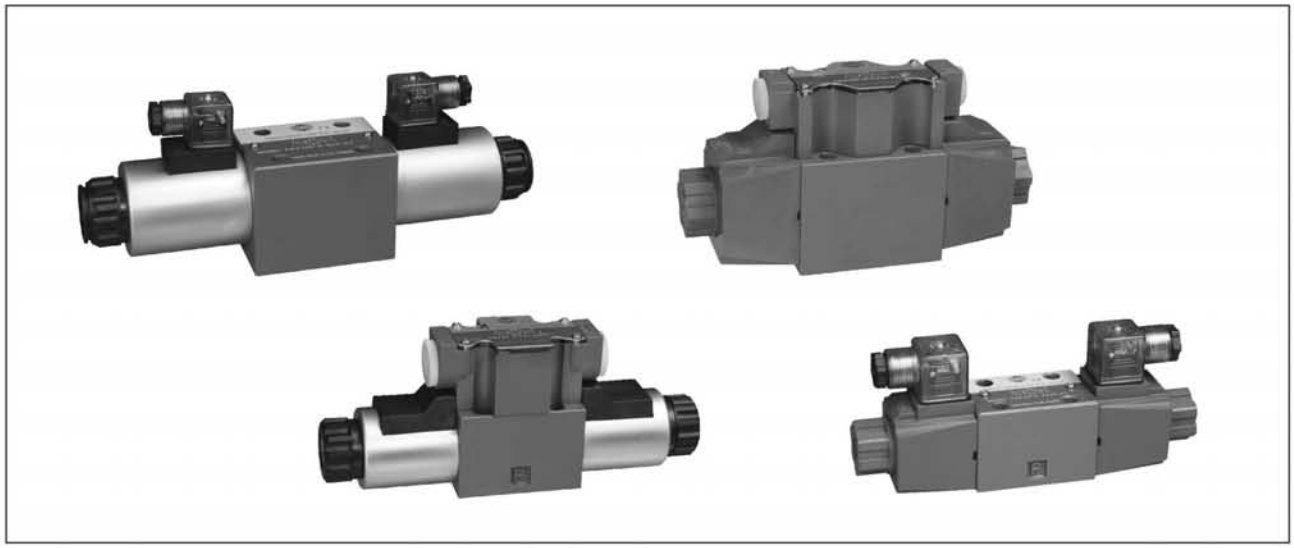
4/3 and 4/2 Directional Valves with wet pinDC or AC solenoids, Type 4WE 6 or 10



Introduction and Characteristic

— The 4WE 6 or 10 directional valves are solenoid operated directional spool valves.

— They control the start ,stop and direction of flow .

— It is unnecessary to open the pressure tight chamber when changing the coil.

— Under urgent situation, the spool can be drived by hidden hand override .

Ordering details

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4WE				/										S	

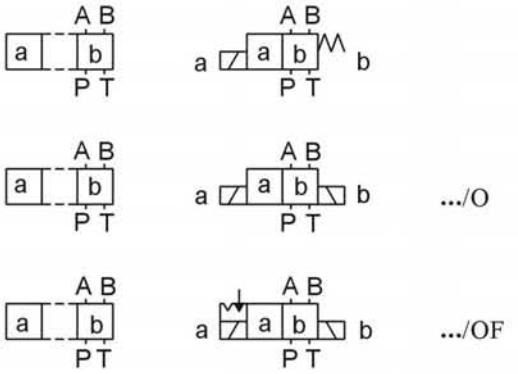
Item	Collocation	Code	Explanation
1	Sort	4WE	4/3 and 4/2 Solenoid operated directional valve
2	Nominal size	6	
		10	
3	Operated Directional Cushion	No Code	Standard
		S	Cushion operated directional Impact is small.
4	Symbols		See symbols list
5	Series	6X	For nominal size 6
		3X	For nominal size 10
6	Return mode	No Code	Spring Return
		O	Without Spring Return
		OF	With detent
7		E	For nominal size 6 , high power solenoid
		C	For nominal size 10
8	Input voltage	W220	220V/50Hz、240V/60Hz
		W110	110V/50Hz、120V/60Hz
		RAC220	220V/50Hz、240V/60Hz
		RAC110	110V/50Hz、120V/60Hz
		G12	12V
		G24	24V
		G48	48V
9	Hand override	N9	With protected hand override (standard)
		N ★	With hand override

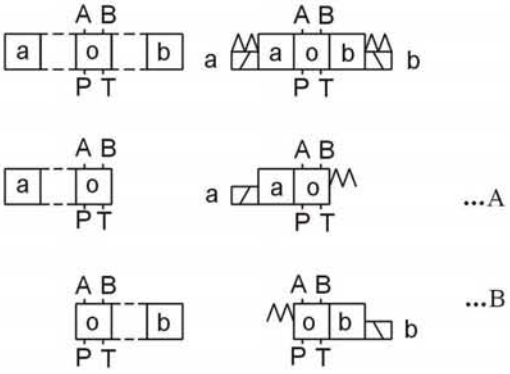
Item	Collocation	Code	Explanation
10	Electrical connections	K4	Individual connections with component plug ISO4400 without plug-in connector
		DL	Central connections Terminal box with cable connector, with indicator light
11	Plug-in connector	No Code	Without plug-in connector
		Z4	With guadrate plug-in connector
		Z5L	Guadrate plug-in connector with indicator light
		F6L	With waterproof ① plug-in connector
12	Throttle position	No Code	Without cartridge throttle
		P	Active in the P line
		A	Active in the A line
		B	Active in the B line
13	Throttle diameter	No Code	Without cartridge throttle
		08	Throttle Φ0.8 mm
		10	Throttle Φ1.0 mm
		12	Throttle Φ1.2 mm
14	Seal material	No Code	NBR seals
		V	FKM seals
15		S	SUNNY hydraulic technical
16			Futher details in clear text

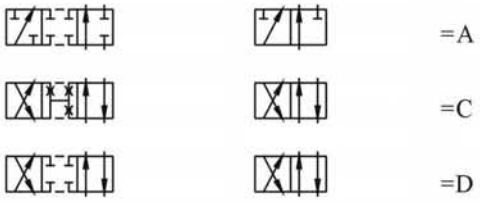
Note：

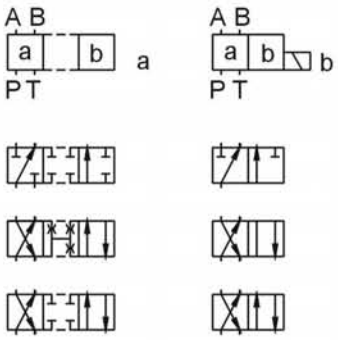
① Waterproof degree of plug-in connector is IP65;

