BFW Oransal Yön Kontrol Valfleri / Proportional Directional Valve

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
Weight	(kg)	DN6	2.0	2.2
		DN10	6.6	6.8

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 span	(%)		≤1
Response sensitivity	(%)		≤0.5
Cleanliness	Maximum permissible degree of pressure fluid contamination to NAS 1638 to class 9 Recommended filter βx≥75 X=10		

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 ℃	2	2
		Max. warm value	3	3
Duty cycle	(%)		100	
Max.Coil temperature[2]			up to150	
Electrical connection	BFW		Plug-in connector to DIN EN 175301-803 and ISO 4400	
	BFWN		Plug-in connector to DIN EN 175301-803 and ISO 4400 Plug-in connector to DIN 43563-AM-3	
Insulation of valve to DIN 40 050			IP 65	

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Control electronics

BFW (type)	Analogue amplifier in Eurocard format[2]		Details refer to proportional amplifier	
	Digital amplifier in Eurocard format[2]		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

Due to the occurring surface temperature of the solenoid coils, the European Standards DIN EN 563 and DIN EN 982 must be taken into account! With HOYEA Machinery Manufacture CO. LTD. control electronics

Model description

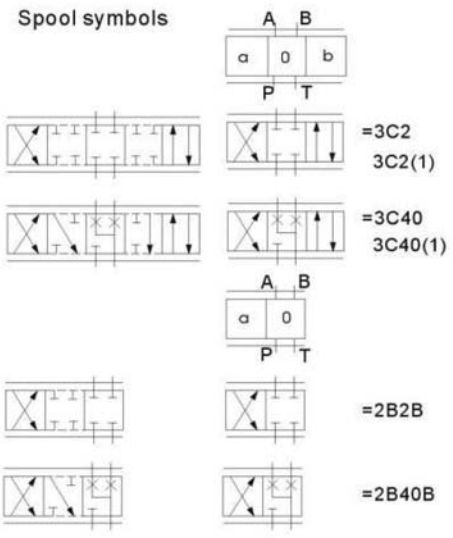
BFW－＊－＊－＊－＊－**2X**－**G24**－＊－＊－＊－＊　＊

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：qvmax B→T:qv/2
P→B：qv/2 A→T:qvmax

Note:
With spools 3C40 and 2B40B, there is a flow from A to T and B to T with approx. 3 % of the corresponding nominal cross section in zero position.

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 BFWN
A1 Command value input±10V
F1 Command value input4~20mA

[2]K4 Electrical connection For BFW (type) with plug component DIN EN 175301-803 See page A.3.3
[2]K31 with plug component DIN 43 650-AM2 See page A.3.4

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 Δp = 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 available with DN6: We can only supply "31" in sea water resistant design "J" !

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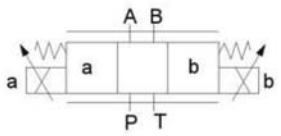
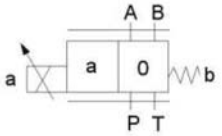
Model description

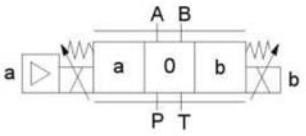
Model BFW···



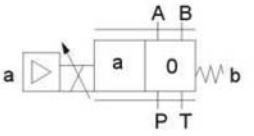
Model BFW···2B2B (2B40B)



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:

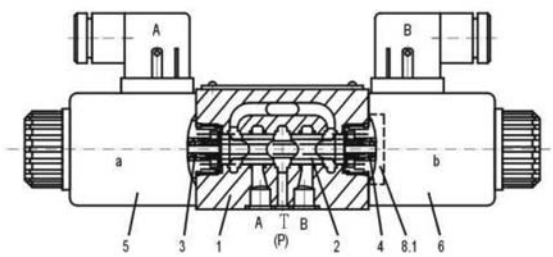
The valves basically consist of:

—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)

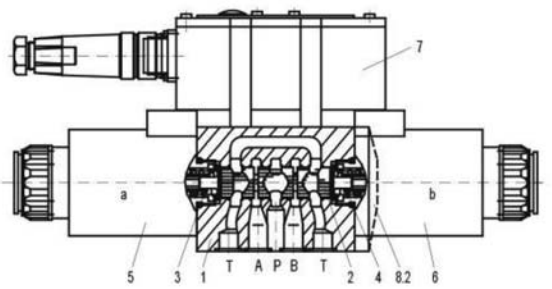
Function:

— 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/···



Model BFWN-03···2x/···



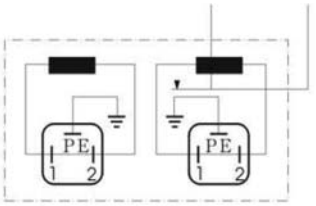
In theory, the function of this valve is the same to the valve with 3 positions. However, the valves with 2 positions are only fitted with solenoid "a".
For DN6 valve, there is a plug (8.1) fixed in the second solenoid,but for DN10, it is a cover (8.2) instead.

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).

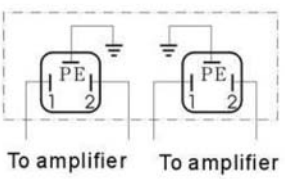
Electrical connection, plug–in connectors

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

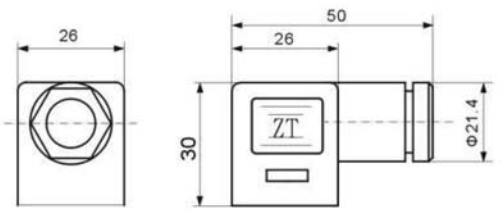
Connection on component plug



Connection on plug-in connector



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



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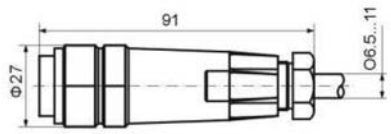
Electrical connection, plug–in connectors

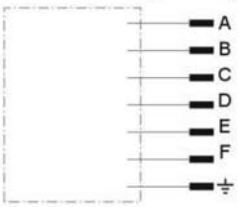
For type BFWN (with integrated electronics (OBE) and for version "J" = sea water-resistant) Plug-in connector see the block circuit diagram below



