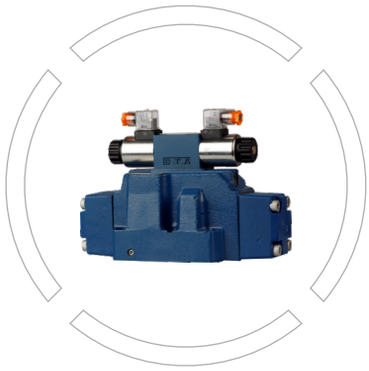
4WH/4WEH

4/2 and 4/3-way Directional valves
Pilot operated type 4WEH...
Externally pilot operated type 4WH...
Sizes: 10 to 32
Pressure up to 350 bar
Flow up to 1100 L/min



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Introduction

- There are four different pilot control types to control main valve's spool movement accurately.
- It is used to control the start, stop and direction of a fluid flow.
- The shifting time also can be adjusted by assembling throttle and check valve.

Ordering code

1	2	3	4	5	6	7	8	9	10	11

Pressure range
upto 280bar = No code
upto 350bar = H

Types of operations
Electro-hydralic = 4WEH
Hydraulic = 4WH

Sizes
NG10 = 10
NG16 = 16
NG22 (Standard type) = 22
NG25 (High power type) = 25
NG32 = 32

Spool return
Spring = No Code
Hydraulic = H

Symbols (See page no.4)

Series
NG10 = 4XT
NG25 (high power type) and NG32 = 6XT
NG16 and NG22 (Standard type) = 7XT

Pilot valve spool return ①
Spring return▲ = No code
Without spring return▲ = O
With orientation organ = OF

High performance valve① = 6E

Input voltage ①
220V/50Hz, 240V/60Hz = W220
110V/50Hz, 120V/60Hz = W110
220V/50Hz, 240V/60Hz = RAC220
110V/50Hz, 120V/60Hz = RAC110
12V = G12
24V = G24
48V = G48

Pilot valves hand override ①
With protected hand override(Standard) = N9
With hand override = N*

Pilot oil supply drain line ①
Pilot oil supply external, pilot oil drain external = No code
Pilot oil supply internal, pilot oil drain external = E
Pilot oil supply external, pilot oil drain internal = T
Pilot oil supply internal, pilot drain internal = ET

Ordering code

12	13	14	15	16	17	18	19	20	21

No code = Further details in clear text

Seal material
No code = NBR Seals
V = FKM Seals

① Pressure reducing valve*
No code = Without pressure reducing valve
D3 = With pressure reducing valve between mail valve pilot valve

④① Preloaded valve
No code = Without preloaded valve
P = With preloaded valve

① Throttle diameter
No code = Without cartridge throttle
08 = Throttle Ø 0.8m
10 = Throttle Ø 1.0m
12 = Throttle Ø 1.2m

① Throttle position
No code = Without cartridge throttle
P = Active in P Line
A = Active in A Line
B = Active in B Line
T = Active in T Line

③ Moving space adjustment
No code = Without moving space adjustment
10 = A and B Side with moving space adjustment
11 = A Side with moving space adjustment
12 = B Side with moving space adjustment

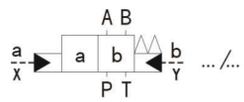
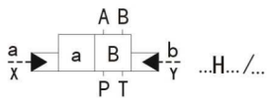
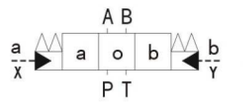
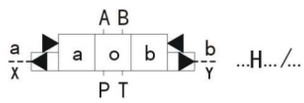
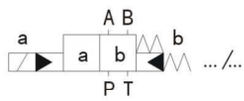
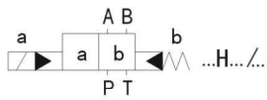
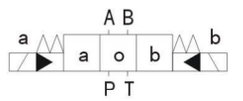
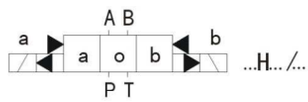
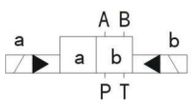
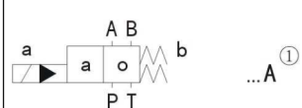
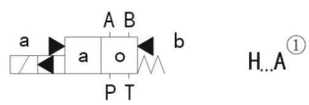
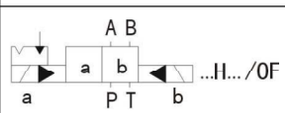
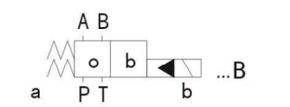
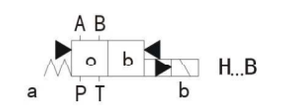
① Plug in connector
No code = Without plug in connector
Z4 = With Guardate plug in connector
Z5L = Guardate plug in connector with indicator light
F6L = With waterproof plug in connector

① Electric connections
K4 = Individual connections with component plug ISO4400 with plug in connector
DL = Central connections terminal box with cable connector with indicator light

①Shifting time adjustment*
No code = Without Shifting time adjustment
S = Shifting time adjustment as meter in control
S2 = Shifting time adjustment as meter out of control

Note:
① Only apply on Electro-hydraulic operated directional valve;
② Waterproof degree of plug-in connector is above IP65;
③ Only apply on NG16;
④ Not apply on NG10 and NG22(Standard type);
* Please consult us when you choose this applications;
▲ Spool return in the pilot valve for 2-position valve and 2 solenoids only possible with spools C,D,K,Z and hydraulicspool return in the main valve.

Symbols

Sort	2-position valve		3-position valve	
	Spring Return	Hydraulic Return	Spring Return	Hydraulic Return
4WH				
4WEH				
	-			
	-			



=C



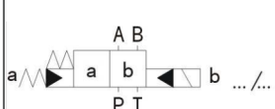
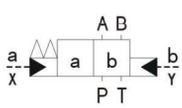
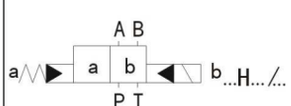
=D



=K

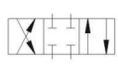


=Z

4WH		—
4WEH		



=Y



=E



=F



=G



=H



=J



=L

=M

=P

=Q

=R

=T

=U

=V

=S

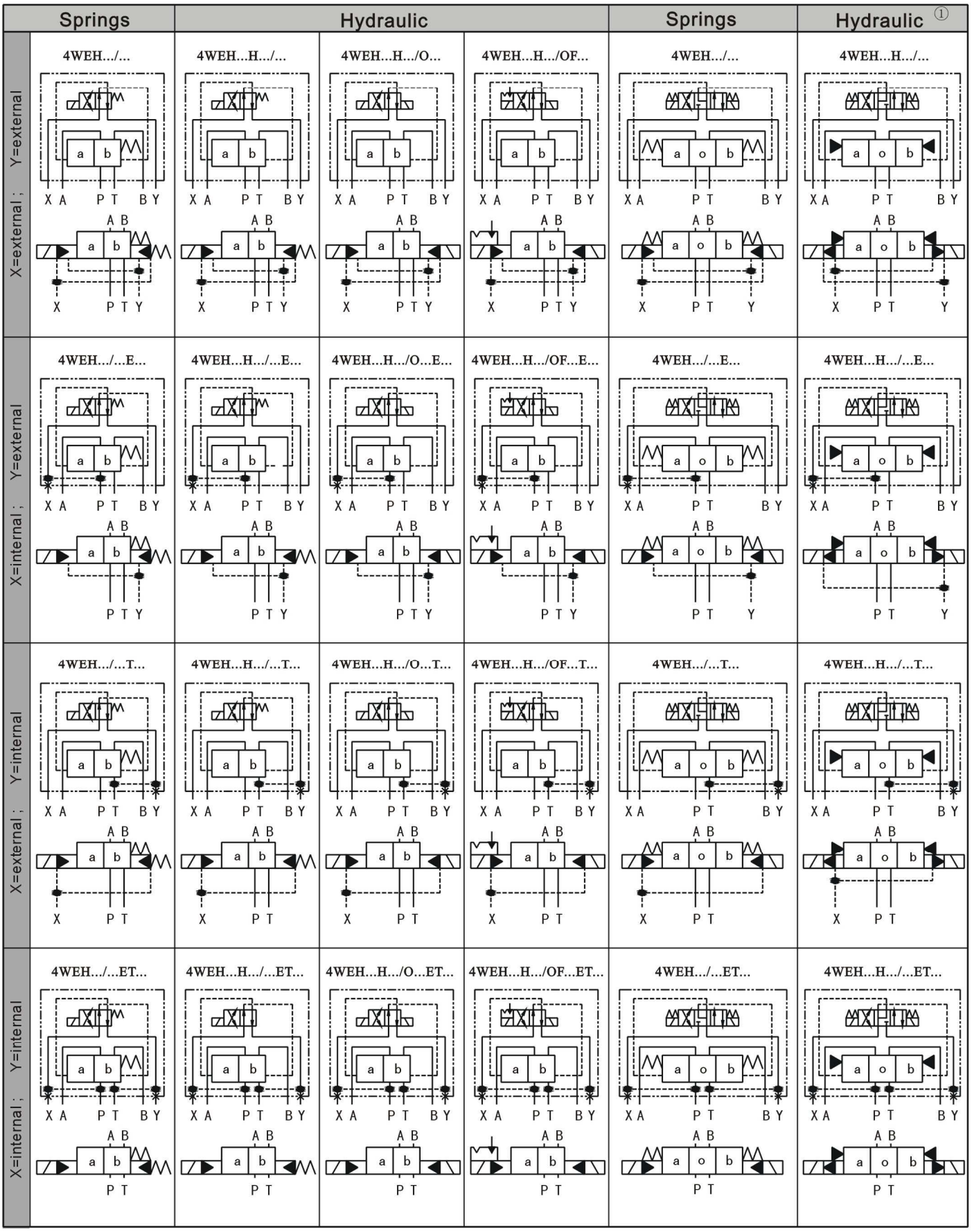
NOTE:

① The two position valve is derived from three position valve. Giving an example for symbols. For example, EA, HEA.