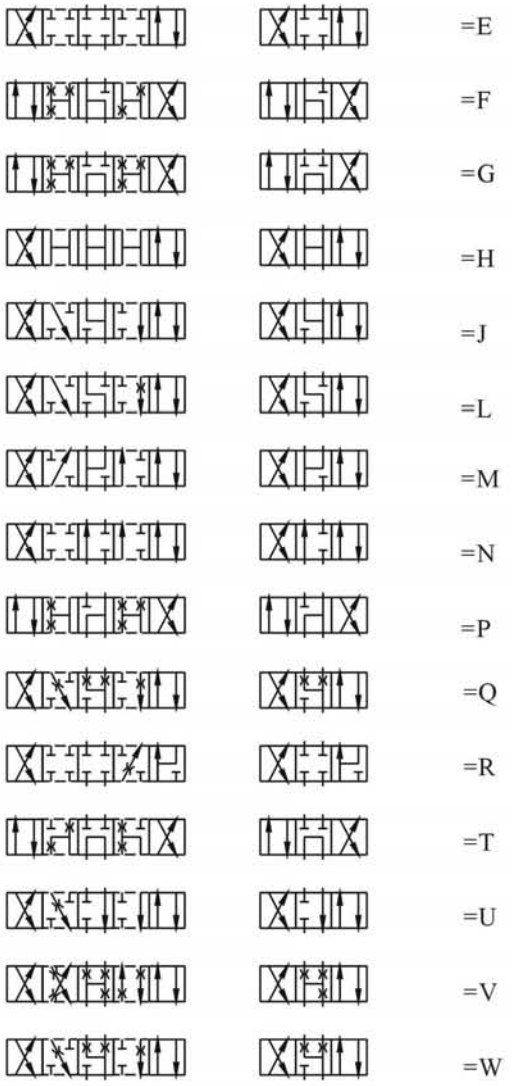
★ Please consult us when you choose this application.











Remark:

1. Example:Spool E with switching position "a" ordering details...EA...
2. The symbol tag is same for W and Q type spool. But the throttle area for W and Q type spool is 3% and 6% of J type spool`s.
3. There are specail cushion spools for C,E,J, L,U codes. Please add S type if need .
4. For special requirement , please contract with our company`s technical department . We can design special spool .

Technical data

General			Size 6	Size 10
Weight	Valve with 1 solenoids	Kg	1.65	4.80
	Valve with 2 solenoids	Kg	2.25	6.15
Ambient temperature		℃	-30 to 50	
Installation			optional	

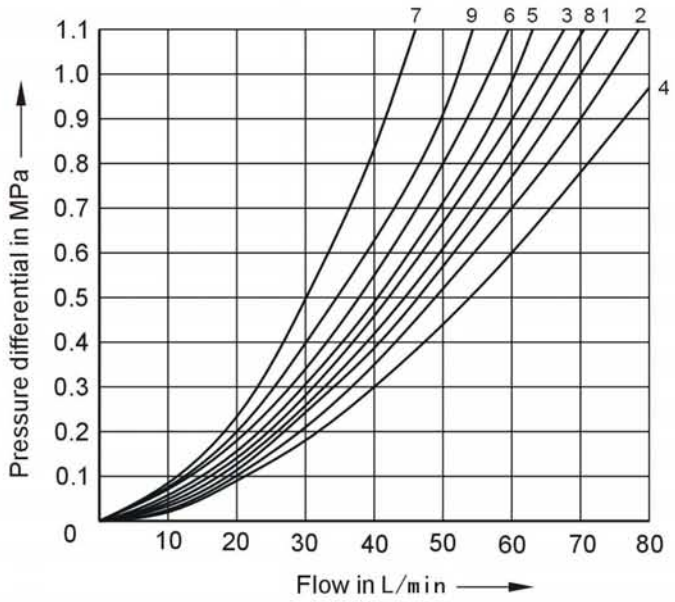
Hydraulic			Size 6	Size 10
Flow Max.		L/min	Up to 80(=);Up to 60(~)	Up to120
Operating pressure max	Ports A、B、P	MPa	35	31.5
	Ports T	MPa	Up to21 (=) ; Up to16 (~) ③	
Pressure fluid: ① suitable for NBR and FKM seals; ② only suitable for FKM seals.			Mineral oil (HL,HLP) to DIN 51524① Fast bio-degradable pressure fluids to VDMA 24568; HETG(rape seed oil) ① HEPG(Polyglycol);HEES(Synthetic ester)② ; Other fluids on request	
Pressure fluid temperature range	NBR seals	℃	-30 to +80	
	FKM seals	℃	-20 to +80	
Viscosity range		mm^2/s	2.8 to 500	
Degree of fluid contamination			Maximum permissible degree of contamination of fluid is to NAS 1638 class 9.We,therefore,recommend a fither minmun retention rat of $\beta_{10} \geqslant 25$.	

Electrical			Size 6		Size 10	
			DC	AC 50/60Hz	DC	AC 50/60Hz
Voltage available		V	12, 24, 48	110,120, 220,240	12, 24, 48	110,120, 220,240
Voltage tolerance (normial voltage)		%	±10	±10	±10	±10
Power consumption		W	32	—	<40	50
Holding current		A	—	—	—	0.9
In-rush current		A	—	<2	—	<2
shifting time to ISO6403	ON	ms	25 to 45	10 to 20	40 to 60	15 to 25
	OFF	ms	10 to 25	15 to 40	20 to 30	20 to 30
shifting frequency		Sw/h	up to 15000	up to 7200	up to 15000	up to 7200
Insulation to DIN 40 050			IP65	IP65	IP65	IP65
Coil temperature		℃	up to +155	up to +180	up to +155	up to +180

Note: ③ For with symbols A and B, port T must be used as a drain port,if the operating pressure is above the permssible tank pressure .

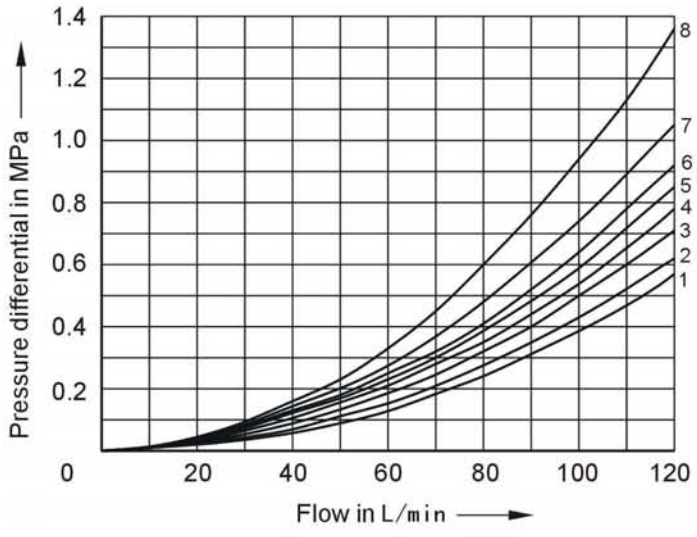
Characteristic Curves (measured at v=41mm^2/s and t=50℃)