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

Integrated electronics for type BFWN

Pin allocation of the component plug

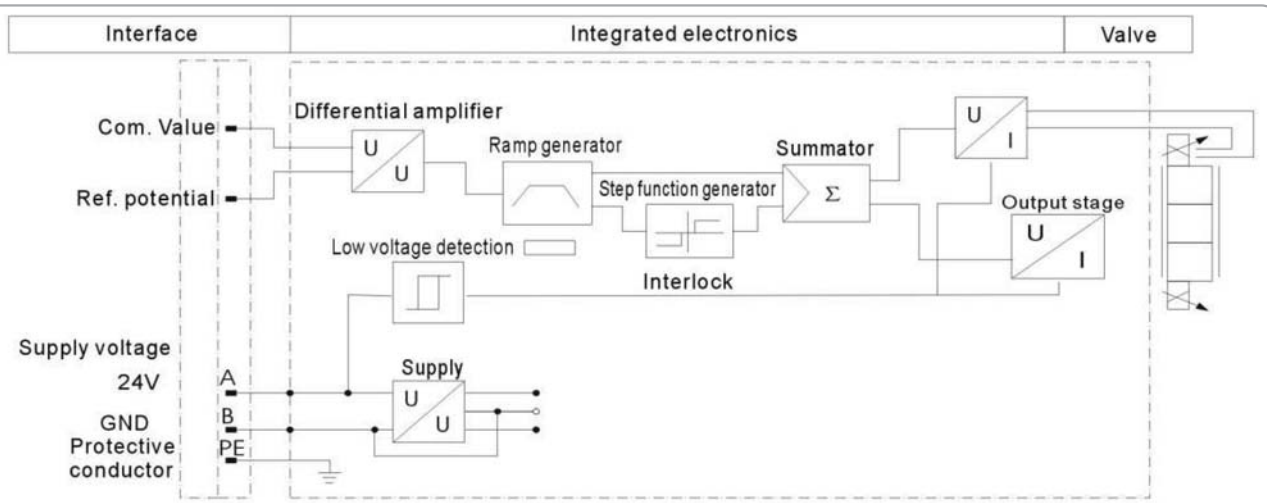


	Contact	Signal
Supply voltage	A B	24VDC(19~35VDC) GND
	C	n.c.(1)
Differential amplifier input	D E	Com. value（±10V/4-20mA） reference potential
	F	n.c.(1)

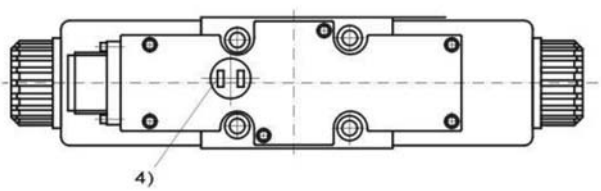
Positive command value (0 to 10 V or 12 to 20 mA) at D and reference potential to E causes flow from P to A and B to T.
Negative command value (0 to 10 V or 12 to 4 mA) at D and reference potential to E causes flow from P to B and A to T.
For valves with a solenoid on side "a" (spool variants EA and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

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!
   Block circuit diagram / connection allocation
2) PE is connected to the cooling body and the valve housing
3) Protective conductor screwed to the valve housing and cover
4) Ramp can be externally adjusted from 0 to 2.5 s; the same applies for *T*up and *T*down
5) Output stages current regulated
6) Low voltage detection is not carried out for component type BFWN-03-2X



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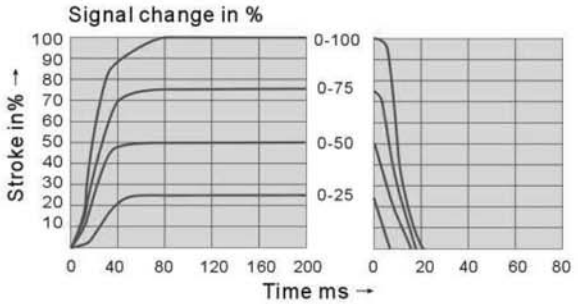
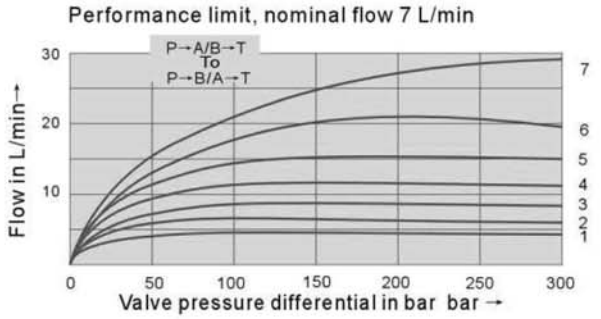
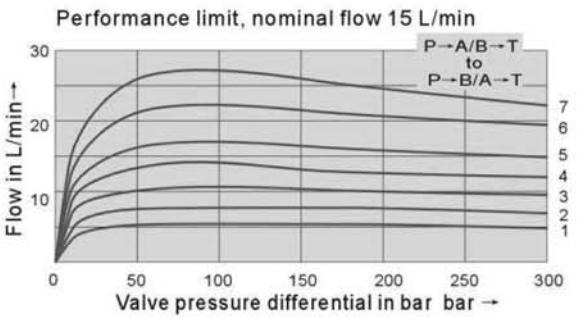
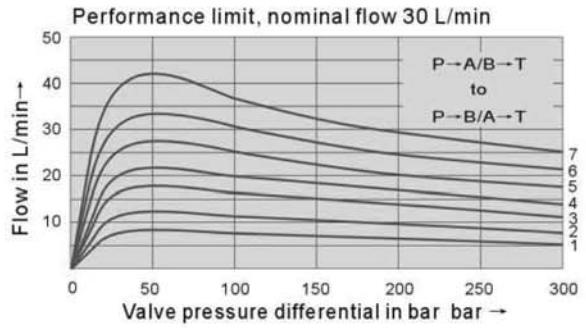
Transition functions with electrical step input signals BFW and BFWN type

6DN





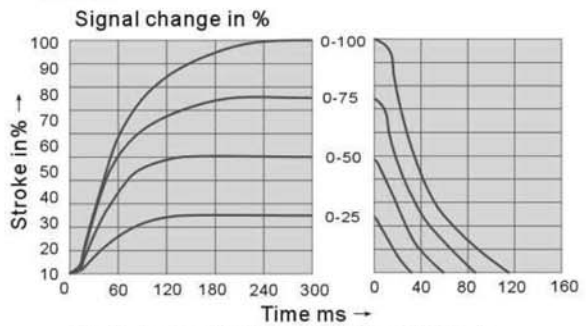


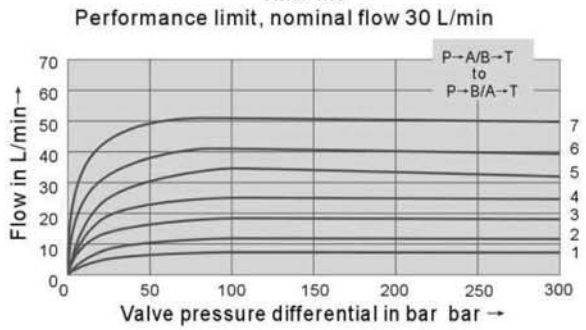


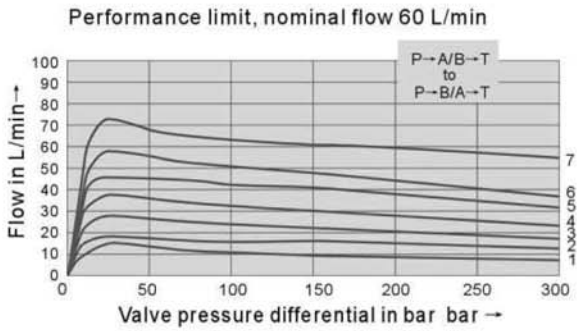
1 Com. Value=40%
2 Com. Value=50%
3 Com. Value=60%
4 Com. Value=70%
5 Com. Value=80%
6 Com. Value=90%
7 Com. Value=100%

