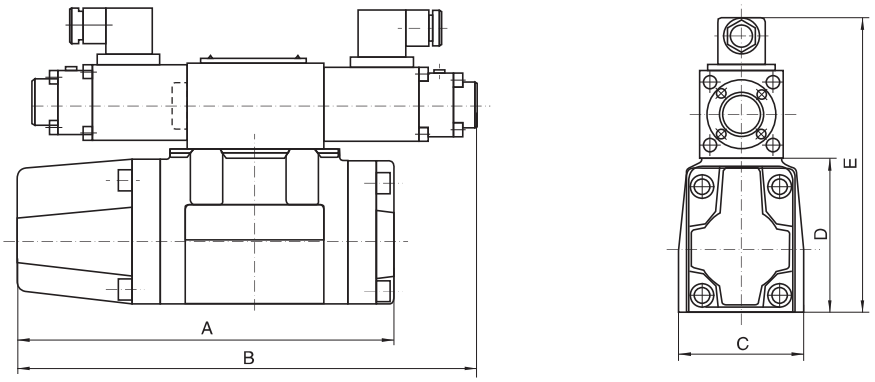


325L/min nominal flow at differential pressure.
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

Pv=Valve differential pressure (input pressure minus load pressure and feedback pressure)

Proportional Electro-hydraulic Directional Valve (BFWH)

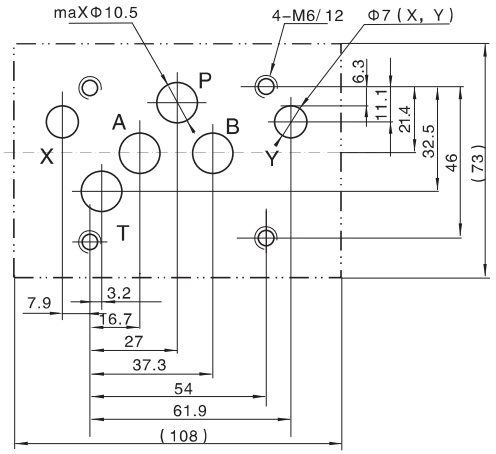
External dimensions



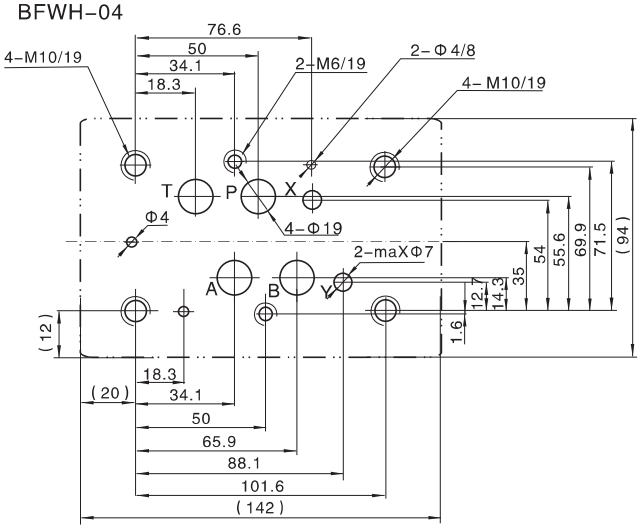
Specification	A	B	C	D	E
BFWH-03	216	250	70	86	171
BFWH-04	250	265	94	95	185
BFWH-06	280	290	120	117.5	202.5

Plate size

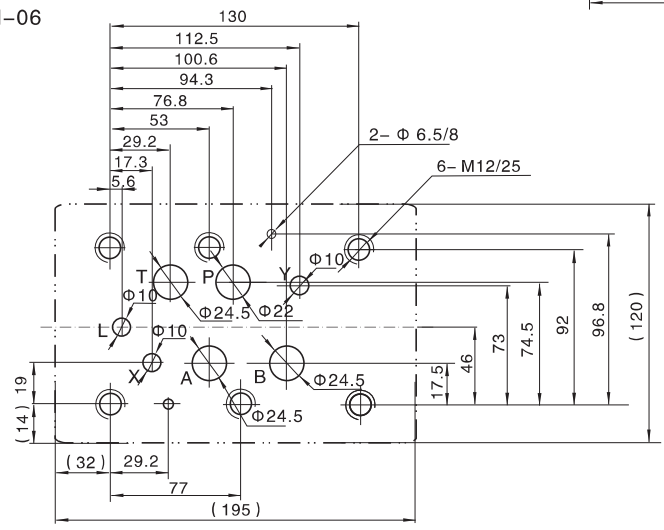
BFWH-03



BFWH-04



BFWH-06



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

Proportional Directly Operated Relief Valve (BYZ)

Technical specification

Maximum pressure (MPa)		31.5
Maximum flow	(l/min)	2
Minimum flow	(l/min)	0.7
Rated current	(mA)	800
Coil resistance	(Ω)	10~19.5
Hysteresis	(%)	< ±1.5
Repeatability	(%)	±1
Cleanliness	Filter is recommended for the highest fluid pollution degree;the lowest specific filtration resistance according to ISO 4406 (C) 20/18/15.	

The valve is a direct operated valve controlled by proportional solenoid, it is mainly used for small hydraulic system according to input current, and always is used to be taken as the pilot relief valve of a second pressure valve.

Model instruction

BYZ – 02 –* – 70–*

Remarks

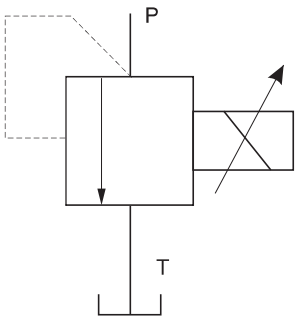
Proportional directly operated relief valve