Nominal size 6



Symbol	Flow Direction				
	P—A	P—B	A—T	B—T	P—T
A、B	3	3	–	–	–
C、X	1	1	3	1	–
D、Y	5	5	3	3	–
E	3	3	1	1	–
F	1	3	1	1	–
G	6	6	8	8	7
H	2	4	2	2	–
J、Q	1	1	2	1	–
L	3	3	4	8	–
M	2	4	3	3	–
P	3	1	1	1	–
R	5	5	4	–	–
T	9	9	8	8	7
U	3	3	8	4	–
V	1	2	1	1	–
W	1	1	2	2	–

Nominal size 10



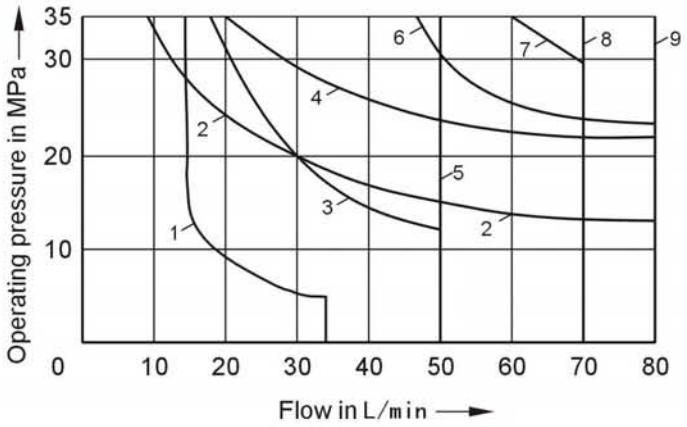
Symbol	Flow Direction				
	P—A	P—B	A—T	B—T	P—T
A、B	3	3	–	–	–
C、X	1	3	4	5	–
D、Y	5	5	6	6	–
E	1	1	4	4	–
F	2	3	7	4	8
G	3	3	6	7	9
H	1	1	6	7	3
J、Q	1	1	3	3	–
L	2	2	3	5	–
M	1	1	4	5	–
P	3	1	1	1	–
R	5	5	4	–	–
T	9	9	8	8	7
U	2	2	3	3	–
V	1	2	1	1	–
W	1	1	2	2	–

Shifting Power Limits

Nominal size 6 DC Soleniod & AC Solenoid

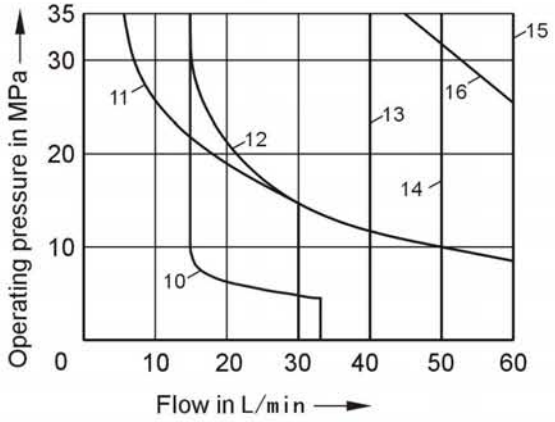
The given switching power limits are for applications with two flow directions, and were measured with the solenoids at operating temperature, 10% under voltage and without tank back pressure.

Measured at v=41mm^2/s and t=50℃



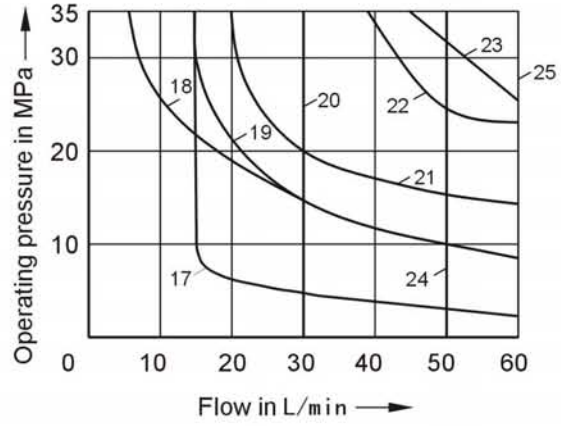
DC Soleniod

Curve	Symbol	Curve	Symbol
1	V	6	A/O、A/OF、L、U
2	A、B	7	C、D、Y
3	F、P	8	M
4	J	9	E、C/O、C/OF、D/O、D/OF、Q、W、R
5	G、H、T		



50Hz AC Soleniod

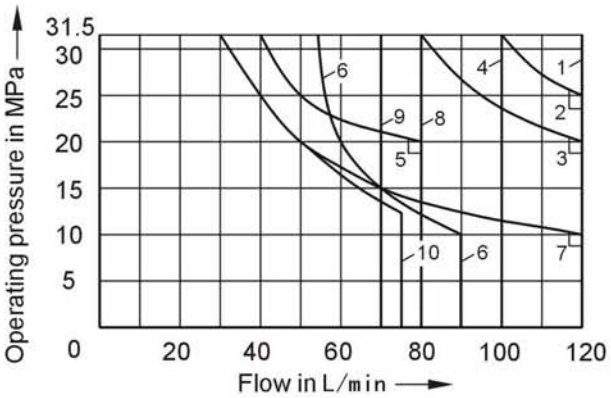
Curve	Symbol	Curve	Symbol
10	V	15	A/O、A/OF C/O、C/OF D/O、D/OF M、J、Q、R、W、E、L、U
11	A、B		
12	F、P		
13	G、T		
14	H	16	C、D、Y