② Please consult us for other special symbol.

Spool return

	Springs	Hydraulic			Springs	Hydraulic ①
X=external ; Y=external	4WEH.../...	4WEH...H.../...	4WEH...H.../O...	4WEH...H.../OF...	4WEH.../...	4WEH...H.../...
X=internal ; Y=external	4WEH.../...E...	4WEH...H.../...E...	4WEH...H.../O...E...	4WEH...H.../OF...E...	4WEH.../...E...	4WEH...H.../...E...
X=external ; Y=internal	4WEH.../...T...	4WEH...H.../...T...	4WEH...H.../O...T...	4WEH...H.../OF...T...	4WEH.../...T...	4WEH...H.../...T...
X=internal ; Y=internal	4WEH.../...ET...	4WEH...H.../...ET...	4WEH...H.../O...ET...	4WEH...H.../OF...ET...	4WEH.../...ET...	4WEH...H.../...ET...



NOTE:

① At present this code only apply on size 16, size 25 (High power type) and size 32.

- For hydraulic middle 3-position valve, It's preferential choice for pilot oil supply external and drain external.

Function section

- Type: WEH

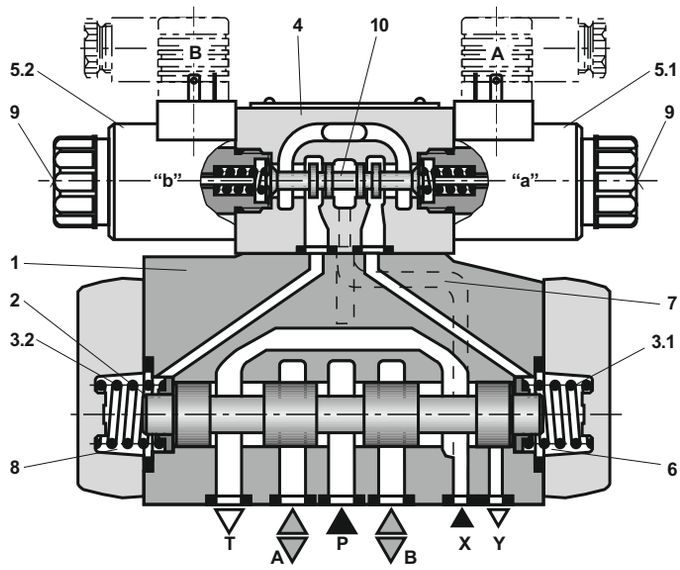
Directional valves type WEH…

The valve type WEH is a directional spool valve with electro-hydraulic actuation. It controls the start, stop and direction of a flow.

The directional valves basically consist of the main valve with housing (1), the main control spool (2), one or two return springs (3.1) and (3.2), as well as the pilot control valve (4) with one or two solenoids "a" (5.1) and/or "b" (5.2).

For valves with three spool positions, the main control spool (2) in the main valve is held in zero position or initial position by means of two springs, for valves with 2 spool positions by pressurization and spring. In the initial position, the two spring chambers (6) and (8) are connected with the tank in a depressurized form via the pilot control valve (4). Via the control line (7), the pilot control valve is supplied with pilot oil. Supply can be implemented internally or externally (externally via port X). Upon actuation of the pilot control valve, e.g. solenoid "a", the pilot control spool (10) is moved to the left and thus, the spring chamber (8) is pressurized with pilot pressure. The spring chamber (6) remains depressurized. The pilot pressure acts on the left side of the main control spool (2) and moves it against the spring (3.1). This connects port P with B and A with T in the main valve.

On switching off of solenoid, the pilot control spool (10) returns to its initial position (except impulse spool).



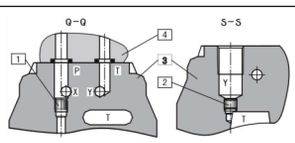
The spring chamber (8) is unloaded to the tank. The pilot oil return is implemented internally (via channel T) or externally (via channel Y). An optional manual override (9) allows for moving of the pilot control spool (10) without solenoid energization. The spring chamber (6) remains depressurized.

Notice:

The return springs (3.1) and (3.2) in the spring chambers (6) and (8) hold the main control spool (2) in central position without pilot pressure even with, for example, vertical valve positioning. Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.

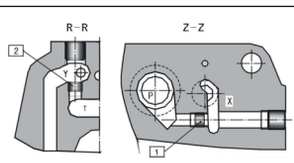
Pilot control type

- 4WEH10...



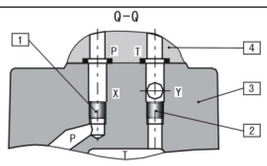
Installation	No code	ET	E	T
Screw plug 1	○	○	X	X
Screw plug 2	○	X	○	X

- 4WEH16...



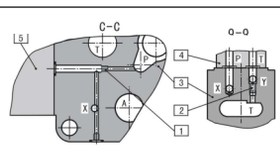
Installation	No code	ET	E	T
Screw plug 1	○	○	X	X
Screw plug 2	○	X	○	X

- 4WEH22...



Installation	No code	ET	E	T
Screw plug 1	○	○	X	X
Screw plug 2	○	X	○	X

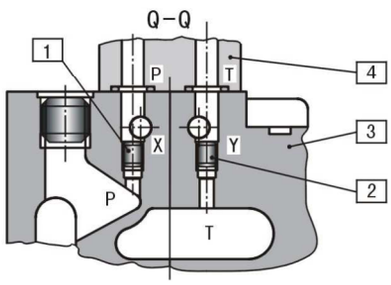
- 4WEH25...



Installation	No code	ET	E	T
Screw plug 1	○	○	X	X
Screw plug 2	○	X	○	X

Pilot control type

- 4WEH32...



Installation	No code	ET	E	T
Screw plug 1	○	○	X	X
Screw plug 2	○	X	○	X

Note:
"O" express installation.
"X" express without installation

The dimension of the Screw plug 1 and 2 is Rc 1/16 (JB/ZQ4446-86)

Type WH...
The pilot oil supply and return is implemented externally via channel X and Y.

Type WEH...
The pilot oil supply is implemented externally - via channel X- from a separate pressure supply. The pilot oil return is implemented externally - via channel Y - into the tank.

Type WEH...E...
The pilot oil supply is implemented internally from channel P of the main valve. The pilot oil return is implemented externally - via channel Y - into the tank. In the subplate, port X is closed.

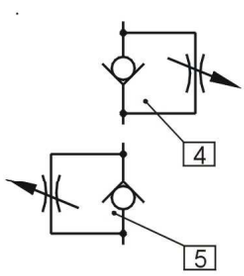
Type WEH...ET...
The pilot oil supply is implemented internally from channel P of the main valve. The pilot oil return is implemented internally - via channel T - into the tank. In the subplate, ports X and Y are closed.

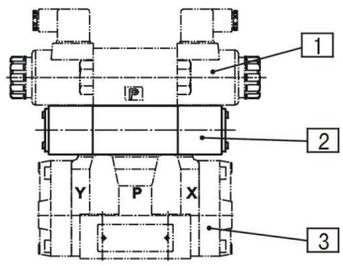
Type WEH...T...
The pilot oil supply is implemented externally - via channel X - from a separate pressure supply. The pilot oil return is implemented internally - via channel T - into the tank. In the sub plate, port Y is closed.

Switching time adjustment

The switching time of the main valve (3) is influenced by the use of a twin throttle check valve (2) (type Z2FS 6).

Modification of supply (4) to discharge control (5):
Remove the pilot control valve (1) – The plate to accept the seal rings stays in place – Turn the switching time adjustment (2) around its longitudinal axis and put it back, install the pilot control valve (1).

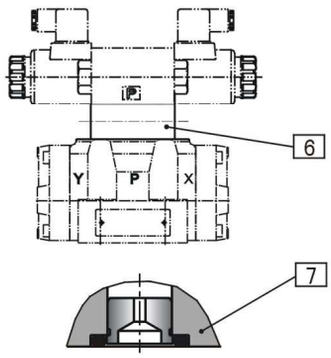




Pilot pressure and flow adjustment

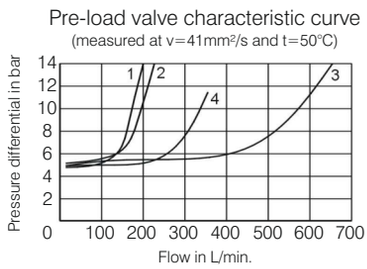
The pressure reducing valve (6) has to be used at a pilot pressure above 250 bar (with "WEH 22 …": 210 bar) and with version "H-".
The secondary pressure is kept at a constant level of 45 bar.

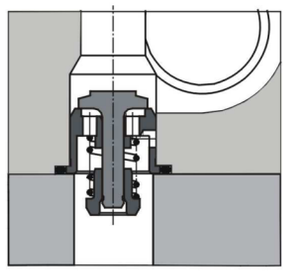
Notice:
If a pressure reducing valve "D3" (8) is used, a "B10" throttle insert has to be installed in channel P of the pilot control valve.
The modification may only be performed by authorized specialists or at the factory.