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

10DN







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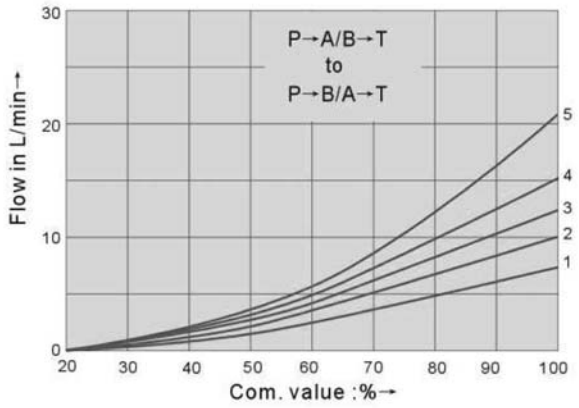
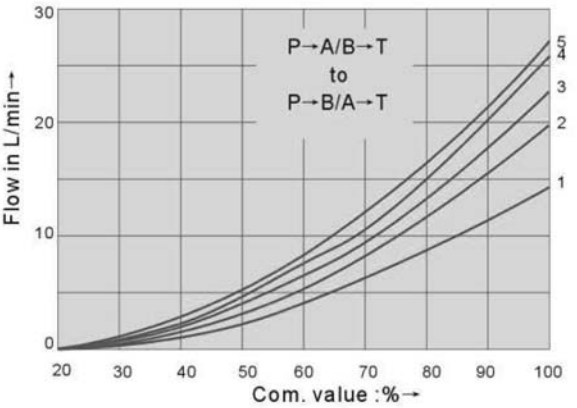
Characteristic curves (measured with HLP46, Qoil = 40 ± 5℃) DN6

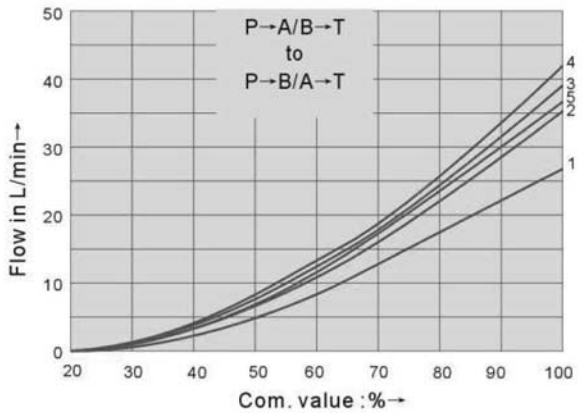
7 l/min nominal flow at differential pressure 10 bar



15 l/min nominal flow at differential pressure 10 bar

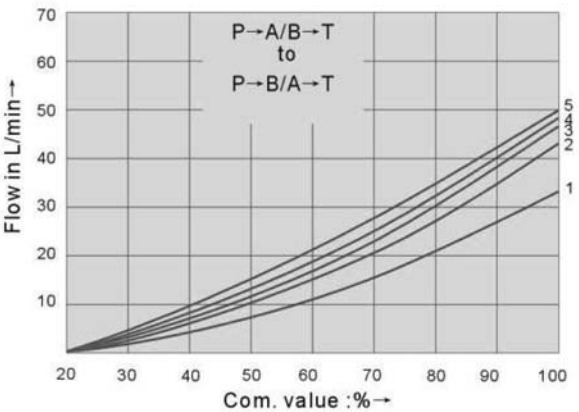


30 l/min nominal flow at differential pressure 10 bar

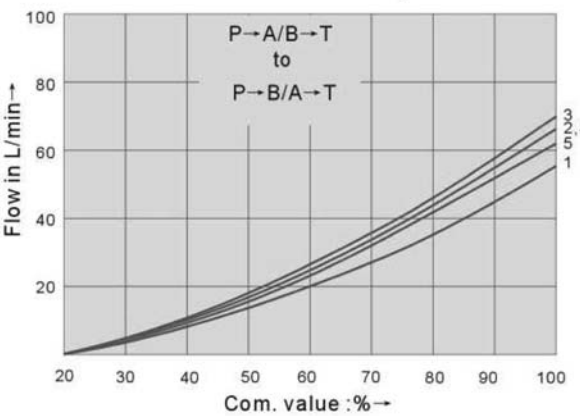


Characteristic curves (measured with HLP46, Qoil = 40 ± 5℃) DN10

30 l/min nominal flow at differential pressure 10 bar



60 l/min nominal flow at differential pressure 10 bar



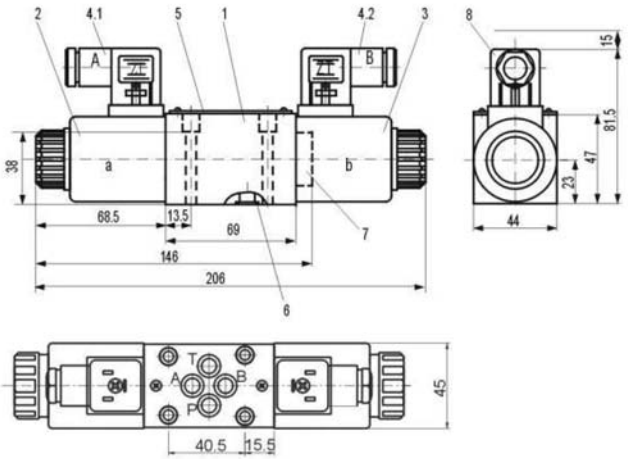
1 △p=10 bar Constant
2 △p=20 bar Constant
3 △p=30 bar Constant
4 △p=50 bar Constant
5 △p=100 bar Constant

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

BFW Oransal Yön Kontrol Valfleri / Proportional Directional Valve

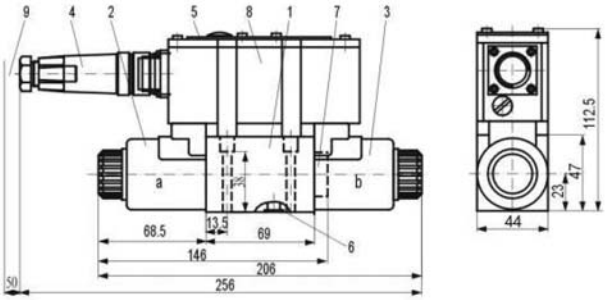
Unit dimensions

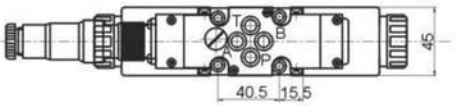
BFW-02 type



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
Valve fixing screws：4个M5x 45 DIN 912-12.9；M_A=8.9 Nm
Subplates：