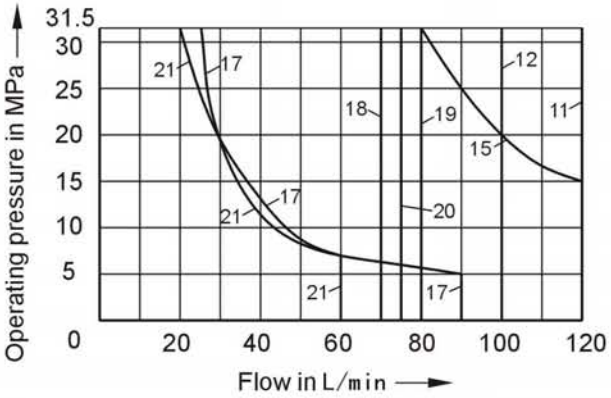


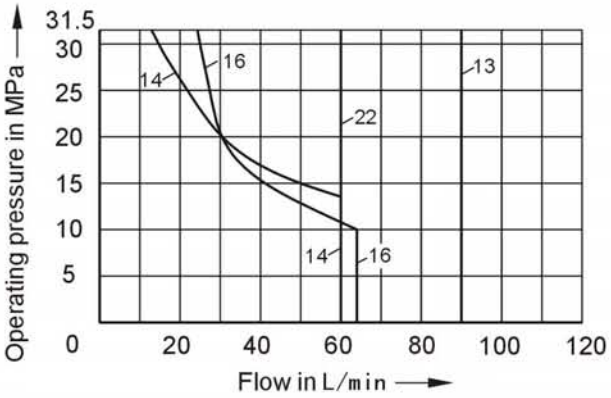
60Hz AC Soleniod

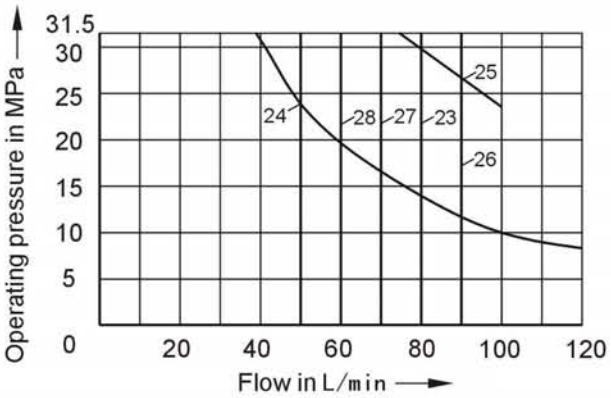
Curve	Symbol	Curve	Symbol
17	V	22	A/O、A/OF、Q、W
18	A、B	23	C、D、Y
19	F、P	24	H
20	G、T	25	C/O、C/OF、D/O D/OF、E、M、R
21	L、U、J		

Nominal size 10 ,DC Soleniod & AC Solenoid









The given switching power limits are for applications with two flow directions, and were measured with the solenoids at operating temperature,10% under voltage and without tank back pressure.

Measured at $v=41mm^2/s$ and $t=50℃$

DC Solenoid:24V

Curve	Symbol	Curve	Symbol
1	C、C/O、C/OF、D、D/O、D/OF、Y、M	5	G
		6	F、P
2	E	7	A、B
3	A/O、A/OF、L、U、J、Q、W	8	R、L①、U①
		9	V
4	H	10	T

① Only fit for the situation at middle position.

AC Solenoid: 110V/50Hz; 120V/60Hz; 220V/50Hz; 240V/60Hz.

Curve	Symbol	Curve	Symbol
11	C、C/O、C/OF D、D/O、D/OF、Y	16	G
		17	F、P
12	E、L、U、Q、W	18	H
		19	R
13	M	20①	L、U
14	A、B	21	T
15	A/O、A/OF、J	22	V

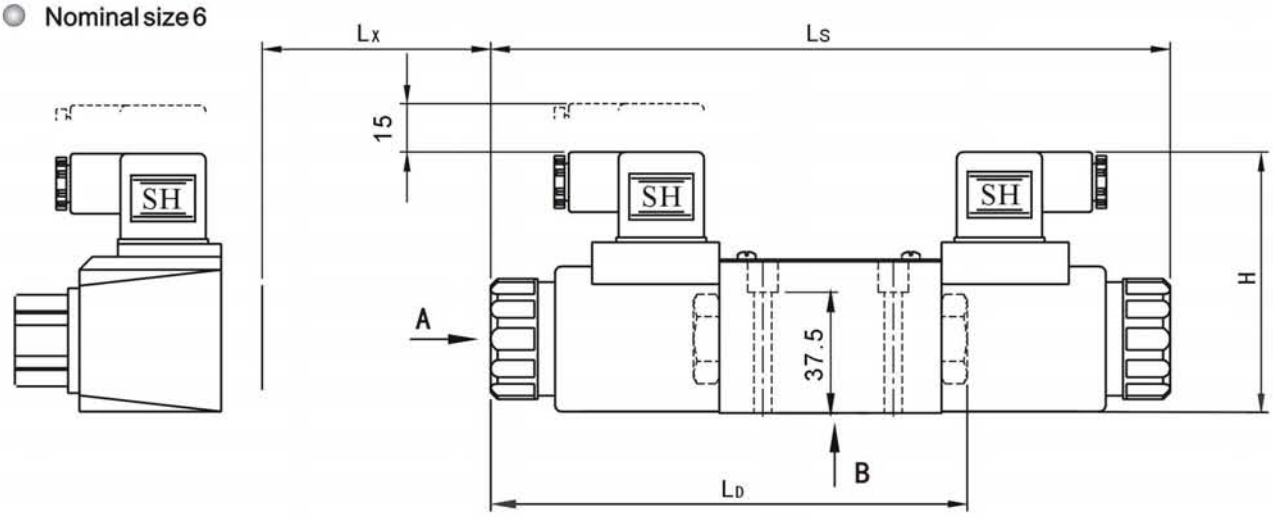
① Only fit for the situation at middle position.

AC Solenoid: 110V/60Hz; 220V/60Hz;