Design serial number

Working pressure
7 7MPa
16 16MPa
25 25MPa
31.5 31.5MPa

Specification
02 DN 6

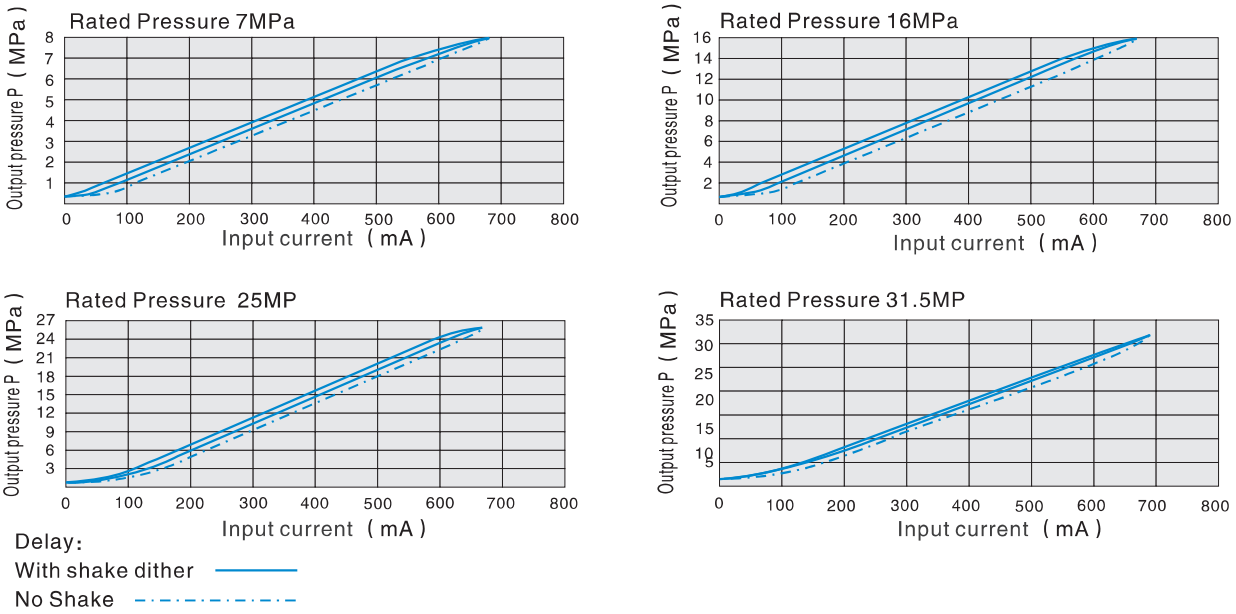
Code symbol



Proportional directly operated Relief Valve (BYZ)

02 Model Characteristic Curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)

Output Pressure/Input Current Curves



70 External dimensions

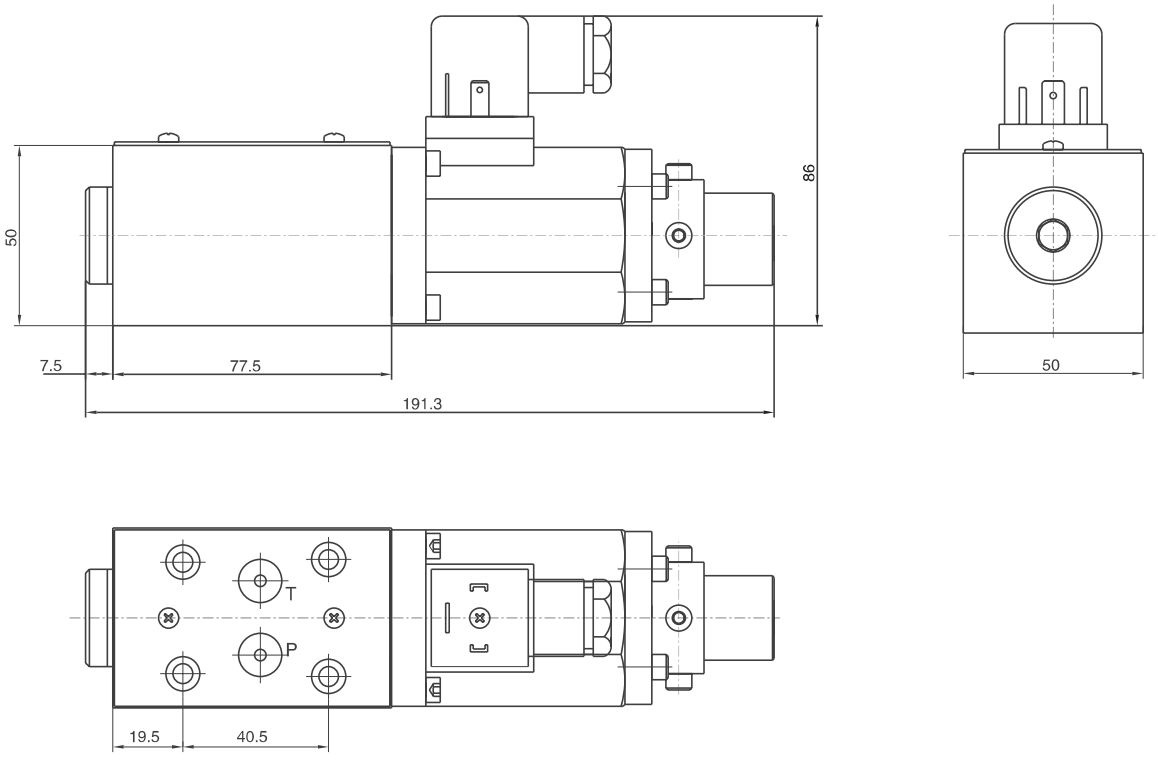
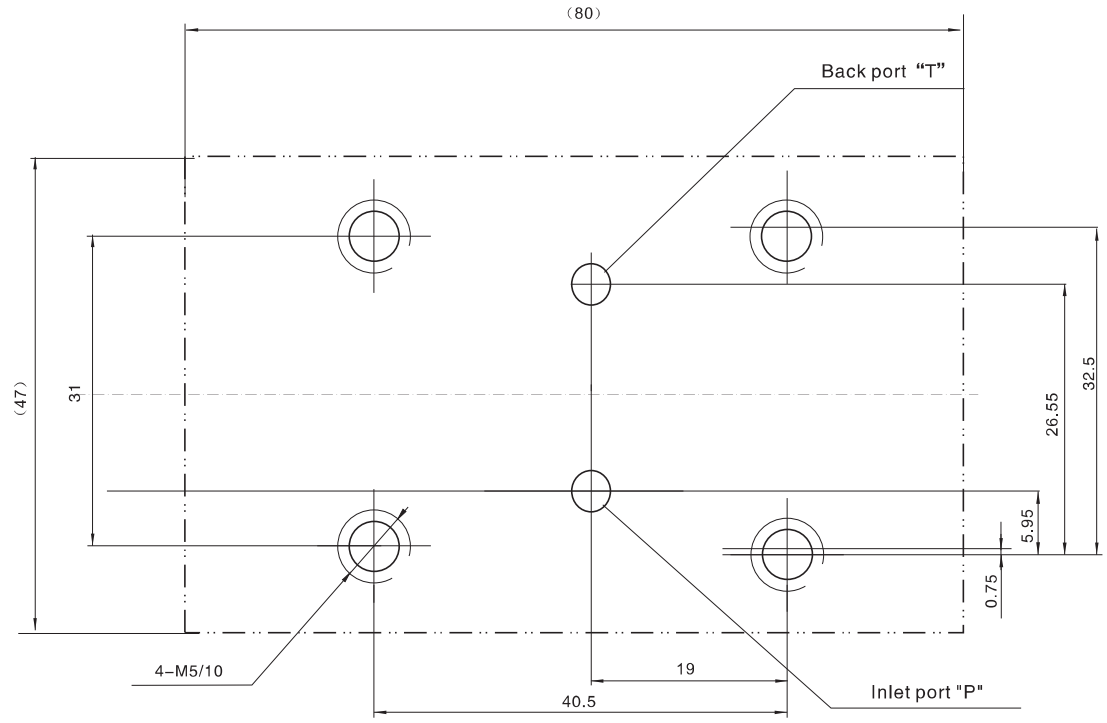