Pre-loaded valve

In case of valves with depressurized circulation and internal pilot oil supply, the installation of the pre load valve (9) in channel P of the main valve is required in order to build up the minimum pilot pressure.The pressure differential of the pre load valve is to be added to the pressure differential of the main valve (see characteristic curves) to result in one total value. The cracking pressure amounts to approx. 4.5 bar.
1.NG16 , 2.NG22(Standard type)
3.NG25(high power type), 4.NG32





Technical data

Nominal size(Ordering code)					10	16	22	25	32
Max. Operating Pressure									
4WEH	Port P, A, B	4WEH		bar	280	280	280	-	280
		H-4WEH		bar	350	350	350	350	350
	Port T	Pilot oil drain external		bar	315	250	250	250	250
		Pilot oil drain internal		bar	210 (DC); 160 (AC)				
	Port Y	Pilot oil supply external		bar	210 (DC); 160 (AC)				
4WH				bar	250	250	210	250	250
Max. Pilot Pressure				bar	250	250	210	250	250
Min. Pilot Pressure									
Pilot oil Supply Internal (for spool D,K,E,J,M, Q,U,W) Pilot oil supply external	3- Position valve spring centered		H-4WEH	bar	10	14	12.5	13	8.5
			4WEH	bar	10	14	10.5	13	8.5
	3- Position valve hydraulic-centered			bar		14		18	8.5
	2- Position valve spring return		H-4WEH	bar	10	14	14	13	10
			4WEH	bar	10	14	11	13	10
	2- Position valve hydraulic return			bar	7	14	8	8	5
Pilot oil supply Internal (For spool C, F, G, H, P, T, V, Z, D)				bar	4.5	4.5	4.5	4.5	4.5

Technical data

Pilot oil volume for the main valve shifting								
3-Position valve, Spring-centered			cm^3	2.04	5.72	7.64	14.2	29.4
2- Position valve			cm^3	4.08	11.45	15.28	28.4	58.8
3- Position valve hydraulic-centred	From middle position to position “a”	WH	cm^3	-	2.83	-	7.15	14.4
		WEH	cm^3	-	2.83	-	7.15	14.4
	From position “a” to middle position	WH	cm^3	-	5.72	-	14.18	29.4
		WEH	cm^3	-	2.9	-	7.0	15.1
	From middle position to position “b”	WH	cm^3	-	5.72	-	14.18	29.4
		WEH	cm^3	-	5.72	-	14.15	29.4
	From position “b” to middle position	WH	cm^3	-	8.55	-	19.88	43.8
		WEH	cm^3	-	2.83	-	5.73	14.4

Pilot oil flow for the shortest shifting time (L/min.)	About35	About35	About35	About35	About45

Weight (data only for reference)						
Single solenoid valve	kg	6.4	8.5	11.5	17.6	40.5
Double solenoid valve spring-centred	kg	6.8	8.9	11.9	18.0	41.0
Double solenoid valve hydraulic-centred	kg	6.8	8.9	11.9	19.0	41.0
Hydraulic operated directional valve	kg	6.5	7.3	10.5	16.5	39.5
Shifting time adjustment set	kg	0.8	0.8	0.8	0.8	0.8
Pressure reducing valve	kg	0.4	0.4	0.4	0.4	0.4

Working Environment Temperature Range (°C)	-30 to +50

Installation Position	Valves for HC, HD, HK, HX, HZ, HY symbols must install horizontally. Other spools are free from this instructions.

Shifting times

Nominal size 10 AC (~) and DC (=)										
Pilot Pressure		bar	70		140		210		250	
Voltage type			~	=	~	=	~	=	~	=
Shifting time of the valve from neutral position to shifted position	3-position valve	ms	30	65	25	60	20	55	15	50
	2-position valve	ms	35	80	30	75	25	70	20	55
Shifting time of the valve from shifted position to neutral position	3-position valve	ms	30	30	30	30	30	30	30	30
	2-position valve	ms	35	40	30	35	25	30	20	25

Nominal size 16 AC (~) and DC (=)										
Pilot Pressure			bar	70		140		210		250	
Voltage type				~	=	~	=	~	=	~	=
Shifting time of the valve from neutral position to shifted position	3-position valve spring centred		ms	25-30	40	25-30	40	25-30	40	20-25	40
	2-position valve		ms	30-35	55	30-35	55	30-35	55	25-30	50
	3-position valve hydraulic centred	“o”to“a”	ms	30	40	30	40	30	35	30	35
		“o”to“b”	ms	30	40	30	40	30	40	30	40
Shifting time of the valve from shifted position to neutral position	3-position valve spring centred		ms	35-50	45	35-50	45	30-45	40	30-45	35
	2-position valve		ms	35-50	45	35-50	45	30-45	40	30-45	35
	3-position valve hydraulic centred		ms	25-35	20	25-55	20	20-35	20	20-35	20

Nominal size 25 (Standard) AC (~) and DC (=)										
Pilot Pressure		bar	35		70		140		210	
Voltage type			~	=	~	=	~	=	~	=
Shifting time of the valve from neutral position to shifted position	3-position valve	ms	50	100	40	80	35	65	30	60
	2-position valve	ms	100	160	90	110	75	95	70	85
Shifting time of the valve from shifted position to neutral position	3-position valve	ms	35-50	35	35-50	35	35-50	35	35-50	35
	2-position valve	ms	90-105	95	65-80	70	65-80	55	45-60	50

Shifting times

Nominal size 25 (High Power Standard) AC (~) and DC (=)											
Pilot Pressure			bar	70		140		210		250	
Voltage type				~	=	~	=	~	=	~	=
Shifting time of the valve from neutral position to shifted position	3-position valve spring centred		ms	50	85	40	75	35	70	30	65
	2-position valve		ms	120	160	100	130	75	120	70	105
	3-position valve hydraulic centred	“o” to “a”	ms	30	55	30	55	25	50	25	50
		“o” to “b”	ms	35	65	35	65	30	60	30	60
Shifting time of the valve from shifted position to neutral position	3-position valve spring centred		ms	40-55	40	40-55	40	40-55	40	40-55	40
	2-position valve		ms	35-50	45	35-50	45	30-45	40	30-45	35
	3-position valve hydraulic centred		ms	30-50	30	30-50	30	30-50	30	30-50	30

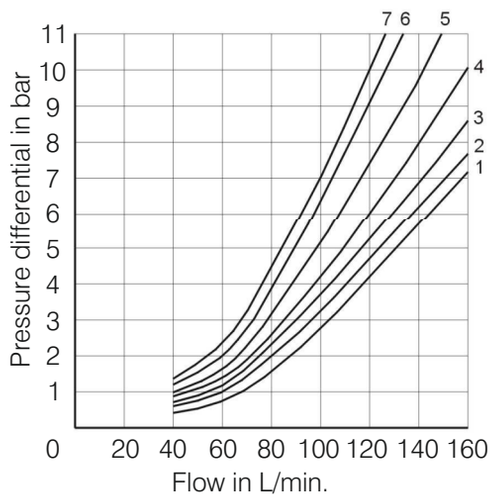
Nominal size 32 AC (~) and DC (=)											
Pilot Pressure			bar	70		140		210		250	
Voltage type				~	=	~	=	~	=	~	=
Shifting time of the valve from neutral position to shifted position	3-position valve spring centred		ms	65	80	50	90	35	105	41.5	80
	2-position valve		ms	100	130	75	100	60	115	90	125
	3-position valve hydraulic centred	“o” to “a”	ms	55	100	40	85	35	85	35	45
		“o” to “b”	ms	60	105	45	95	40	95	35	45
Shifting time of the valve from shifted position to neutral position	3-position valve spring centred		ms	60-75	50	60-75	50	60-75	50	70	70
	2-position valve		ms	115-130	90	85-100	70	65-80	65	80	85
	3-position valve hydraulic centred	“a” to “o”	ms	30-65	30	60-90	30	105-155	50	60	60
		“b” to “o”	ms	30-65	30	60-90	30	105-155	50	60	660

Characteristics curves (measured at v=41mm²/s and t= 50°C)

- 4WH10...

Symbol	Flow Direction			
	P-A	P-B	A-T	B-T
E, Y, D	2	2	4	5
F	1	4	1	4
G, T	4	2	2	6
H, C	4	4	1	4
J, K	1	4	1	4
L	2	3	1	4
M	4	4	3	4
P	4	1	3	4
Q, V, W, Z,	2	2	3	5
R	2	2	3	-
U	3	3	3	4

Symbol	Neutral position		
	A-T	B-T	P-T
F	3	-	3
G, T	-	-	7
H	1	3	5
L	3	-	-
P	-	7	5
U	-	4	-



Shifting performance limits (measured at v=41mm²/s and t= 50°C)

- 4WH10...

2 and 3-position valves permissible flow in L/min.