Curve	Symbol	Curve	Symbol
23	C、CO、COF、D DO、DOF、Y	26	M
24	AO、AOF	27	H
25	E	28	V

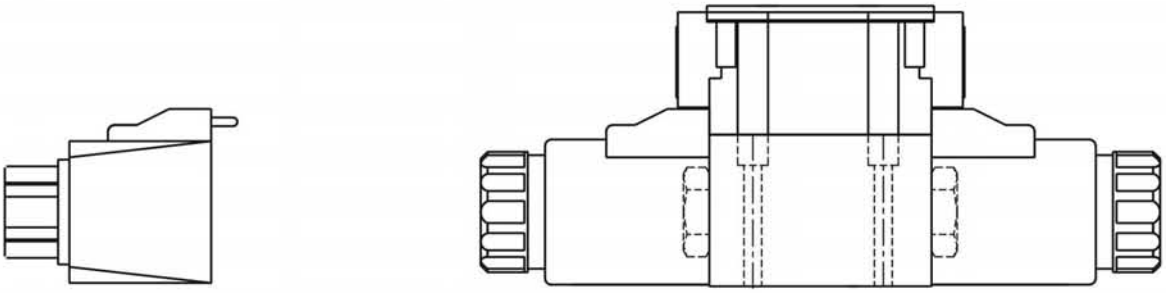
Installation Dimensions

Nominal size 6



AC Plug-in Connection Type

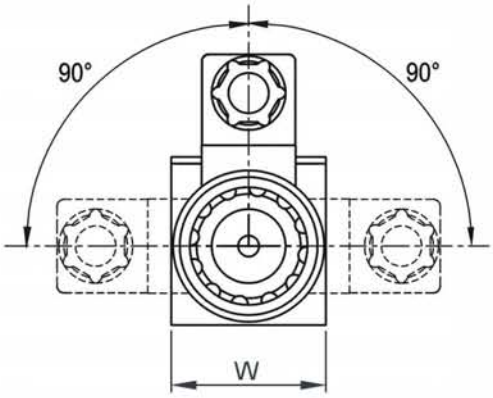
DC Plug-in Connection Type



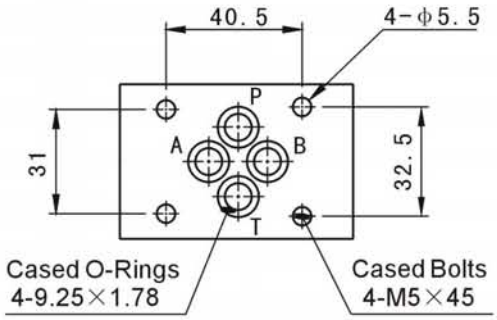
AC With Lamp Central Connection Type

DC With Lamp Central Connection Type

A Direction



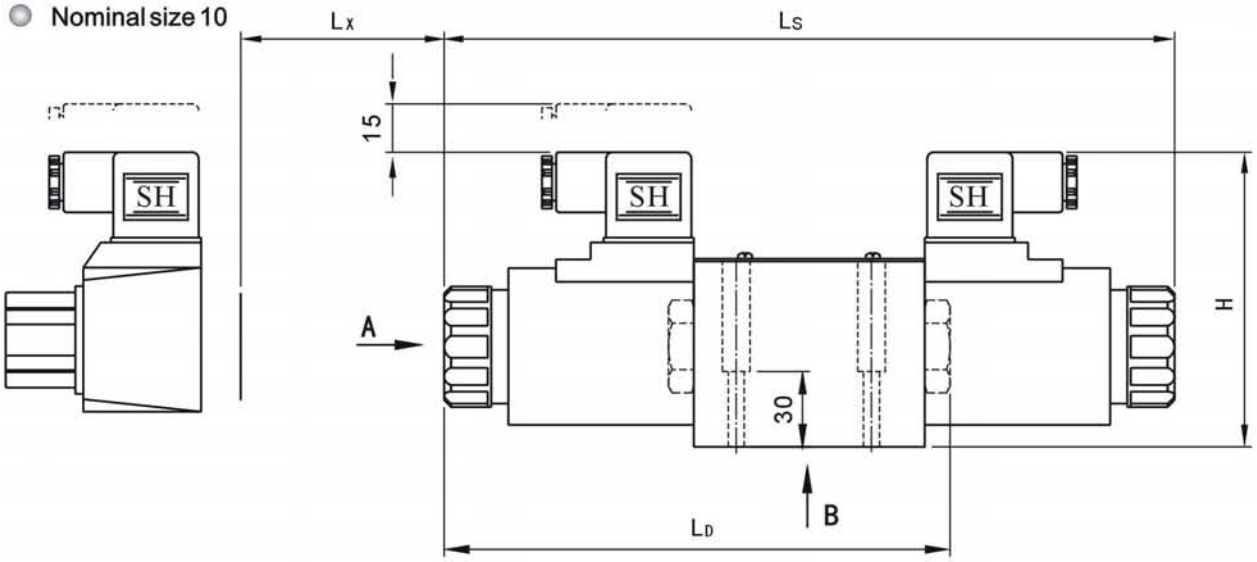
B Direction



Valve type	Total length		Total width (W)	Total high (H)	Take out coil (Lx)
	LD	Ls			
DC Plug-In Connection Type	148	211	46	81	71
DC With Lamp Central Connection Type	148	211	46	85	71
AC Plgu-in Connection Type	141	197	46	81	64
AC With Lamp Central Connection Type	141	197	46	85	64

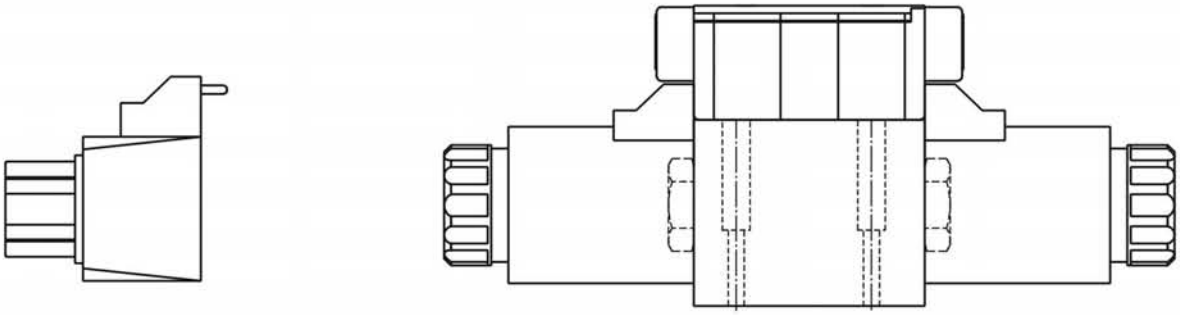
Installation Dimensions

Nominal size 10



AC Plug-in Connection Type

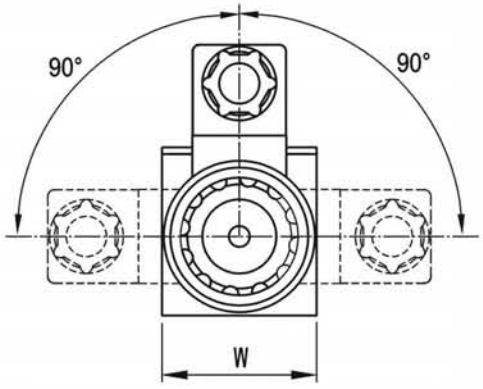
DC Plug-in Connection Type



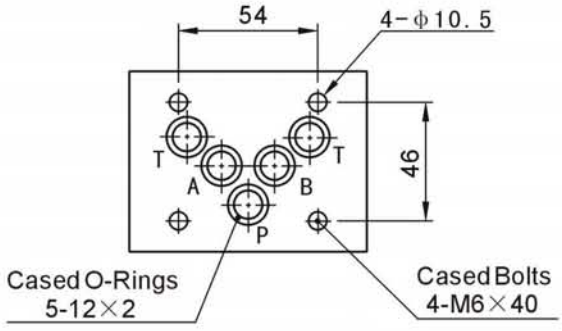
AC With Lamp Central Connection Type

DC With Lamp Central Connection Type

A Direction



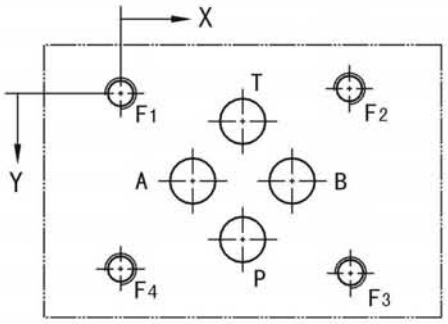
B Direction

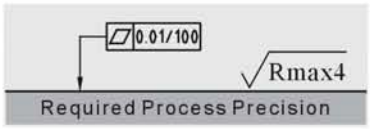


Valve type	Total length		Total width (W)	Total high (H)	Take out coil (Lx)
	LD	Ls			
DC Plug-In Connection Type	207.3	302	70	111	105
DC With Lamp Central Connection Type	207.3	302	70	119	105
AC Plgu-in Connection Type	168.3	224.2	70	111	66
AC With Lamp Central Connection Type	168.3	224.2	70	119	66