Plate size



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

Proportional Pilot-operated Relief Valve (BY)

Technical specification

Specification	03	06	10
Maximum pressure (MPa)	31.5	31.5	31.5
Maximum flow (L/min)	100	200	400
Minimum flow (L/min)	3		
Rated current (mA)	800		
Coil resistance (Ω)	10~19.5		
Hysteresis (%)	< ±1.5		
Repeatability (%)	< ±2		
Cleanliness	Filter is recommended for the highest fluid pollution degree;the lowest specific filtration resistance according to ISO 4406 (C) 20/18/15.		

Comprised of proportional directly-operated relief valve, pressure limiting valve and low-noise relief valve.

Model instruction

By - * - * * - 70 *

Proportional pilot-operated relief valve

Specification
03 DN10
06 DN20
10 DN30

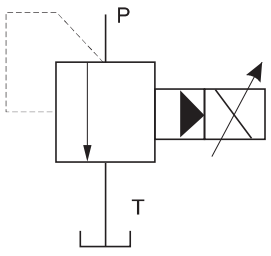
Working pressure:
7 7 MPa
16 16 MPa
25 25 MPa

Remarks

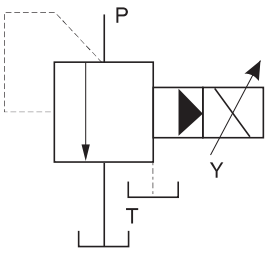
Design serial number

Control oil
Omit intl cntrl intnl disch
Y intl cntrl extl disch

Code symbol



Internal control, internal discharge



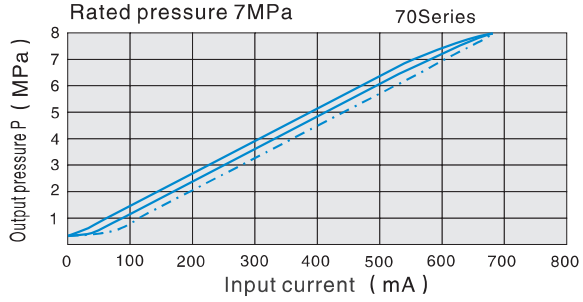
Internal control, external discharge

Proportional Pilot–operated Relief Valve (BY)

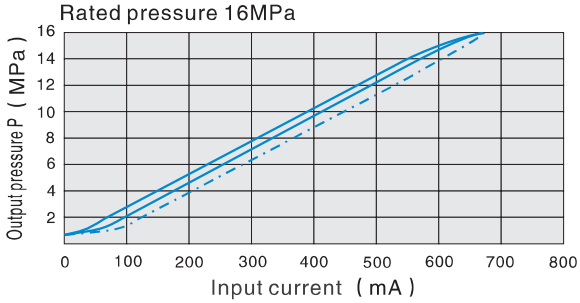
03、06、10 Model characteristic curves (Testing Condition ν =36X10^{-6}m^2/S t=50^{0}C)

Output pressure/input current curves

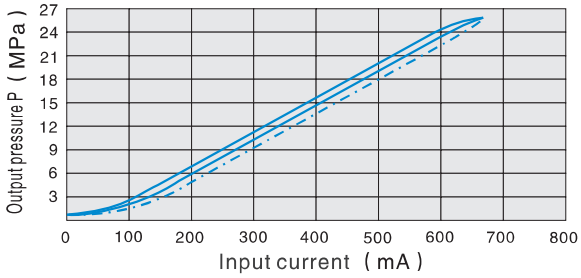
Rated pressure 7MPa 70Series



Rated pressure 16MPa



Rated pressure 25MPa



Delay:

With shake dither ——————

No Shake -·-·-·-·-·-·-

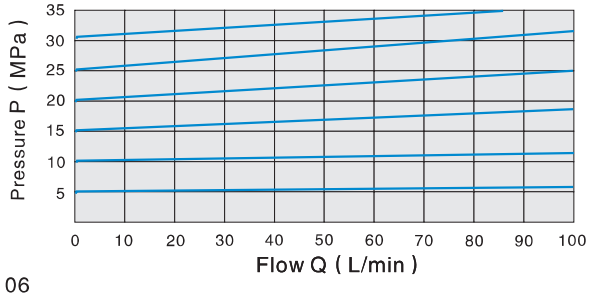
BY03、06、10 The result is tested under 27l/min

Note: In order to get the lowest settable pressure.
90 series initial current is not more than 0.1A,
70series must be 0A.