BFWN-02···/···K31···V type

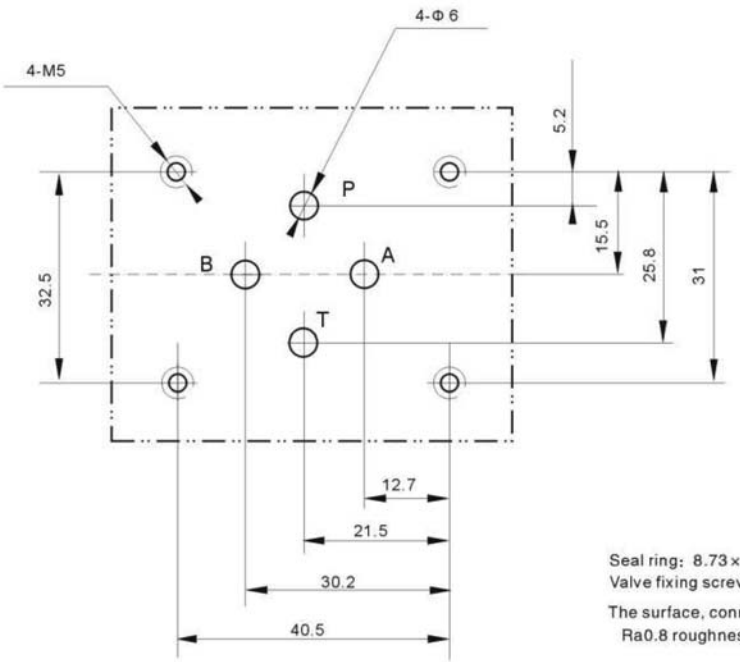




1 Valve body
2 Proportional solenoid "a"
3 Proportional solenoid "b"
4 Plug-in connector to E DIN 43 563-BF6-3/Pg11，
5 Nameplate
6 8.73 x 1.78 O Identical seal rings for ports A, B, P and T
7 Plug for valves with one solenoid （2 switched positions, spool type 2B2B or 2B40B)
8 Integrated electronics
9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

Subplate Size

BFW-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.

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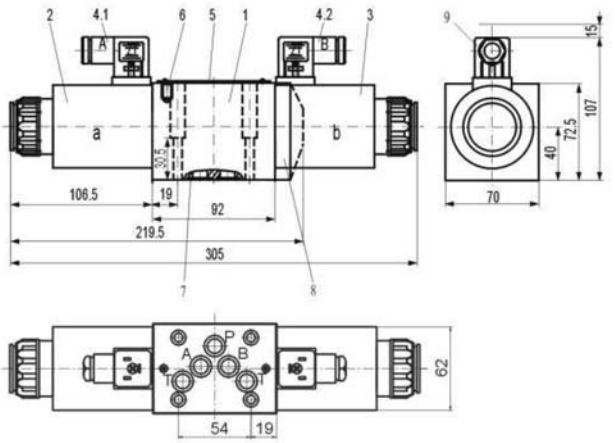
Unit dimensions

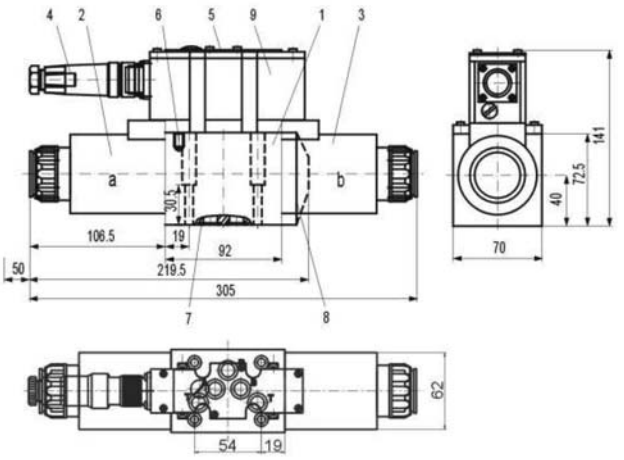
BFW–03 type



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

Valve fixing screws：4个M6x 40 DIN 912–12.9;
M_A=15.5 Nm Subplates：

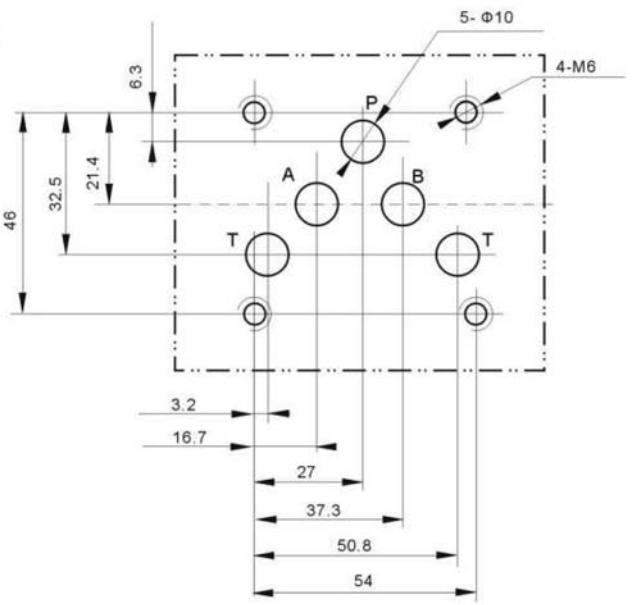
BFWN–03 type



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

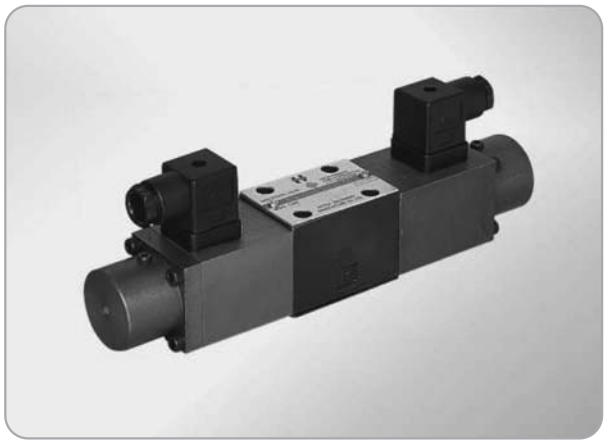
Subplate Size

BFWN–03



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.

BFW Oransal Yön Kontrol Valfleri / Proportional Directional Valve



This product is a direct-action valve with one or two proportional solenoids to control the flow rate and directions in the hydraulic system.

Technical specification

Specification		02	03
Maximum pressure (MPa)		31.5	
Return pressure (MPa)		<16	
Maximum flow (l/min)		17	50
Hysteresis (%)		6	
Repeatability (%)		<3	
-3dB Frequency response(Hz)		5	3
Rated current (mA)		800、1500	
Filtration accuracy (um)		≤20	
Hydraulic fluid		Mineral oil, phosphate-ester	
Viscosity (mm^2/s)		2.8~100	
Fluid temp. (°C)		-20~70	
Coil resistance (Ω)		19.5	
Weight (Kg)	2-Position	1.9	2.6
	3-Position	3.8	4.5
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

BFW– * – * – * –**50** *

Remarks

Design serial number

Nominal flow
(based on 1MPa pressure drop)
02 Specification 8 8 l/min
13 13 l/min
17 17 l/min
03 Specification 18 18 l/min
27 27 l/min
50 50 l/min

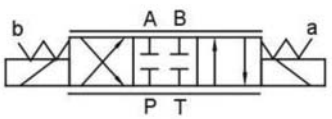
Proportional directional valve

Specification
02 DN 6
03 DN 10

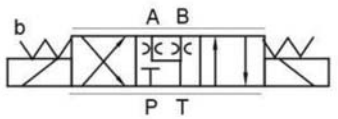
Symbol

Code symbol

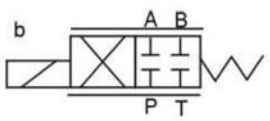
3C2
3C2 (1)



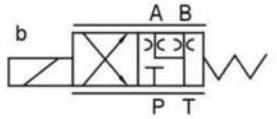
3C40
3C40 (1)