Subplate Installation Dimensions (Porting pattern to ISO 4401)

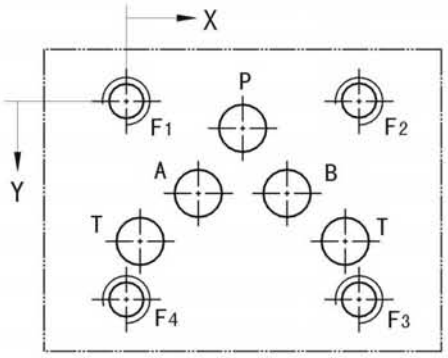
Nominal size 6

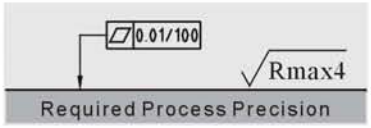




	4-M5 Deep 10				4-φ7.6max			
X	0	40.5	40.5	0	12.7	21.5	30.2	21.5
Y	0	-0.75	31.75	31	15.5	5.1	15.5	25.9
Code	F1	F2	F3	F4	A	T	B	P
Note: The tolerance for each hole dimension is ±0.1 .								

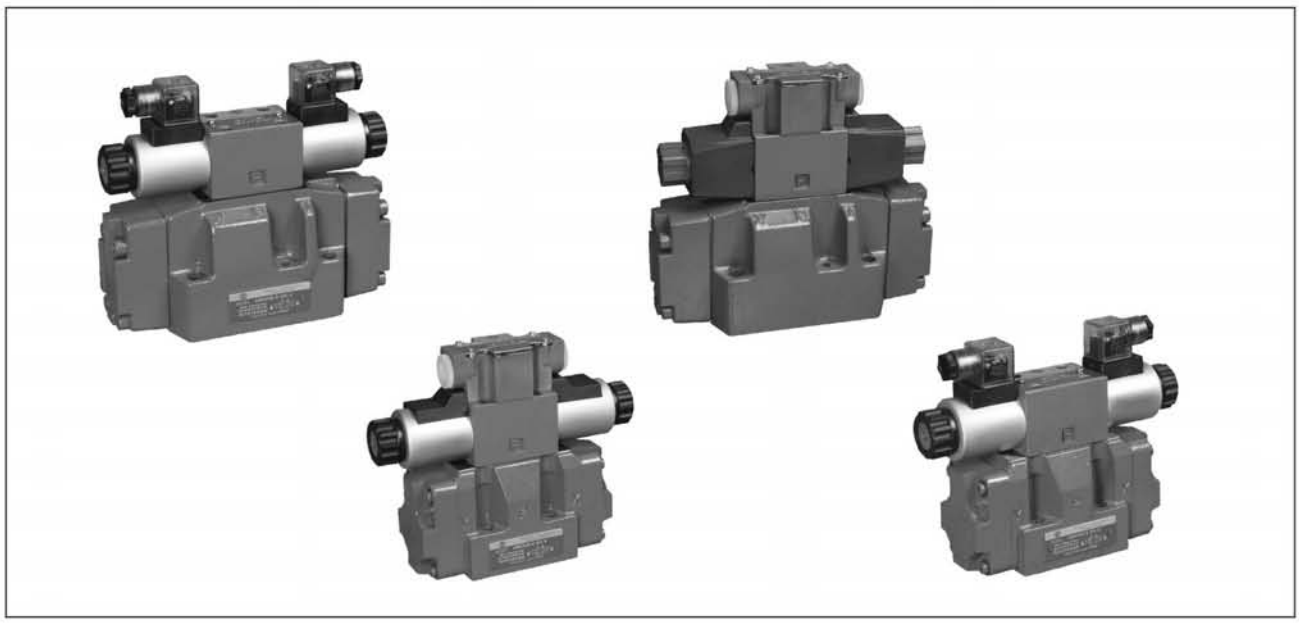
Nominal size 10





	4-M6 Deep 12				5-φ10.5max				
X	0	54	54	0	16.7	3.2	50.8	37.3	27
Y	0	0	46	46	21.4	32.5		21.4	6.3
Code	F1	F2	F3	F4	A	T		B	P
Note: The tolerance for each hole dimension is ±0.1 .									

4/2 and 4/3-way Directional Valves
Pilot Opertated Type 4WEH...
Externally Pilot Operated Type 4WH...



Introduction and Characteristic

— There are four different pilot control types to control main valve`s spool moving accurately .

— it used to control the start ,stop and direction of a fluid flow.

— The shifing time also can be adjusted by assembling throttle and check valve.

Ordering details

1	2	3	4	5	6	7	8	9	10	11
						/	6E			

NO.	Version	Code	Explanation
1	Highest pressure	No Code	To 28MPa
		H-	To 35MPa
2	Types of operation	4WEH	Electro-hydraulic
		4WH	Hydraulic
3	Nominal size	10	Size 10
		16	Size 16
		22	Size 25,standard type
		25	Size 25,high power type
		32	Size 32
4	Spool return	No Code	Springs
		H	Hydraulic
5	Symbols		See page
6	Series	4X	For size 10
		6X	For size 25 (high power type) and size 32
		7X	Size 16 and size 25(standard type)
7①	Pilot vavle spool return	No Code	Spring return — Spool return in the pilot vavle for 2-position vavle and 2 solenoids only possible with spools C,D,K,Z and hydraulicspool return in the main valve .
		O	Without spring return
		OF	With Orientation Organ
8①		6E	High-performance valve
9①	Input voltage	W220	220V/50Hz、240V/60Hz
		W110	110V/50Hz、120V/60Hz
		RAC220	220V/50Hz、240V/60Hz
		RAC110	110V/50Hz、120V/60Hz
		G12	12V
		G24	24V
		G48	48V
10①	Pilot valves hand override	N9	With protected hand override (standard)
		N ★	With hand override
11①	Pilot oil supply and drain line	No Code	Pilot oil supply external , pilot oil drain external
		E	Pilot oil supply internal , pilot oil drain external
		T	Pilot oil supply external , pilot oil drain internal
		ET	Pilot oil supply internal , pilot oil drain internal