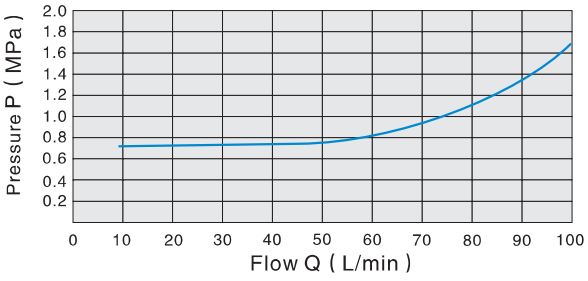
Characteristic curves (Testing Condition ν =36X10^{-6}m^2/S t=50^{0}C)

03

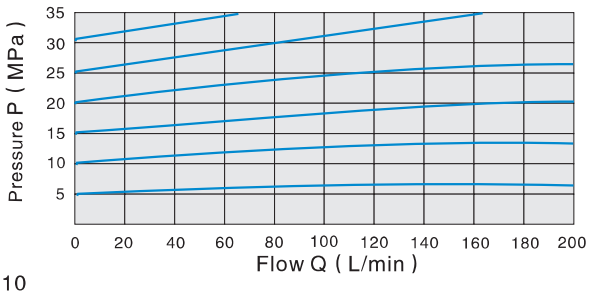
Working pressure in relation to flow

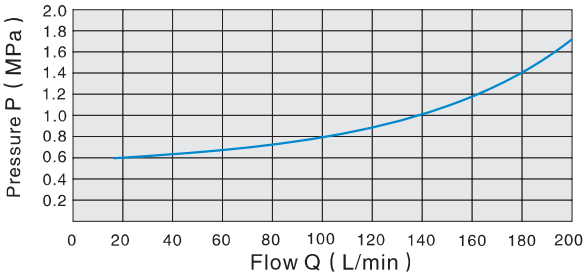


Lowest settable pressure in relation to flow

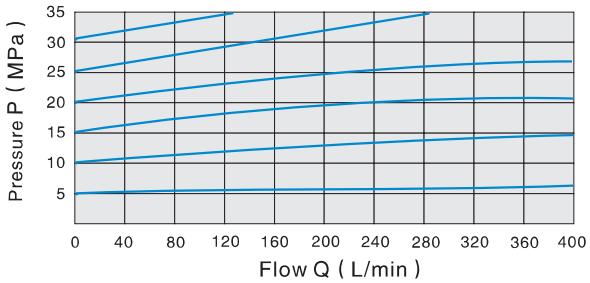


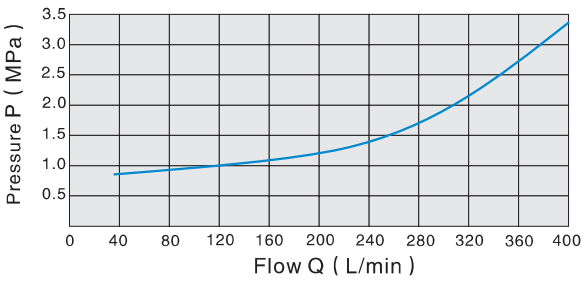
06





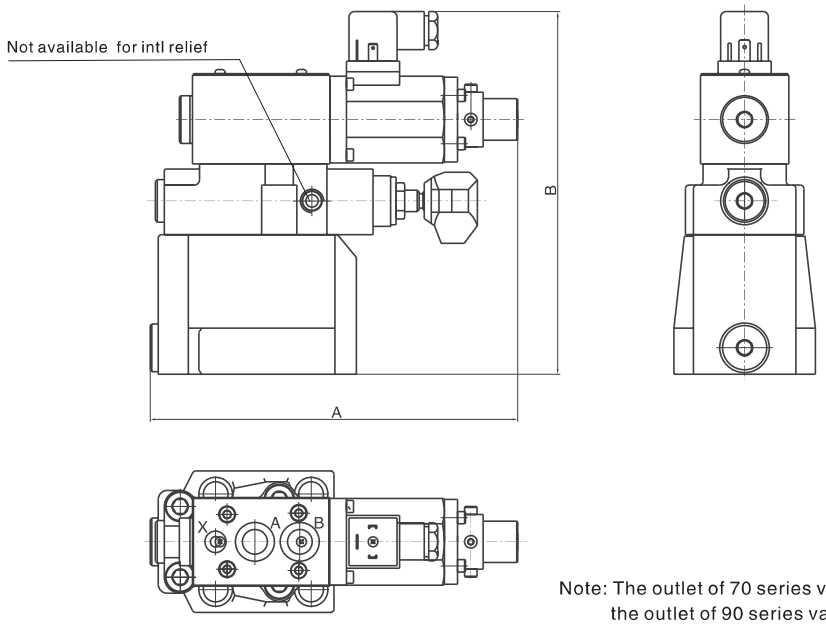
10





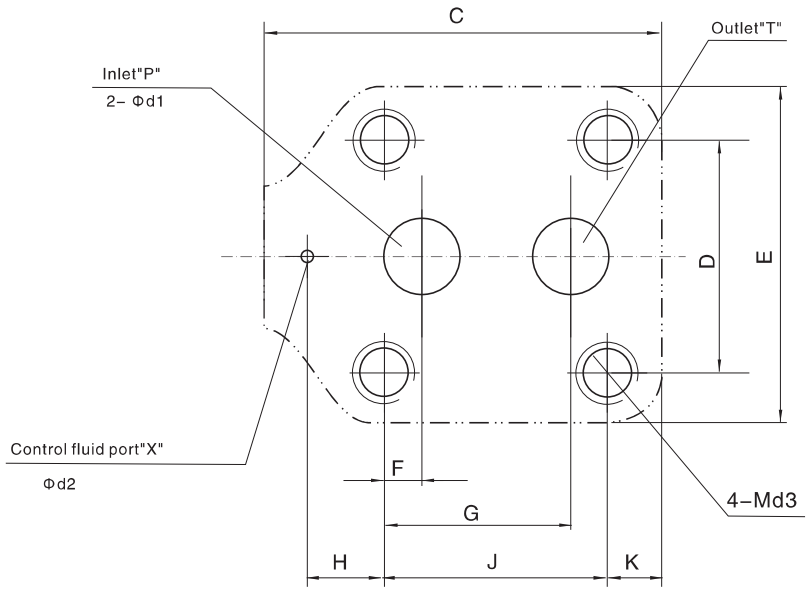
Proportional Pilot-operated Relief Valve (BY)

External dimensions



Note: The outlet of 70 series valve is in the safety valve, and the outlet of 90 series valve is in the proportional pilot valve.