Symbol	Operating pressure in bar		
	200	250	315
E, J, L, M, Q, R, U, V, W, C, D, K, Z, Y	160	160	160
H	160	150	120
G, T	160	160	140
F, P	160	140	120

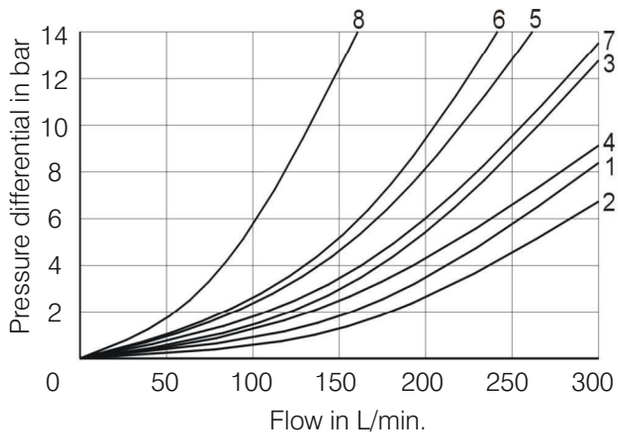
Note:

- Data of table is only fit for flow in two direction at the same time. For single flow direction (for example: P to A, B plugged), the permitted flow is reduced obviously. Please contact with our company's technical dept for detail information.
- The power limit is measured under solenoid on working temperature, 10% return voltage and without return oil back pressure.

Characteristics curves (measured at v=41mm²/s and t= 50°C)

- 4WH16...

Symbol	Flow Direction				
	P-A	P-B	A-T	B-T	P-T
E, D, Y	1	1	1	3	-
F	2	2	2	3	-
G, T	5	1	3	7	6
H, C, Q, V, Z	2	2	3	3	-
J, K, L	1	1	3	3	-
M, W	2	2	4	3	-
R	2	2	4	-	-
U	1	1	4	7	-



Shifting performance limits (measured at v=41mm²/s and t= 50°C)

- 4WH16...

- 2-position valves permissible flow in L/min.

	Symbol	Operating pressure in bar				
		70	140	210	280	350
Main ① valve spring return	C	300	300	300	300	300
	D, Y	300	270	260	250	230
	K	300	250	240	230	210
	Z	300	260	190	180	160
Hydraulic return	HC, HD, HK, HZ, HY	300	300	300	300	300

Note:

① The flow data above is the limit data of driving spool back to end position when pilot pressure is nil.

- Main valve spring return and pilot oil supply external type. Main valve permit flow is 300L/min. within adjustment pressure range when smallest pilot control oil pressure is 12bar.

  If using pilot oil supply internal type and flow is smaller than 160L/min, it needs to install prefill valve on main valve P port for C, D, Y, K, Z, HC, HD, HK, HZ, HY spools.

- 3-position valves permissible flow in L/min.

	Symbol	Operating pressure in bar				
		70	140	210	280	350
Spring centred	E, H, J, L, M, Q, U, W, R	300	300	300	300	300
	F, P	300	250	180	170	150
	G, T	300	300	240	210	190
	S	300	300	300	250	220
	V	300	250	210	200	180
Hydraulic centred	All spools	300	300	300	300	300

Note:

- It needs to install prefill valve at P port when V type spools's flow for pilot oil supply external and hydraulic centred smaller than 160L/min.
- If using pilot oil supply internal type, It needs to install prefill valve at P port for F, G, M, P, S spools.

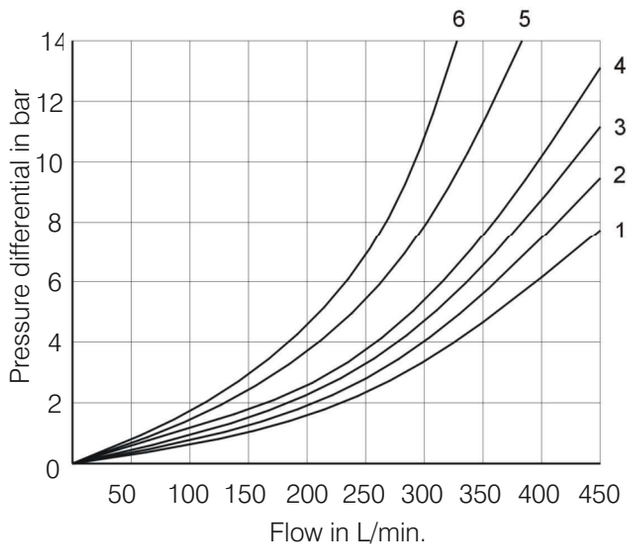
It must improve control pressure when using 3-position, 4-pass direction valve of main spool spring centred and using pressure more than limit. For example, work pressure is 350bar, flow is 300L/min,pilot control pressure should be 16bar.

Characteristics curves (measured at v=41mm²/s and t= 50°C)

- 4WH22...

Symbol	Flow Direction			
	P-A	P-B	A-T	B-T
E, M, P, Q, U, V	2	2	1	4
F	1	2	1	2
G, T	2	2	2	4
H, J, W	1	2	1	3
L	2	2	1	2
R	1	2	1	-

Symbol	Neutral position		
	A-T	B-T	P-T
F	-	-	4
G, P	-	-	6
H	-	-	2
L	4	-	-
T	-	-	5
U	-	6	-



Shifting performance limits (measured at v=41mm²/s and t= 50°C)

- 4WH22...
- 2-position valves permissible flow in L/min.

	Symbol	Operating pressure in bar				
		70	140	210	280	350
Spring① return	C	450	450	320	250	200
	D, Y	450	450	450	400	320
	K	450	215	150	120	100
	Z	350	300	290	260	160
Hydraulic centred	HC, HD, HK, HZ, HY	450	450	450	450	450
	HC.../O...	450	450	450	450	450
	HD.../O...	450	450	450	450	450
	HK.../O...	450	450	450	450	450
	HZ.../O...	450	450	450	450	450
	HC.../OF...	450	450	450	450	450
	HC.../OF...	450	450	450	450	450
	HC.../OF...	450	450	450	450	450
	HC.../OF...	450	450	450	450	450

- 3-position valves permissible flow in L/min.

	Symbol	Operating pressure in bar				
		70	140	210	280	350
Spring return	E, J, L, M, Q, U, W	450	450	450	450	450
	H	450	450	300	260	230
	G	400	350	250	200	180
	F	450	270	175	130	110
	V	450	300	240	220	160
	T	400	300	240	200	160
	P	450	270	180	170	110

Note:

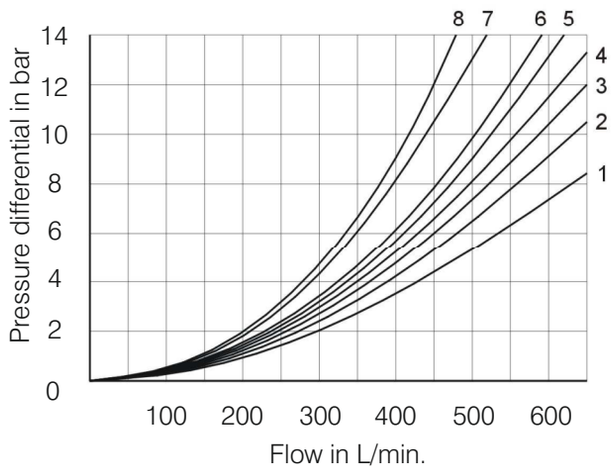
①Showing flow data is the limit data of driving spool back to end position when pilot pressure is nil.

- If using pilot oil supply internal type and flow is smaller than 160L/min, It needs to install prefill valve on main valve P port for F, G, M, P, T spools.

Characteristics curves (measured at v=41mm²/s and t= 50°C)

- 4WH25...

Symbol	Flow Direction			
	P-A	P-B	A-T	B-T
E	1	1	1	3
F	1	4	3	3
G	3	1	2	4
H	4	4	3	4
J, Q	2	2	3	5
L	2	2	3	3
M	4	4	1	4
P	4	1	1	5
R	2	1	1	-
U	4	1	1	8
V	2	4	3	6
W	1	1	1	3
T	3	1	2	4



Shifting performance limits (measured at v=41mm²/s and t= 50°C)

- 4WH25...
- 2-position valves permissible flow in L/min.

	Symbol	Operating pressure in bar				
		70	140	210	280	350
Spring ① return	C	700	700	700	700	650
	D, Y	700	650	400	350	300
	K	700	650	420	370	320
	Z	700	700	650	480	400
Hydraulic centred	HC, HD, HK, HZ, HY	700	700	700	700	700
	HC.../O...	700	700	700	700	700
	HD.../O...	700	700	700	700	700
	HK.../O...	700	700	700	700	700
	HZ.../O...	700	700	700	700	700
	HC.../OF...	700	700	700	700	700
	HC.../OF...	700	700	700	700	700
	HC.../OF...	700	700	700	700	700
	HC.../OF...	700	700	700	700	700

- 3-position valves permissible flow in L/min.