2B2B



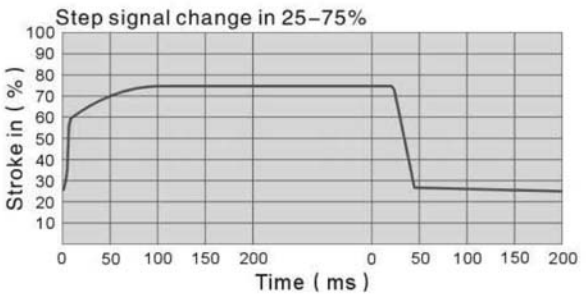
2B40B

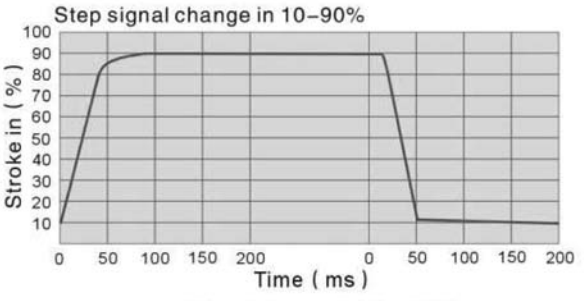


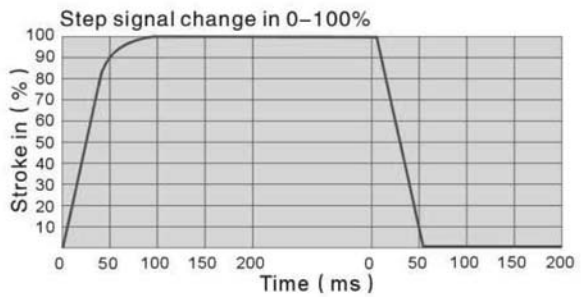
For functional symbol 3C2(1) and 3C40(1)
P → A: Qvmax B → T: Qvmax/2 P → B: Qvmax/2 A → T: Qvmax

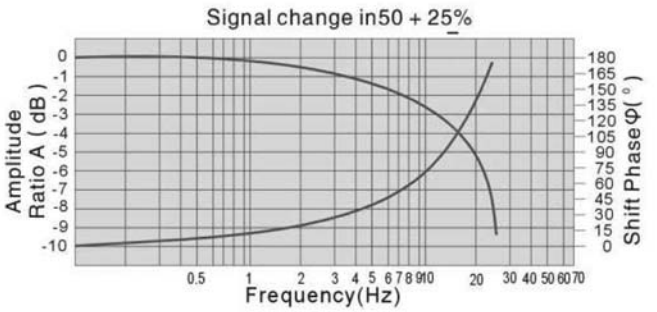
BFW Oransal Yön Kontrol Valfleri / Proportional Directional Valve

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

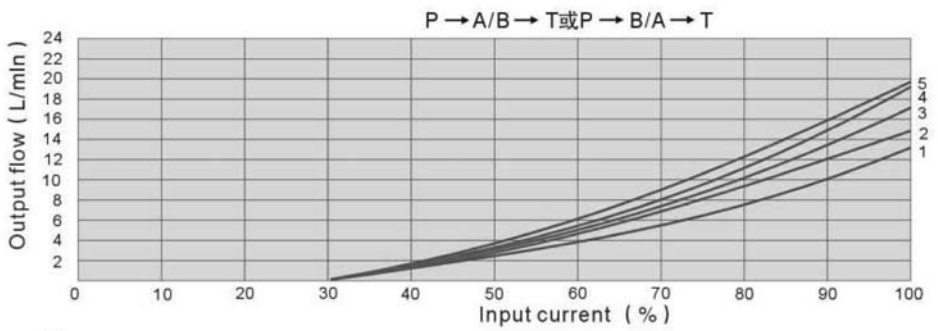




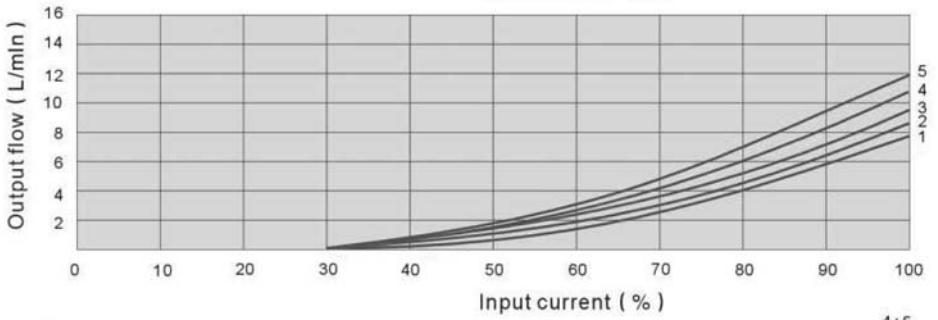




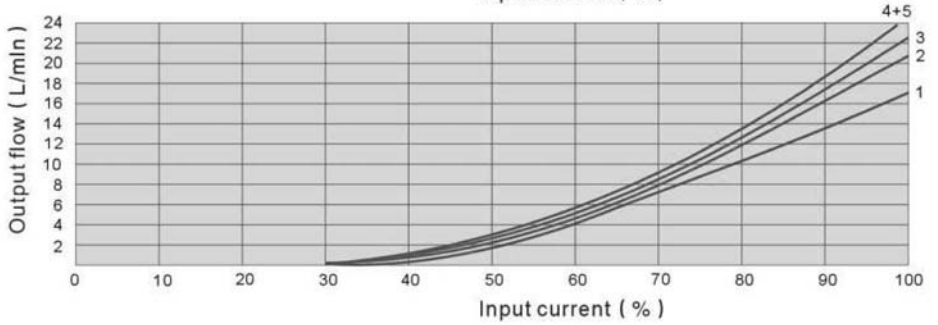
02 Model characteristic curves (Testing Condition ν =36X10^{-6}m^2/S t=50°C)



8L/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



13L/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

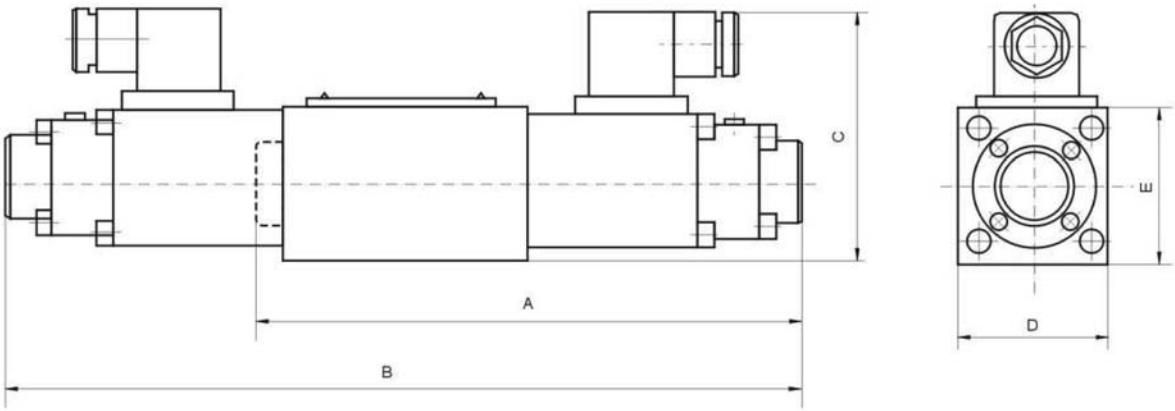


17L/min nominal flow at differential pressure.
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