Plate size



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

Specification	A	B	C	D	E	F	G	H	J	K	d_1	d_2	d_3
BY-03	197	193	112	54	80	22.2	47.6	0	54	25.8	12	6	12
BY-06	197	197	119	69.8	102	11.1	55.6	23.8	66.7	16.3	25	6	16
BY-10	197	200	150	82.5	116	12.7	76.2	31.7	89	18	32	6	18

Attention: set the deflate hole upward to exhaust air from the pipe

Proportional Pilot-operated Pressure Reducing Valve (BYJ)

Technical specification

Specification		03	06
Maximum pressure (MPa)		31.5	31.5
Maximum flow (l/min)		80	200
Secondary pressure Regulating range	(MPa)	See model description	
Rated current	(mA)	800	
Coil resistance	(Ω)	19.5	
Hysteresis	(%)	< ± 2.5	
Repeatability	(%)	< ±2	
Cleanliness		Filter is recommended for the highest fluid pollution degree;the lowest specific filtration resistance according to ISO 4406 (C) 20/18/15.	

Comprised of proportional directly-operated relief valve, pressure limiting valve and reducing valve, this product controls a secondary pressure from the system pressure according to value of input current.

Model instruction

BYJ - * - * * Y - 90 *

Proportional pilot-operated pressure reducing valve

Specification
03 DN10
06 DN20

Secondary pressure regulating range
7 7MPa
16 16MPa
25 25MPa

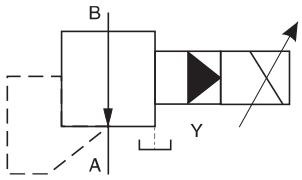
Remarks

Design serial number

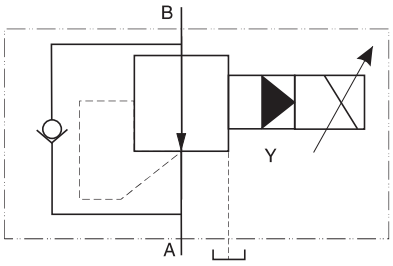
Control oil
Y intl cntrl extl disch

Default Without check valve
D With check valve

Code symbol



BYJ···Y

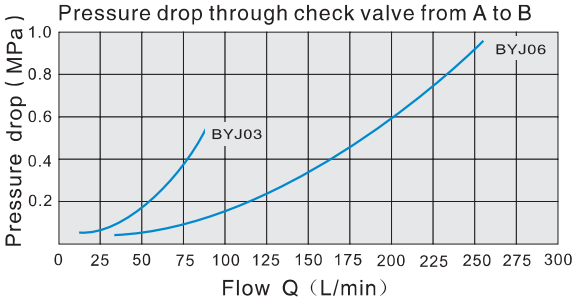


BYJ···DY

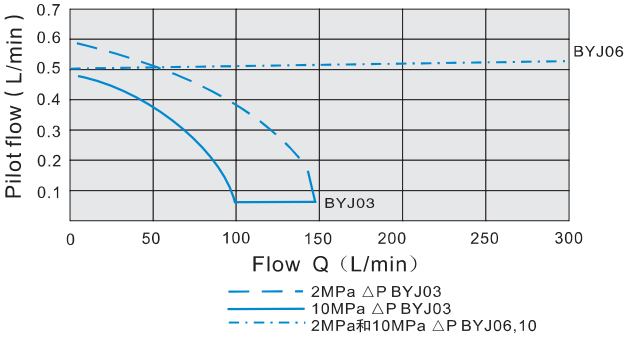
Proportional Pilot-operated Pressure Reducing Valve (BYJ)

03、06、10 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50^{0}C)

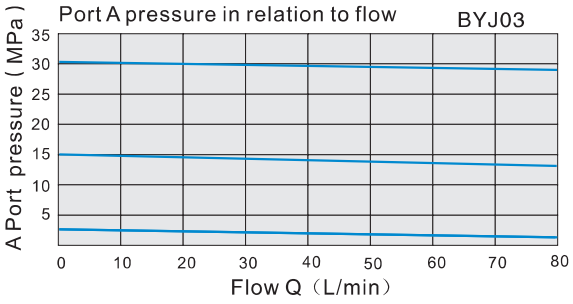
Pressure drop through check valve from A to B



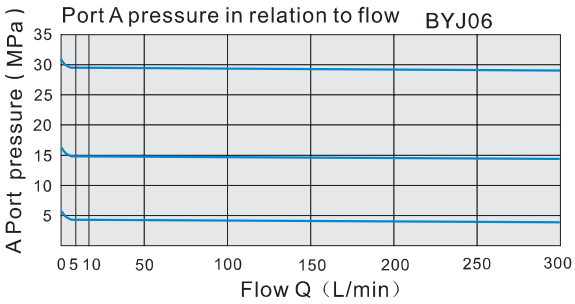
Pilot oil flow in relation to main valve flow



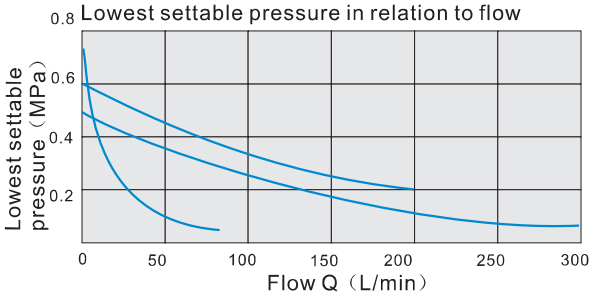
Port A pressure in relation to flow BYJ03



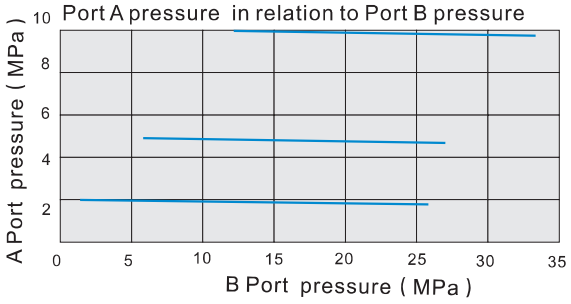
Port A pressure in relation to flow BYJ06



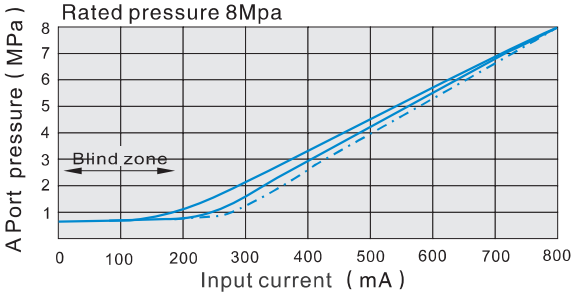
Lowest settable pressure in relation to flow