	Symbol	Operating pressure in bar				
		70	140	210	280	350
Spring return	E, L, M, Q, U, W	700	700	700	700	650
	G, T	400	400	400	400	400
	F	650	550	430	330	300
	H	700	650	550	400	360
	J	700	700	650	600	520
	P	650	550	430	330	300
	V	650	550	400	350	310
	R	700	700	700	650	580
Hydraulic centred	E, F, H, J, L, M. P, Q, R, U, V, W	700	700	700	700	650
	G, T	400	400	400	400	400
Hydraulic centred	G, T.	700	700	700	700	650

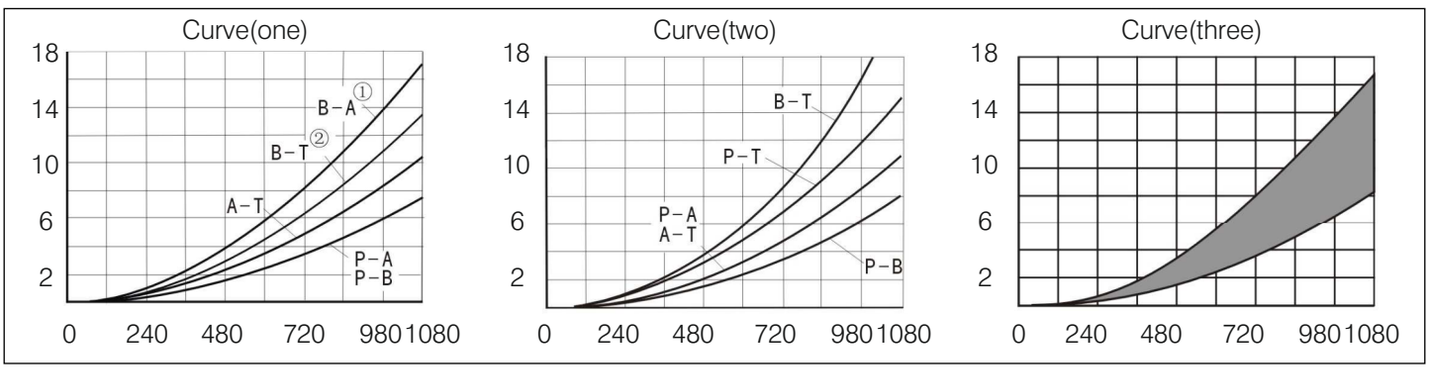
Note:

① Showing flow data is the limit data of driving spool back to end position when pilot pressure is nil.

- If using pilot oil supply internal type and flow is smaller than 180L/min, It needs to install prefill valve on main valve P port for H, HZ, V, C, HC, F, P, T spools.
- Main valve spring return and choosing pilot oil supply external type. Main valve permit flow is 700L/min under 280bar when smallest pilot control oil pressure is 13bar. The flow should be 650L/min when pressure is 350bar.

Characteristics curves (measured at v=41mm²/s and t= 50°C)

- 4WH32...



Note:
- Curves (one) for E, R, W spools;
- Curves (two) for G and T spools;
- Curves (three) for all spools;

① Only for R spool;
② Don't use for R spool;

Shifting performance limits (measured at v=41mm²/s and t= 50°C)

- 4WH32...
- 2-position valves permissible flow in L/min. (pilot oil supply external)

	Symbol	Operating Pressure in bar				
		70	140	210	280	350
Spring① return	C, D, K, Z, Y	1100	1040	860	750	680
Spring② return	C	1100	1040	860	800	680
	D, Y	1100	1040	540	480	680
	K	1100	1040	860	500	680
	Z	1100	1040	860	700	680
Hydraulic return	HC, HD, HK, HZ, HY	1100	1040	860	750	680

- 3-position valves permissible flow in L/min. (pilot oil supply external)

	Symbol	Operating Pressure in bar				
		70	140	210	280	350
Spring centred	E, H, J, L, M, Q, U, W, R	300	300	300	300	300
	F, P	300	250	180	170	150
	G, T	300	300	240	210	190
	S	300	300	300	250	220
	V	300	250	210	200	180
Hydraulic centred	ALL	300	300	300	300	300

Note:

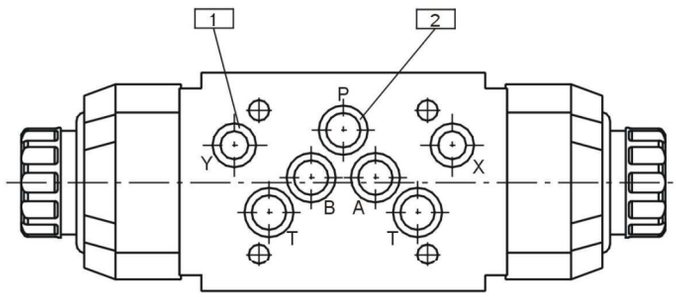
① Showing flow data is the limit data of driving spool back to end position when pilot pressure is nil.

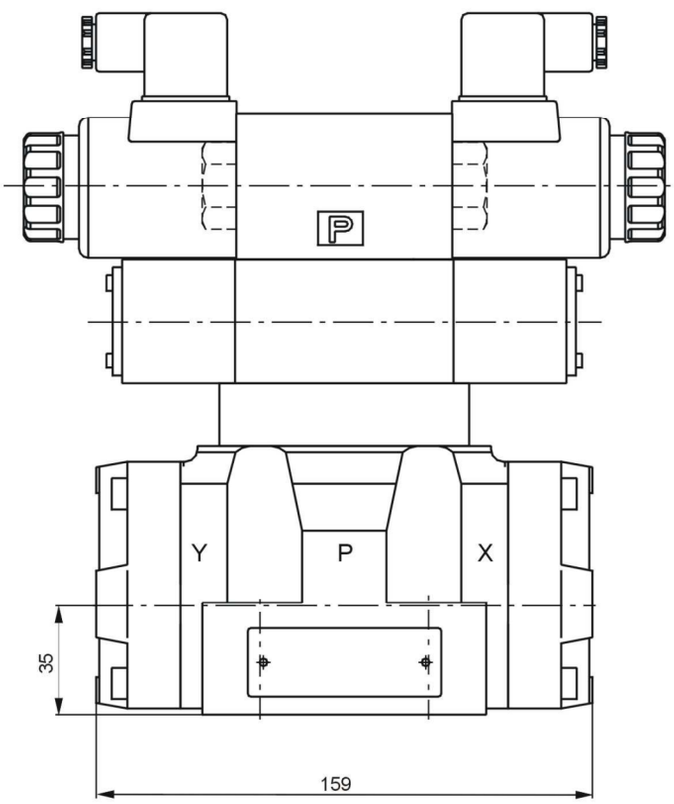
② Main valve spring return and choosing pilot oil supply external type. Main valve permit flow is 700 L/min. under 280bar when smallest pilot control oil pressure is 10bar.

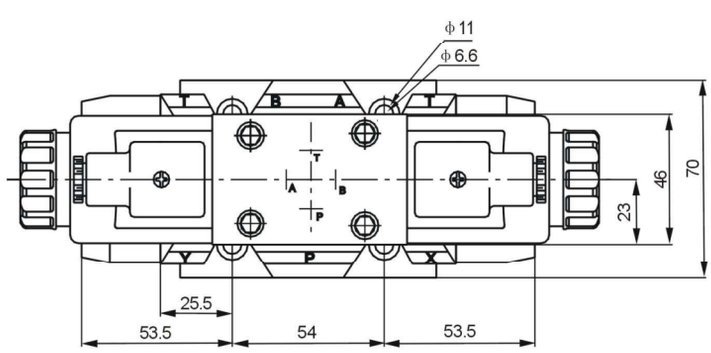
- If using pilot oil supply internal type flow is smaller than 180 L/min. It needs to install prefill valve on main valve P port for Z, HZ, V spools.
- It must improve control pressure when using 3-position, 4--pass direction valve of main spool centred and using pressure more than limit. For example; work pressure is 350 bar flow is 1100L/min.pilot control pressure should be 16bar
- If using pilot oil supply internal type and flow is smaller than 180 L/min. It needs to install prefill valve on main valve P port for C, HC, F, G, H, P, T spools.

Installation dimensions

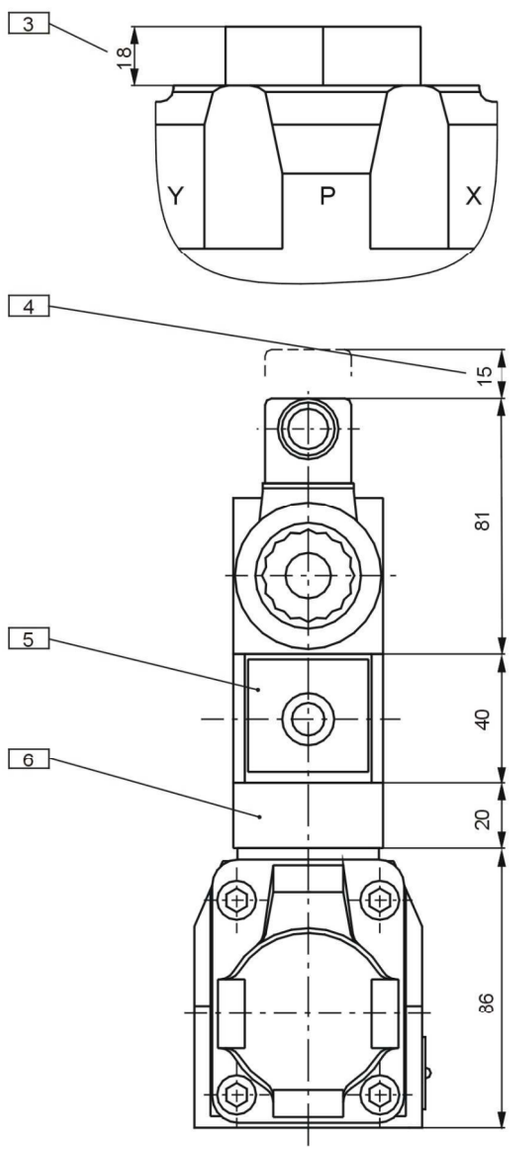
- 4WH10...