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

BFW Oransal Yön Kontrol Valfleri / Proportional Directional Valve

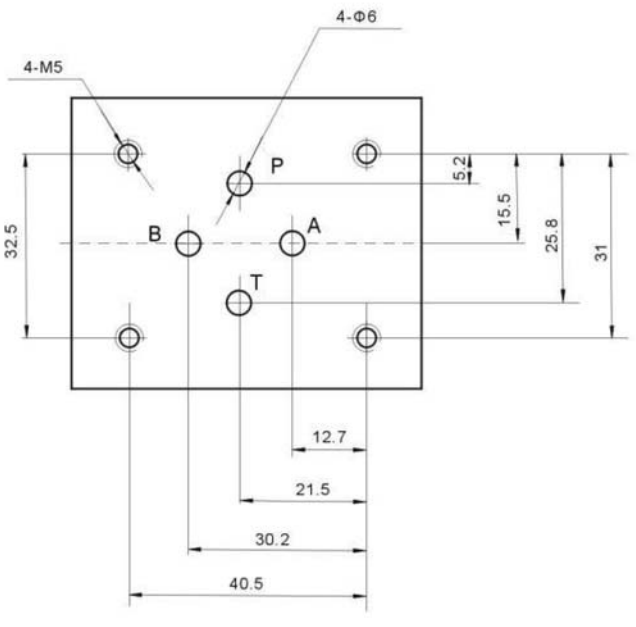
External dimensions



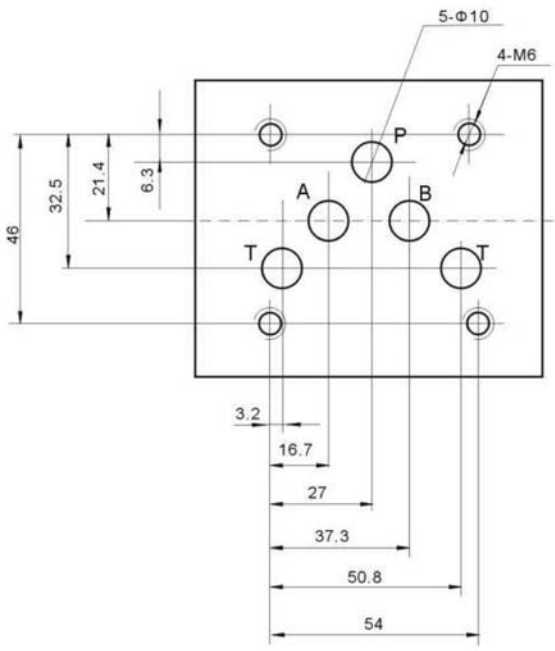
Specification	A	B	C	D	E
BFW-02	171	250	78	47	47
BFW-03	205	285	100	70	68

Plate size

BFW-02

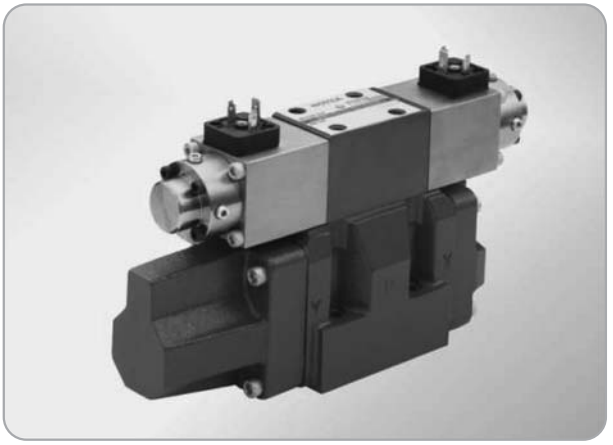


BFW-03



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

BFW Oransal Yön Kontrol Valfleri / Proportional Electro-Hydraulic Directional Valve



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.

Technical specification

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		
Filtration accuracy (um)		≤20		
Hydraulic fluid		Mineral oil, phosphate-ester		
Viscosity (mm^2/s)		2.8~100		
Fluid temp. (°C)		-20~70		
Coil resistance (Ω)		19.5		
Weight (Kg)	2-Position	8.1	12.3	17.5
	3-Position	8.8	13	18.2
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 20

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

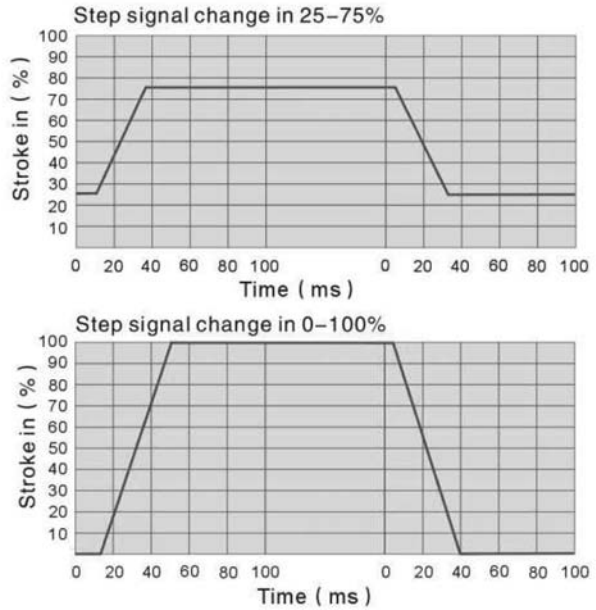
Nominal flow
(based on 1MPa pressure drop)
02 Specification 8 8 l/min
13 13 l/min
17 17 l/min
03 Specification 18 18 l/min
27 27 l/min
50 50 l/min