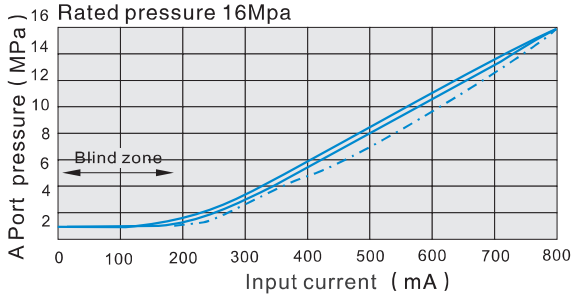
Port A pressure in relation to Port B pressure



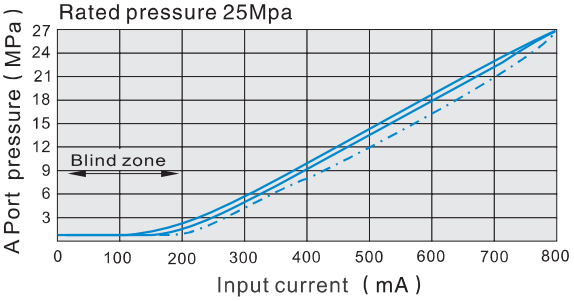
Port A pressure in relation to input current
Rated pressure 8Mpa



Port A pressure in relation to input current
Rated pressure 16Mpa



Port A pressure in relation to input current
Rated pressure 25Mpa



Delay:
With shake dither
No Shake

BYJ03、06 Model are tested under 27L/min.

Note: In order to get the lowest rated pressure, pilot initial current is not more than 0.1A

Proportional Pilot-operated Pressure Reducing Valve (BYJ)

External dimensions

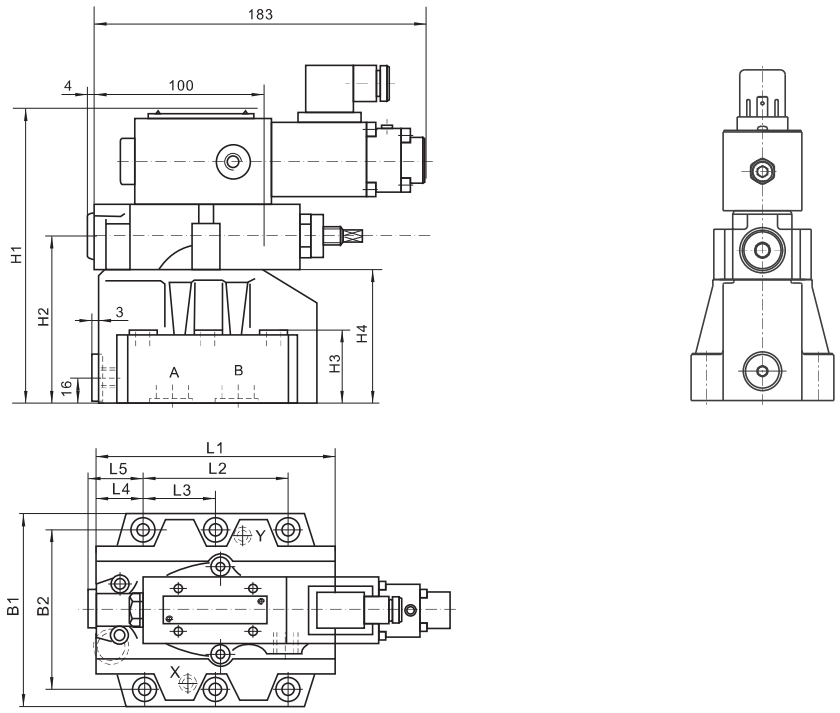
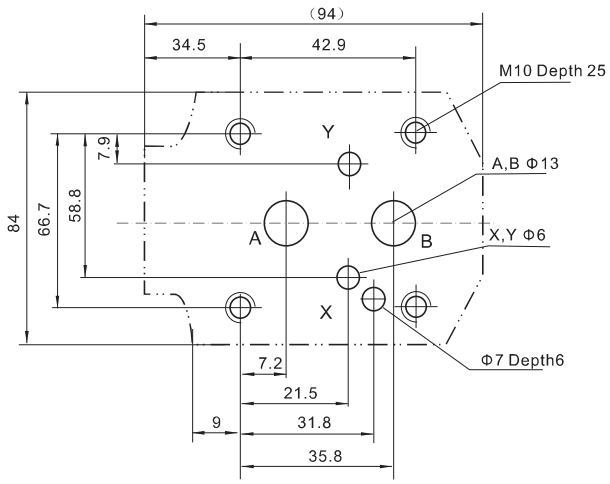
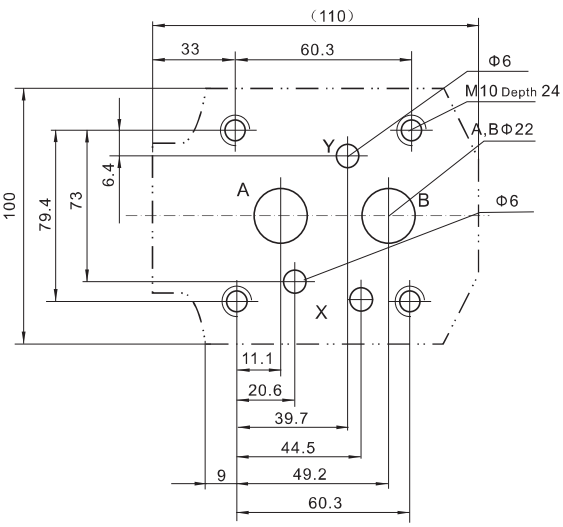


Plate size

BYJ-03



BYJ-06



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

Specification	B1	B2	H1	H2	H3	H4	L1	L2	L3	L4	L5
BYJ-03	85	66.7	190	92	28	72	90	42.9	-	35.5	34.5
BYJ-06	102	79.4	200	102	38	82	112	60.3	-	33.5	37

Proportional Electro-hydraulic Control P-Q Valve (BYLZ)

Technical specification

This proportional valve adopts two electrical loops to control pressure and flow of hydraulic system respectively. Using very small pressure drop to track load pressure and control the pump pressure, it is an energy-saving valve.