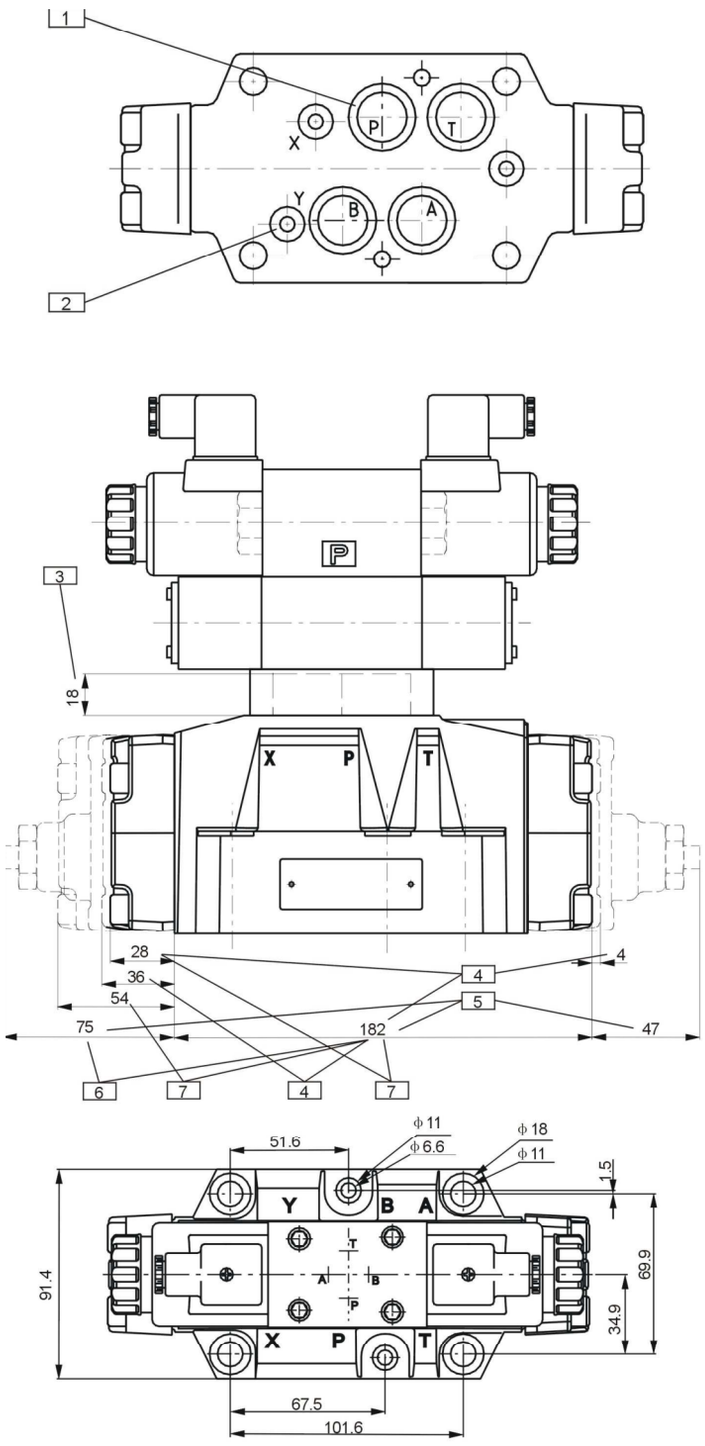
Valve fix bolts:
4-M6x45 GB/T70.1-2000-12.9,
M_A = 15.5N•M



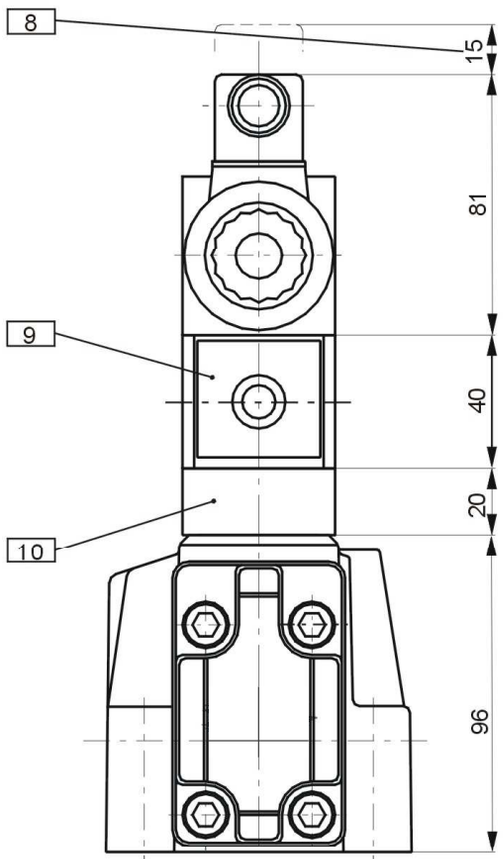
Explanation:
1. O Ring 2-10.6x1.8
2. O Ring 5-12x2
3. Connection subplate thickness for hydraulic operate (4WH...)
4. Space for pulling out plug;
5. Shifting time adjustment;
6. Reducing valve

Installation dimensions

- 4WH16...



Valve fix bolts:
4-M10x60 GB/T70.1-2000-12.9,
M_A = 75N•M
2-M6x60 GB/T70.1-2000-12.9,
M_A =15.5N•M

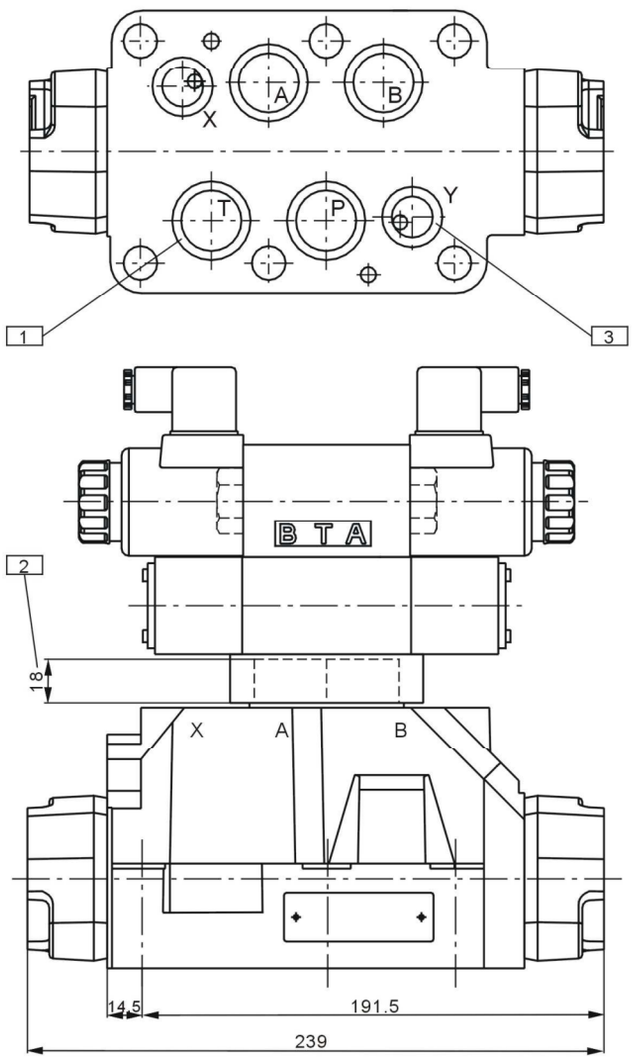


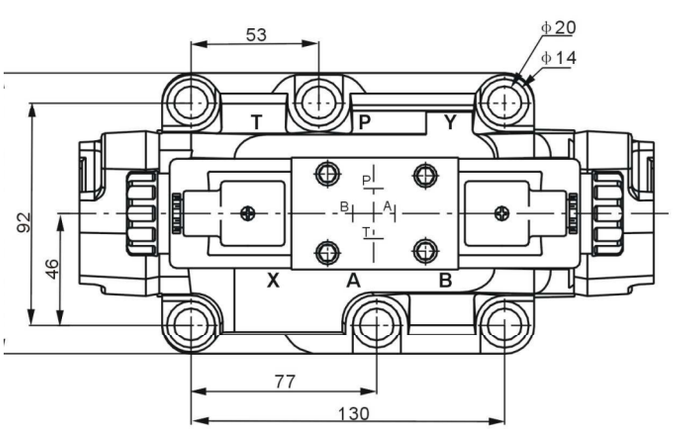
Explanation:

1. O Ring 4-22.4x2.65;
2. O Ring 2-9.8x2.4;
3. Connection subplate thickness for hydraulic operate (4WH...);
4. 2-position valve for main valve spring deflection;
5. Space for pulling out plug;
6. Moving space adjustment;
7. 3-position valve, spring centred; 2-position valve, main valve hydraulic return;
8. Space for pulling out plug;
9. Shifting time adjustment;
10. Reducing valve

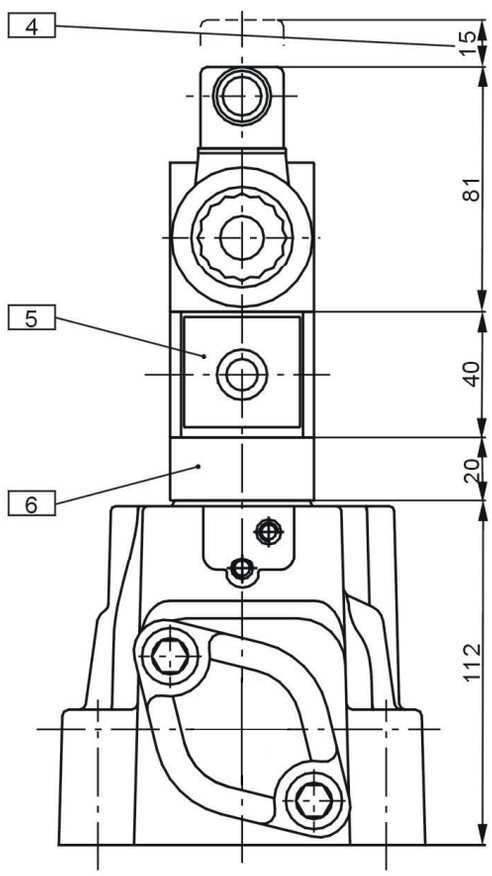
Installation dimensions

- 4WH22...