Design serial number

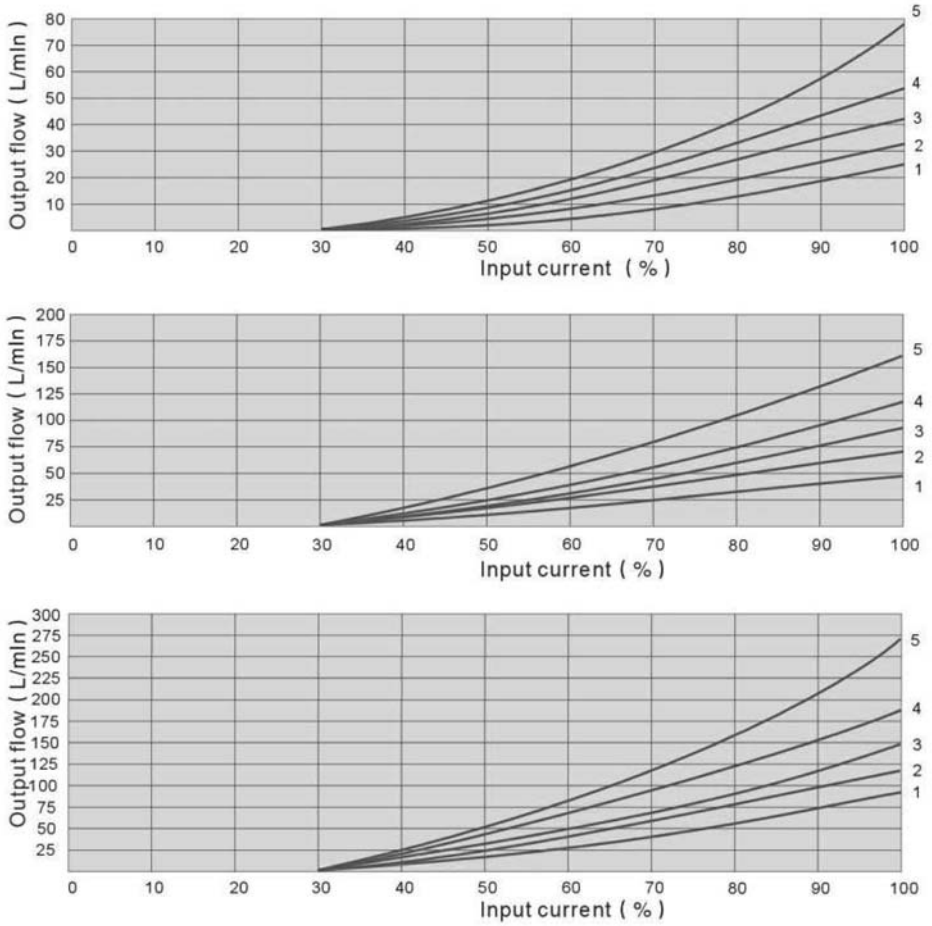
Remarks

BFW Oransal Yön Kontrol Valfleri / Proportional Electro-Hydraulic Directional Valve

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

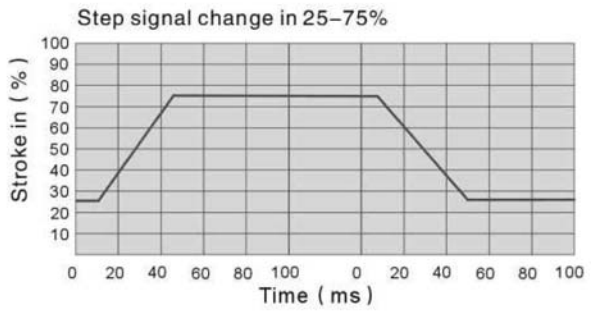


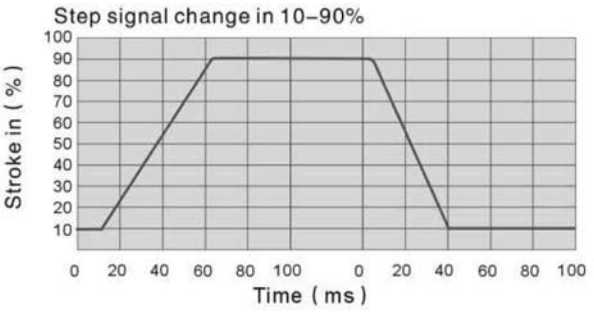
03 Model characteristic curves (Measured at ν =36X10^{-6}m^2/S t=50°C)

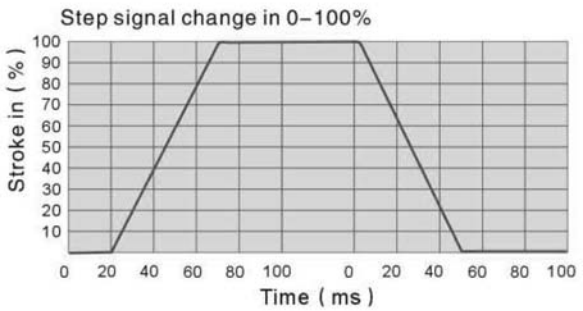


BFW Oransal Yön Kontrol Valfleri / Proportional Electro-Hydraulic Directional Valve

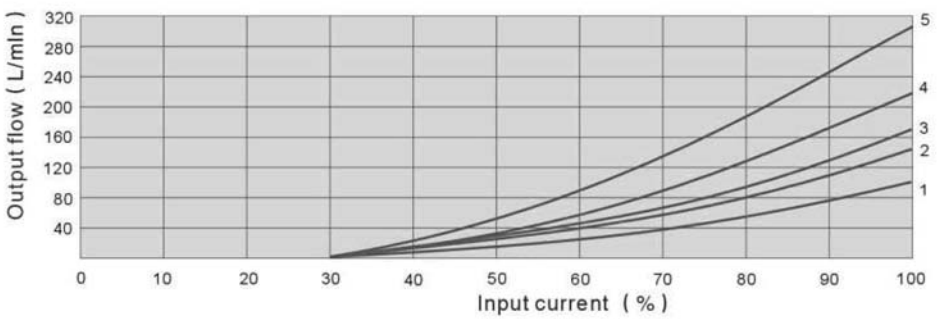
04 Model characteristic curves (Measured at $\nu = 36X10^{-6}m^2/S$ $t=50^{\circ}C$)



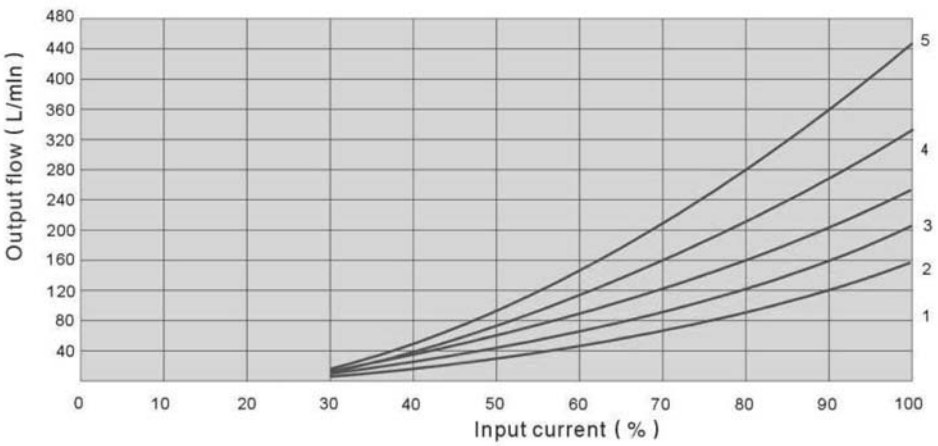




04 Model characteristic curves (Measured at $\nu = 36X10^{-6}m^2/S$ $t=50^{\circ}C$)



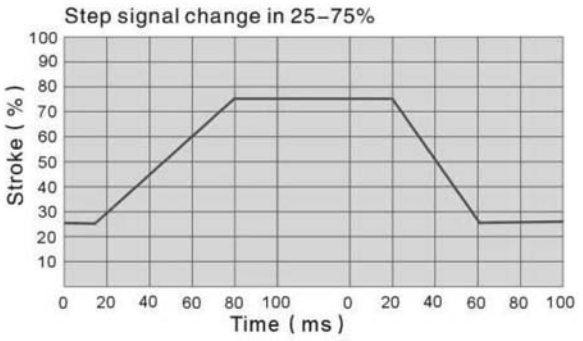
100L/min nominal flow at differential pressure .
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