Model		BYLZ-02-*-*	BYLZ-03-*-*	BYLZ-06-250-*
Maximum pressure (MPa)		31.5		
Maximum flow (l/min)		40	160	250
Flow range (l/min)		1-40	2-160	3-250
Pressure control	Rated current (mA)	800		
	Coil resistance (Ω)	19.5	43.5	43.5
	P Differential(MPa)	0.6	0.6	0.7
	Hysteresis (%)	< 5	< 7	< 7
	Repeatability (%)	< 1		
Flow control	Pressure Range (Mpa)	16:1.5-16 25:1.5-25 31.5:1.5-31.5	16:1.5-16 25:1.5-25 31.5:1.5-31.5	16:1.5-16 25:1.5-25 31.5:1.5-31.5
	Rated current (mA)	800		
	Coil resistance (Ω)	10	10	10
	Hysteresis (%)	< 3		
	Repeatability (%)	< 1		
Cleanliness		Filter is recommended for the highest fluid pollution degree;the lowest specific filtration resistance according to ISO 4406 (C) 20/18/15.		

Model instruction

BYL Z - * /* - * - 90 - *

Proportional electro-hydraulic control P-Q valve

Remarks

Design serial number

Working pressure
16 16MPa
25 25MPa
31.5 31.5MPa

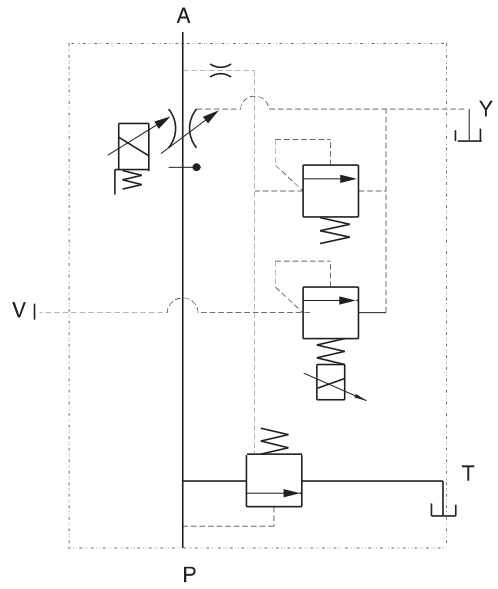
Z directly operated

Flow range:
02 Specification
20 20 l/min
40 40l/min
03 Specification
125 125l/min
160 160l/min
06 Specification
250 250l/min

Specification
02 DN 6
03 DN 10
06 DN 25

Proportional Electro-hydraulic Control P-Q Valve (BYLZ)

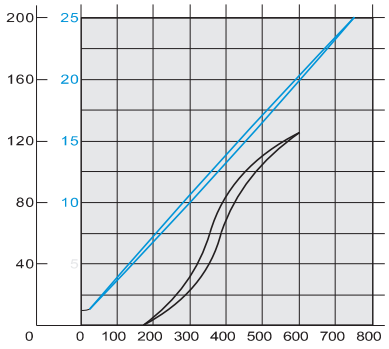
Code symbol



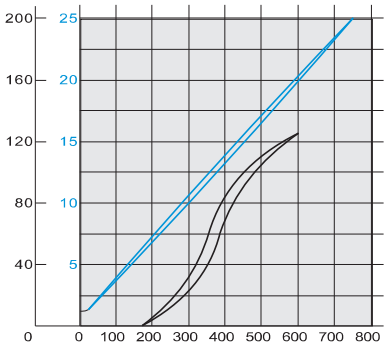
02, 03, 06 Characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50°C)

Output flow, output pressure/input current curves

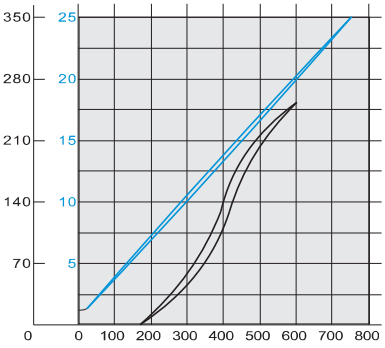
Output flow (L/min) ——— Output pressure (MPa) ———