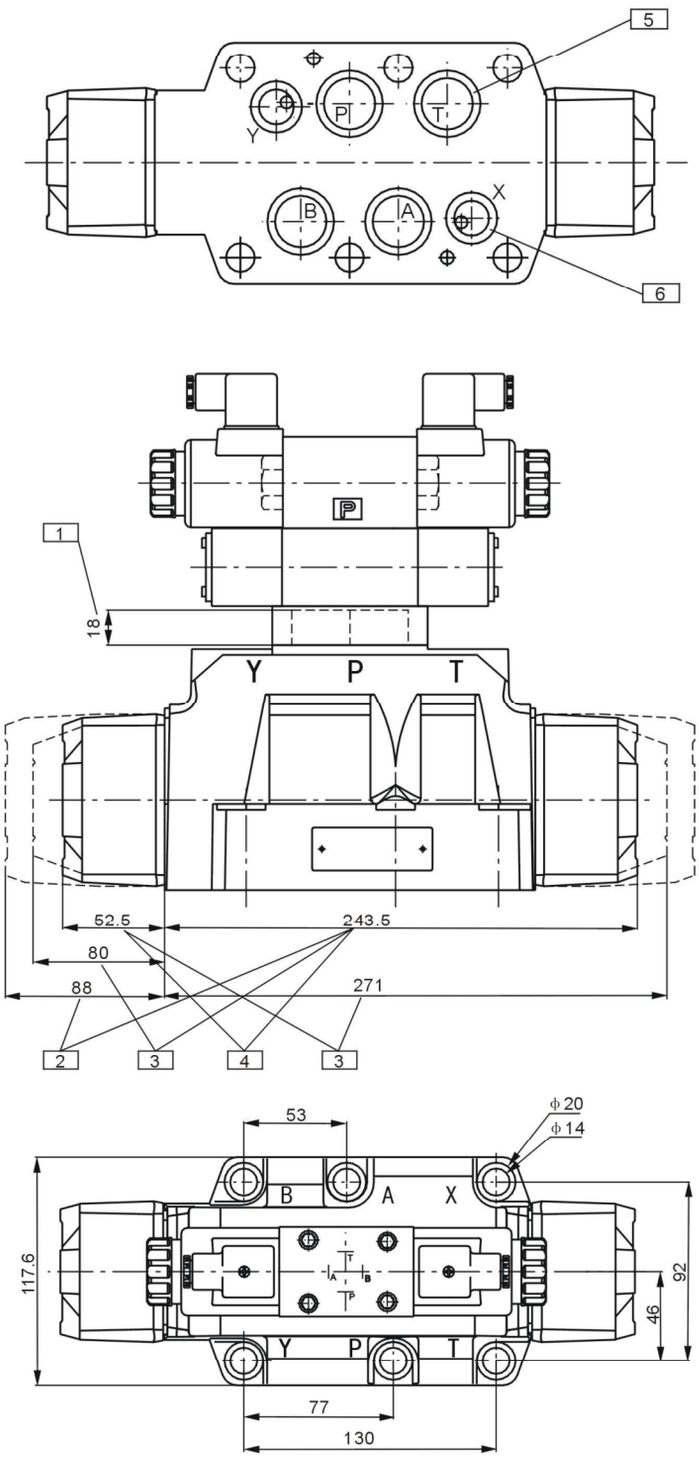
Valve fix bolts:
6-M12x60 GB/T70.1-2000-12.9,
M_A = 150N•M



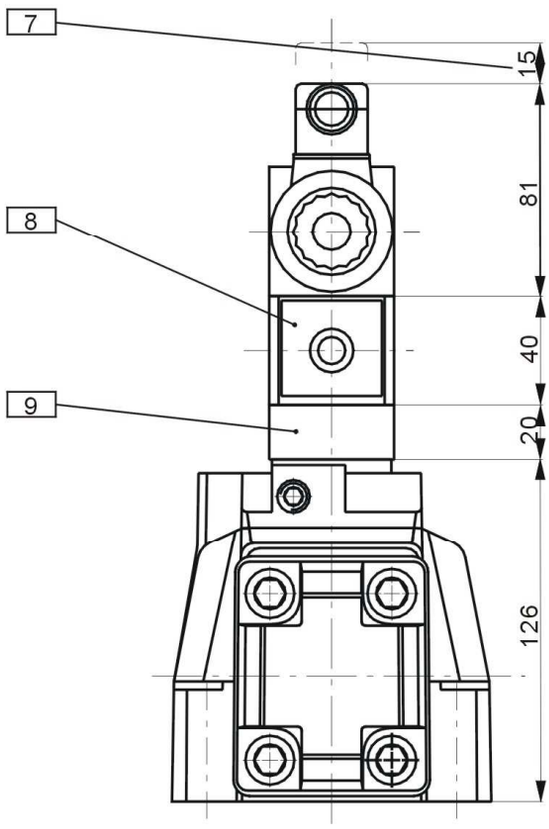
Explanation:
1. O Ring 4-27x3;
2. Connection subplate thickness for hydraulic operate (4WH...);
3. O Ring 2-20.8x2.4;
4. Space for pulling out plug;
5. Shifting time adjustment;
6. Reducing valve;

Installation dimensions

- 4WH25...



Valve fix bolts:
6-M12x60 GB/T70.1-2000-12.9,
M_A = 130N•M

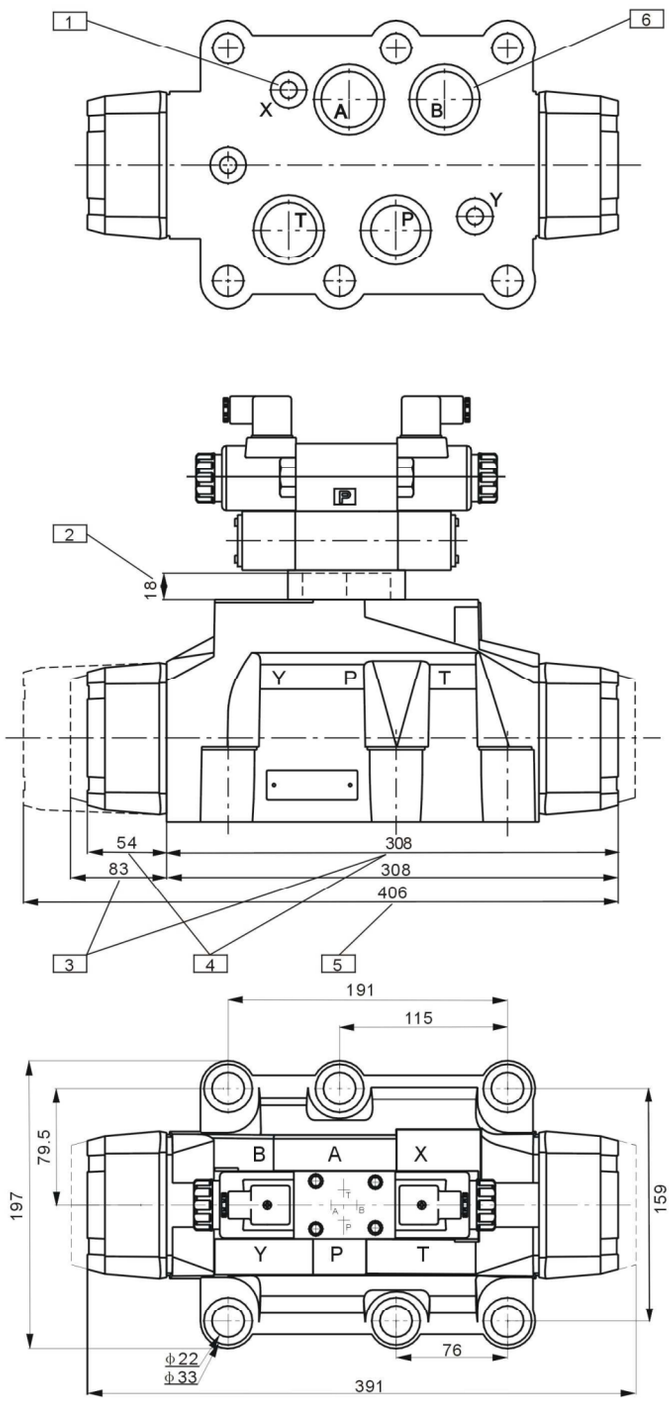


Explanation:

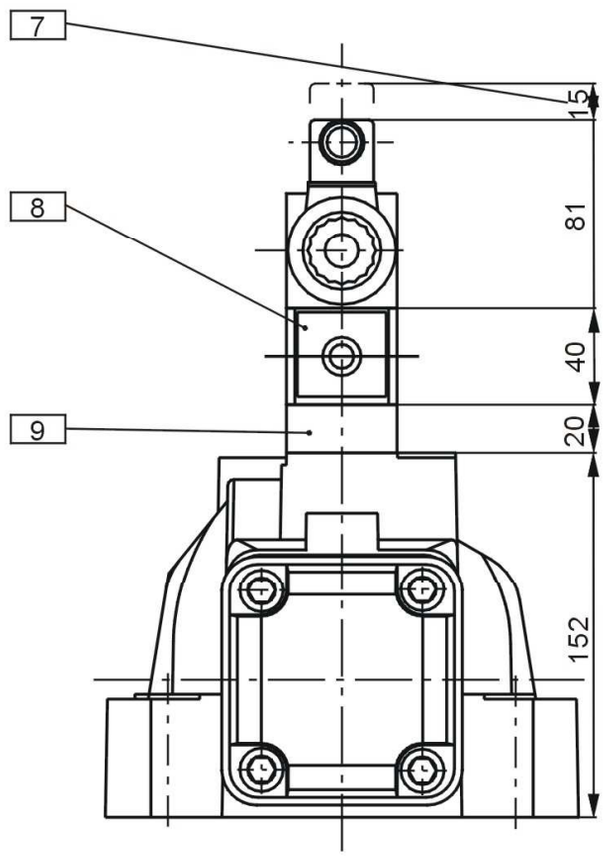
1. Connection subplate thickness for hydraulic operate (4WH...);
2. 3-position valve, pressure centred;
3. 2-position valve for main valve spring deflection;
4. 3-position valve, spring centred;
5. 2-position valve, main valve hydraulic return;
6. O Ring 4-29.7x3.5
7. O Ring 2-20.8x2.4
8. Space for pulling out plug;
9. Shifting time adjustment;
10. Reducing valve;

Installation dimensions

- 4WH32...