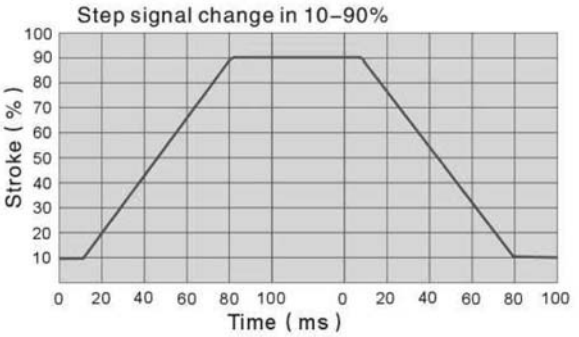


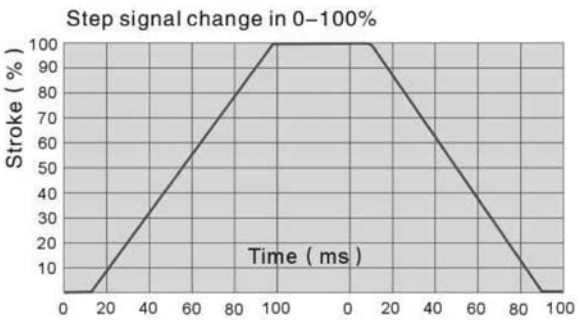
150L/min nominal flow at differential pressure.
1 Pv=1MPa Constant
2 Pv=2MPa Constant
3 Pv=3MPa Constant
4 Pv=5MPa Constant
5 Pv=10MPa Constant

BFW Oransal Yön Kontrol Valfleri / Proportional Electro-Hydraulic Directional Valve

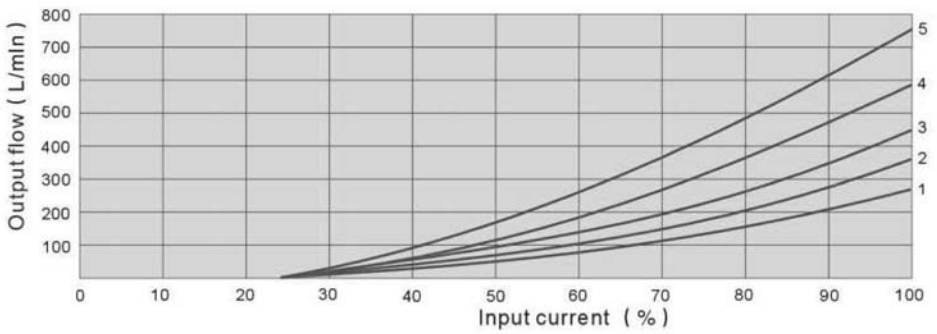
06 Model characteristic curves (Measured at $\nu = 36X10^{-6}m^2/S$ $t=50^{\circ}C$)



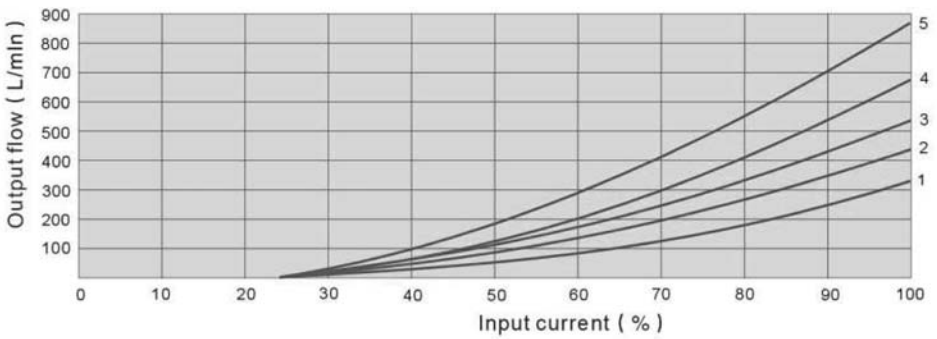




06 Model characteristic curves (Measured at $\nu = 36X10^{-6}m^2/S$ $t=50^{\circ}C$)



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

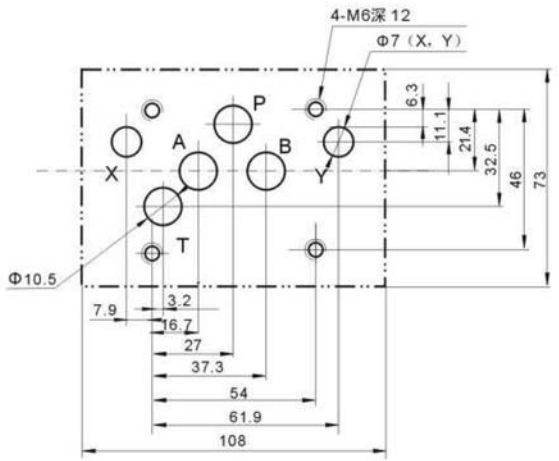
BFW Oransal Yön Kontrol Valfleri / Proportional Electro-Hydraulic Directional Valve

External dimensions

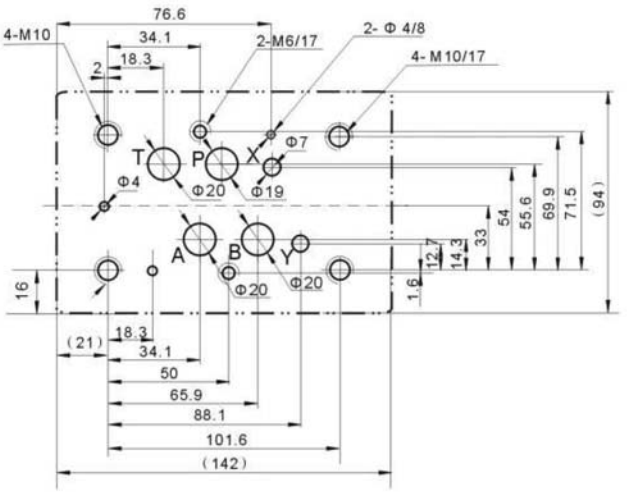
Specification	A	B	C	D	E
BFWH-03	216	250	70	86	171
BFWH-04	250	265	94	95	185
BFWH-06	280	290	120	117.5	202.5

Plate size

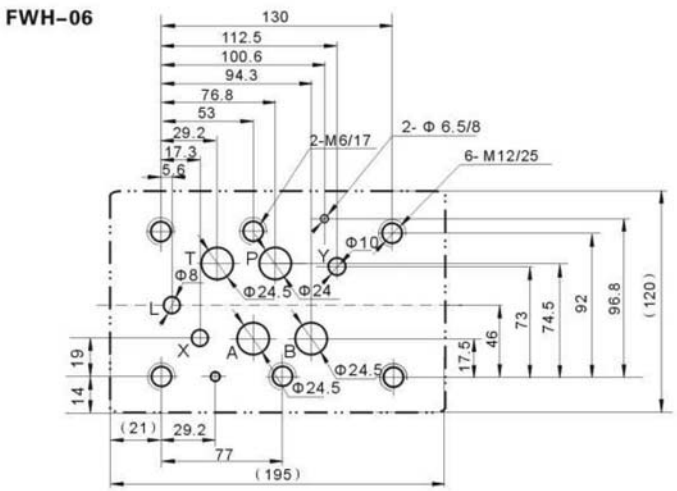
BFWH-03



BFWH-04



FWH-06



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