BYLZ-02/40-25



BYL-03/160-25

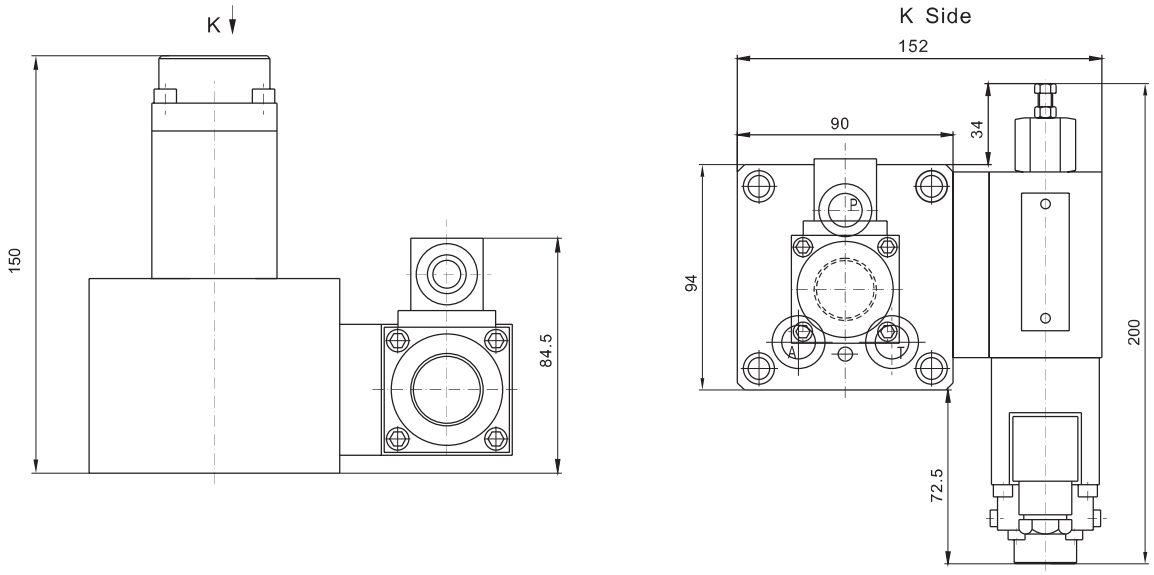


BYLZ-06/250-25

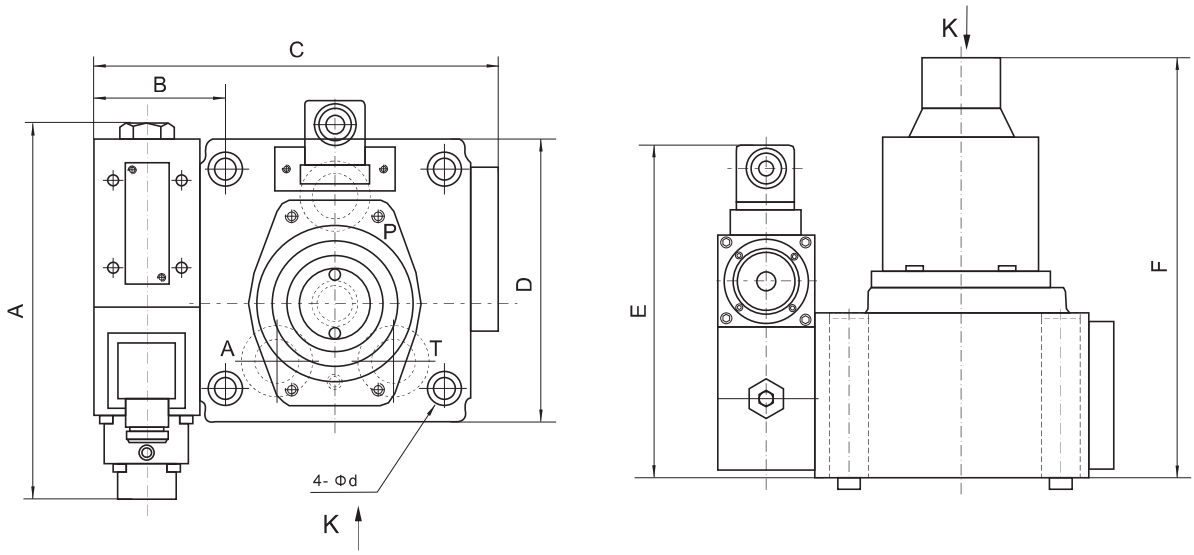
Proportional Electro-hydraulic Control P-Q Valve (BYLZ)

External dimensions

BYLZ-02



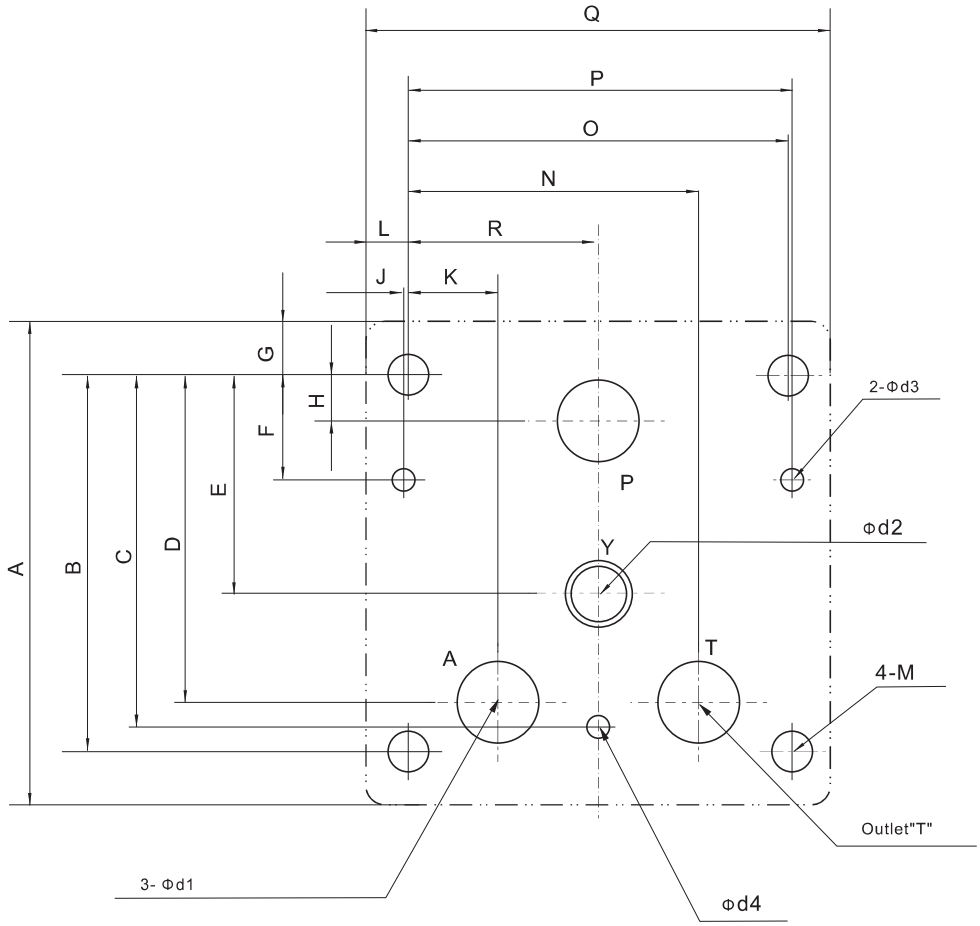
BYLZ-03、06



Model	A	B	C	D	E	F	d
BYLZ-03	171	61.7	188	130	171	216	11
BYLZ-06	171	67	247	174	199.5	248	17.5

Proportional Electro-hydraulic Control P-Q Valve (BYLZ)

Plate size



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

Model	A	B	C	D	E	F	G	H	J	K	L	R	N	O	P	Q	M	d_1	d_2	d_3	d_4
BYLZ-02	84	76	70	65	43	21.5	9	10	1	16.5	9	36	55.5	72	73	90	M8/14	14	10	7×7L	6
BYLZ-03	130	101.6	95.3	88.9	59	28.6	14.2	12.7	0.8	23.8	11.7	50.8	77.8	101.6	102.4	124	M10/19	23	11	7×7L	6
BYLZ-06	174	133.4	133.4	107	82.2	41.3	24	12.7	1.6	28.1	17	73.1	118.1	146.1	144.5	180	M16/30	29	14	17×10L	6.2

Note in use

- Discharge back press≤0.2MPa
  Return back press≤0.5MPa
- Minimum stable flow under controlled pressure
  Nominal size03，06≥10 l/min
  Nominal size10≥15 l/min
- Vent hole orientation can be adjusted freely：Put it upward to vent off the air from the piping.