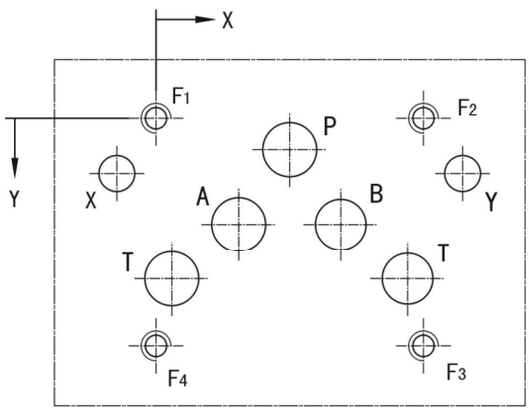
Valve fix bolts:
6-M12x60 GB/T70.1-2000-12.9,
M_A = 130N•M



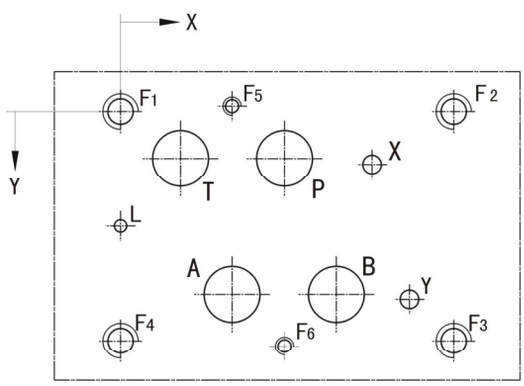
Explanation:
1. O Ring 3-19x3;
2. Connection subplate thickness for hydraulic operate (4WH...);
3. 2-position valve for main valve spring deflection;
4. 3-position valve, spring centred;
5. 2-position valve, main valve hydraulic return;
6. 3-position valve, pressure centred
7. O Ring 4-42x3;
8. Space for pulling out plug;
9. Shifting time adjustment;
10. Reducing valve

Subplate installation dimensions

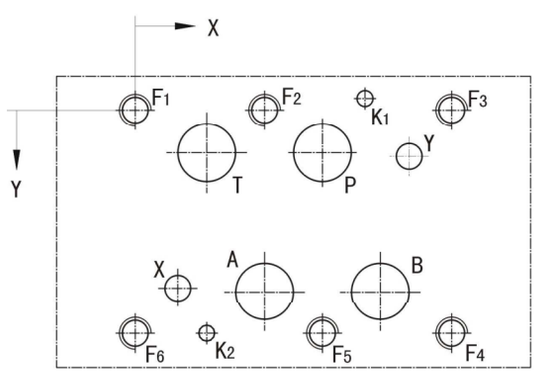
- 4WH10...



- 4WH16...



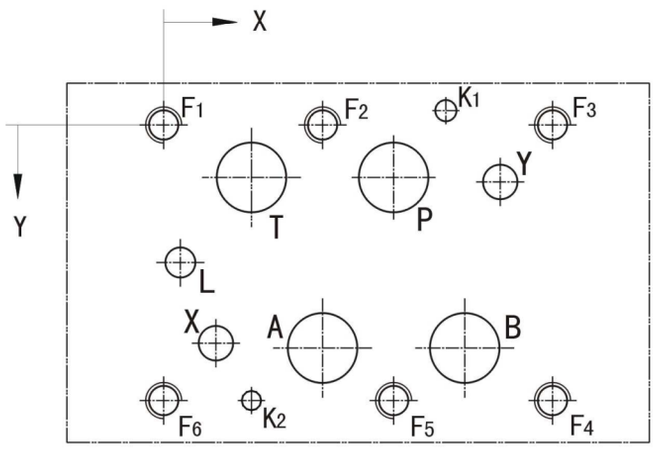
- 4WH22...



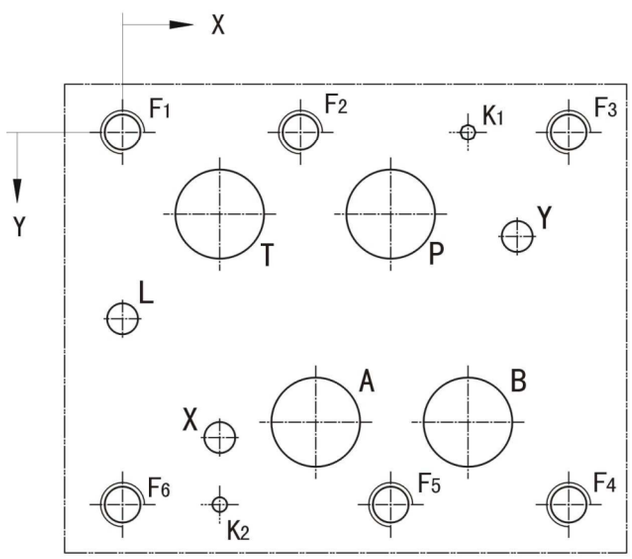
Size	Des. / Code	Position		Character	
		X	Y		Deep
4WH10	F1	0	0	M6	12
	F2	54	0	M6	12
	F3	54	46	M6	12
	F4	0	46	M69	12
	P	27	6.3	Ø10.5	-
	A	16.7	21.4	Ø10.5	-
	B	37.3	21.4	Ø10.5	-
	T	3.2 50.8	32.5	Ø10.5	-
	X	-7.9	11.1	Ø7	-
	Y	61.9	11.1	Ø7	-
4WH16.	F1	0	0	M10	19
	F2	101.6	0	M10	19
	F3	101.6	69.9	M10	19
	F4	0	69.9	M10	19
	F5	34	71.5	M6	12
	F6	50	-1.6	M6	12
	L	0	35	Ø4	-
	T	18.3	55.6	Ø17.5	-
	A	34	14.2	Ø17.5	-
	P	50	55.6	Ø17.5	-
	B	65.8	14.2	Ø17.5	-
	X	76.7	53.8	Ø6	-
	Y	88.1	12.7	Ø6	-
4WH22.	F1	0	0	M12	24
	F2	53.2	0	M12	24
	F3	130.2	0	M12	24
	F4	130.2	92.1	M12	24
	F5	77	92.1	M12	24
	F6	0	92.1	M12	24
	K1	94.5	-4.8	Ø6.5	8
	K2	29.4	92.1	Ø6.5	8
	T	29.4	17.5	Ø24.5	-
	A	53.2	74.6	Ø24.5	-
	B	100.8	74.6	Ø24.5	-
	P	77	17.5	Ø22	-
	X	17.5	73	Ø11.2	-
	Y	112.7	19	Ø11.2	-

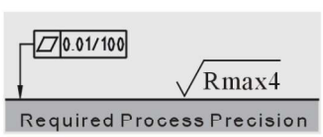
Subplate installation dimensions

- 4WH25...



- 4WH32...





Size	Des. / Code	Position		Character	
		X	Y		Deep
4WH25.	F1	0	0	M20	35
	F2	76	0	M20	35
	F3	190.5	0	M20	35
	F4	190.5	159	M20	35
	F5	114.5	159	M20	35
	F6	0	159	M20	35
	L	0	79.7	Ø13	-
	K1	147.5	0	Ø6.5	8
	K2	41.5	159	Ø6.5	8
	T	41.5	35	Ø35	-
	A	82.5	124	Ø35	-
	B	147.5	124	Ø35	-
	P	114.5	35	Ø34	-
	X	41.5	130.5	Ø13	-
	Y	168.5	44.5	Ø13	-
4WH32.	F1	0	0	M12	24
	F2	53.2	0	M12	24
	F3	130.2	0	M12	24
	F4	130.2	92.1	M12	24
	F5	77	92.1	M12	24
	F6	0	92.1	M12	24
	L	5.6	-4.8	Ø10	-
	K1	94.5	-4.8	Ø6.5	8
	K2	29.4	92.1	Ø6.5	8
	T	29.4	17.5	Ø24.5	-
	A	53.2	74.6	Ø24.5	-
	B	100.8	74.6	Ø24.5	-
	P	77	17.5	Ø22	-
	X	17.5	73	Ø11.2	-
	Y	112.7	19	Ø11.2	-

The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.

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