Ordering details

12	13	14	15	16	17	18	19	20	21	22
			/						S	

NO.	Version	Code	Explanation
12①	★ shifting time adjustment	No Code	Without shifting time adjustment
		S	shifting time adjustment as meter-in control
		S2	shifting time adjustment as meter-out control
13①	Electrical connections	K4	Individual connections with component plug ISO4400 with plug-in connector
		DL	Central connections Terminal box with cable connector,with indicator light
14①	Plug-in connector	No Code	Without plug-in connector
		Z4	With guadrate plug-in connector
		Z5L	Guadrate plug-in connector with indicator light
		F6L	With waterproof plug-in connector②
15	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
16①	Throttle position	No Code	Without cartridge throttle
		P	Active in the P line
		A	Active in the A line
		B	Active in the B line
		T	Active in the T line
17①	Throttle diameter	No Code	Without cartridge throttle
		08	Throttle Φ0.8 mm
		10	Throttle Φ1.0 mm
		12	Throttle Φ1.2 mm
18①	④ Pre-load valve	No Code	Without pre-load valve
		P	With pre-load valve
19①	Pressure ★ reducing valve	No Code	Without pressure reducing valve
		D3	With pressure reducing valve between mail valve and pilot valve
20	Seal material	No Code	NBR seals
		V	FKM seals
21		S	SUNNY fluid power technic
22		No Code	Futher details in clear text

Note:

① Only apply on Electro-hydraulic Operated Directional Valve;

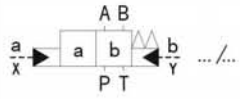
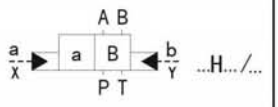
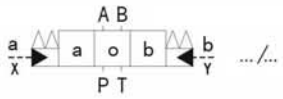
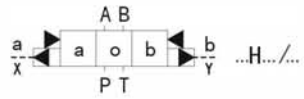
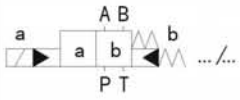
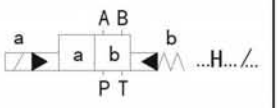
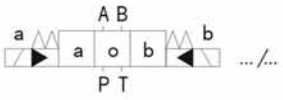
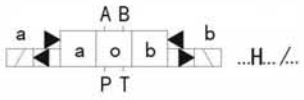
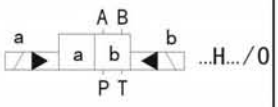
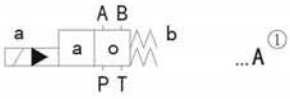
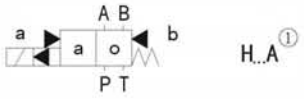
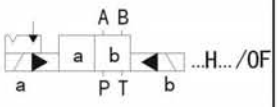
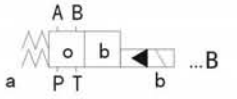
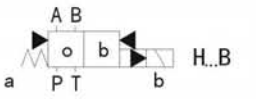
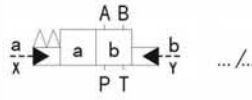
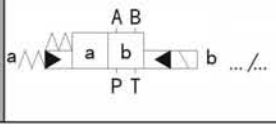
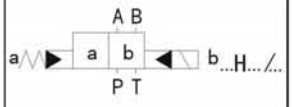
② Waterproof degree of plug-in connector is above IP65;

③ Only apply on size 16 ;

④ Not apply on size 10 and size 25 (standard type);

★ Please consult us when you choose this application.

Symbols

Sort	2-position valve		3-position valve	
	Spring return	Hydraulic return	Spring return	Hydraulic return
4WH	 ... /...	 ...H... /...	 ... /...	 ...H... /...
4WEH	 ... /...	 ...H... /...	 ... /...	 ...H... /...
	—	 ...H... /0	 ...A ①	 H...A ①
	—	 ...H... /0F	 ...B	 H...B
4WH	 ... /...	—		
4WEH	 ... /...	 ...H... /...		



=C



=D



=K



=Z



=Y



=E



=F



=G



=H



=J



=L



=M



=P



=Q



=R



=T



=U



=V



=S

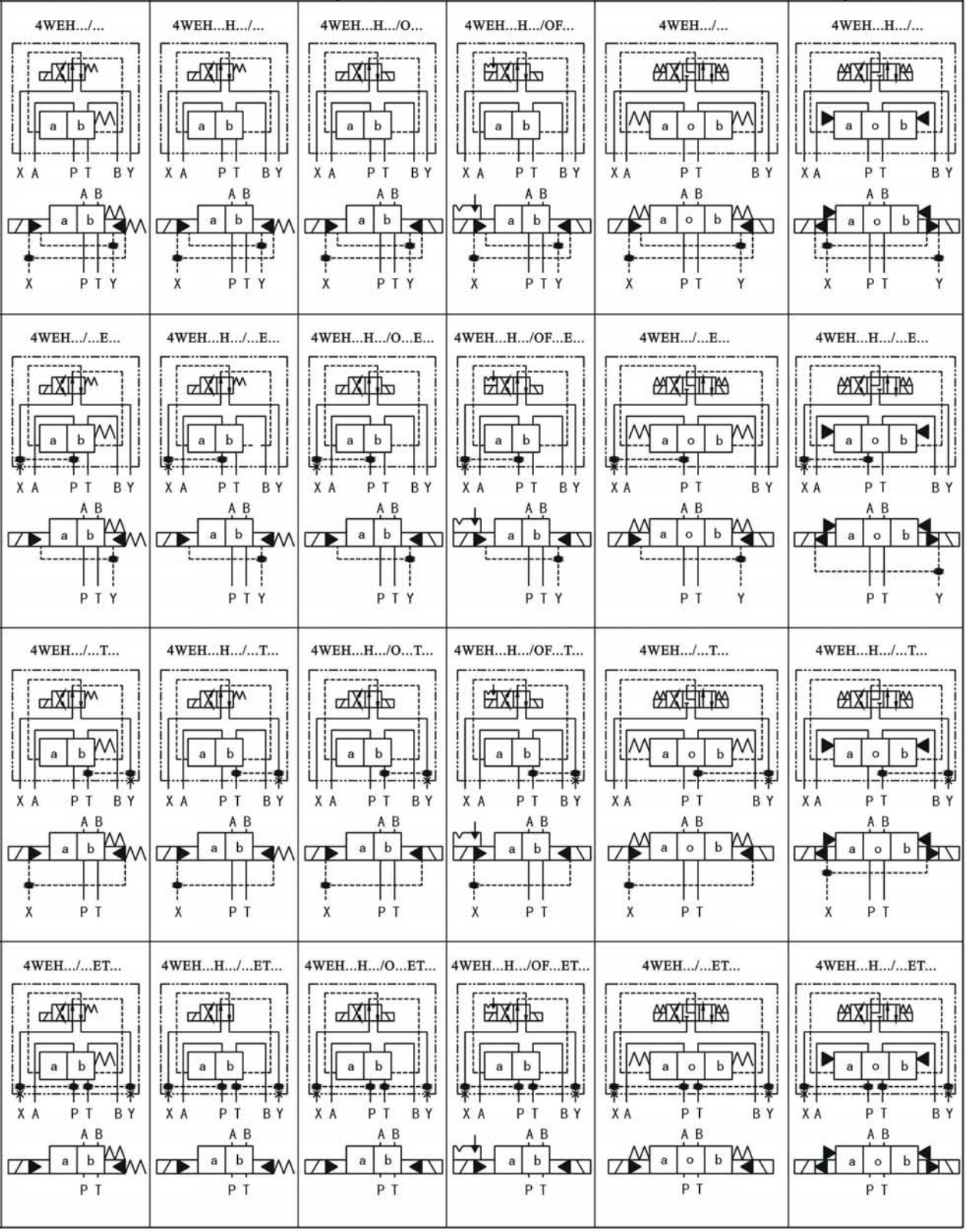
NOTE:

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

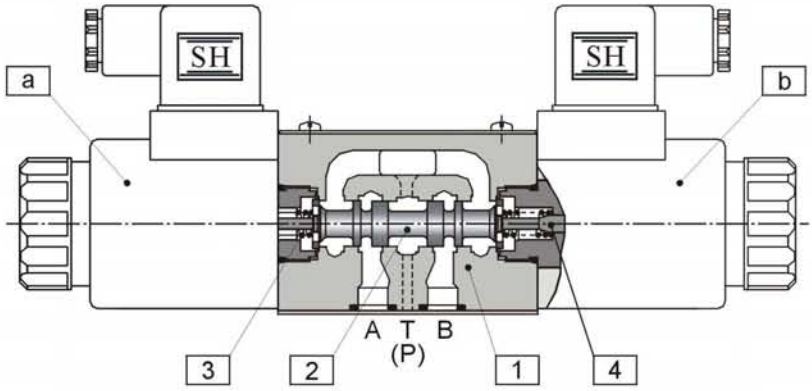
	Springs	Hydraulic			Springs	Hydraulic ①
X=external ; Y=external	4WEH.../...	4WEH...H.../...	4WEH...H.../O...	4WEH...H.../OF...	4WEH.../...	4WEH...H.../...
X=internal ; Y=external	4WEH.../...E...	4WEH...H.../...E...	4WEH...H.../O...E...	4WEH...H.../OF...E...	4WEH.../...E...	4WEH...H.../...E...
X=external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



Section photo 3 Type：4WE 6 .....6X/.....Z5LS

Function description

On the section photo 3, the solenoid power which is brought after solenoid ‘a’ or solenoid ‘b’ gets through eletricity can drive the control spool 2 to move right or left inside housing 1 pass plunger 4 .So it can flow freely from P to B ,A to T or P to A ,B to T.

There are three kinds of return type for spool when de-energising solenoid. Spring return type: return spring 3 drive spool back to the initial position; Without spring return type: the spool position when solenoids are de-energisedisnot defined; Detent or type: spool can keep any position when solenid stoppes eletricity.

Spring Return Type （4WE .../...）

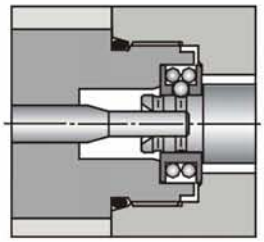
For this kind return type solenoid operated directional valve, solenoid power conquers spring power to drive spool when solenoid gets through eletricity. The spool comes back and keeps at one end(two position valve) or middle position(three position valve) because of spring power after solenoid loses eletricity.

Without Spring Return Type （4WE .../O...）

For this kind return type solenoid operated directional valve,solenoid power drives spool to needed position directly when solenoid gets through eletricity. There isn't fixed position after solenoid loses eletricity.

Orientation Organ Type （4WE .../OF...）

For this kind return type solenoid operated directional valve,solenoid power drives spool to needed position directly when solenoid gets through eletricity. After that ,when solenids are de-energisod, the sool is heid in the deent po-sion and thus the solennoids do not need to be centinuously energised.



Section photo 4 : detent

Cartridge throttle （4WE ...P08...）

In some fixed work condition hydraulic system , please insert right throttler into P.A.B oil port base on detail situation when the flows exceed permited power limit of thel valve during operation (see section photo 5).

There are three dimensions for damper are 0.8、1.0、1.2（mm）。

Section photo 5 : throttle

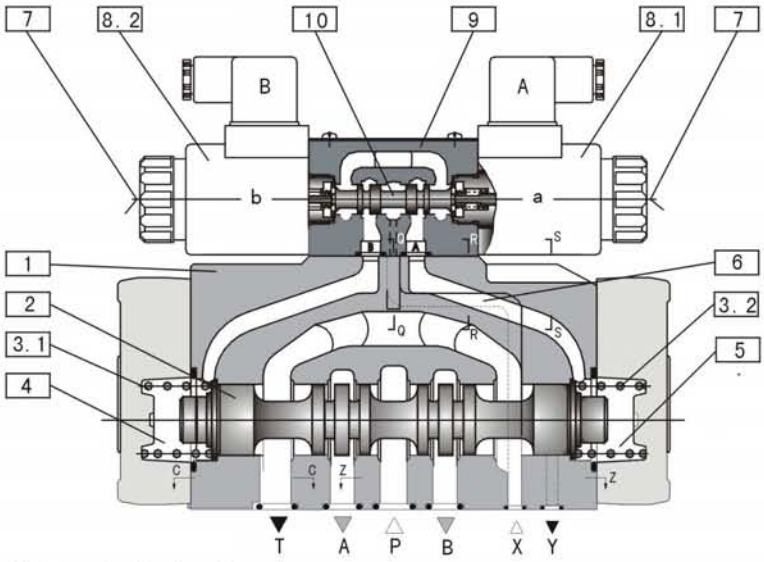
Type: 4WEH 10 E 4X/6EG24N9K4Z5LH

Initializtion

Pilot valve at middle position. Main spool at two end pass oil box .

Work state

Solenoid “a” gets through eletricity. Pilot spool 10 moves to left to control oil from pilot valve`s P port to B port . After that , the oil entermain spool`s left antrum 4 . It drives main spool 2 to move to right after conquering the spring power of spring 3.2 . At final , it comes true P pass to B and A pass to T for main valve. Solenoid “b” gets through eletricity . The P pass to A and B pass to T for main valve.



Main valve spring return

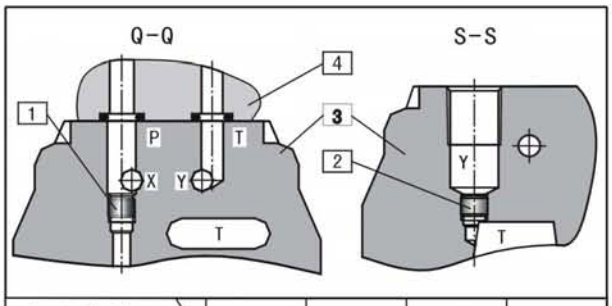
Solenoid loses eletricity. The main spool return to original position under spring power of spring 3.1 or 3.2.

Main valve hydraulic return

The main spool`s two end pass to control oil . After solenoidgets through eletricity , one end controls oil to return to oil box and main apool to move . It comes true oil road`s shift for main valve. After solenoid loses eletricity , the main spool`s two end return under hydraulic power.

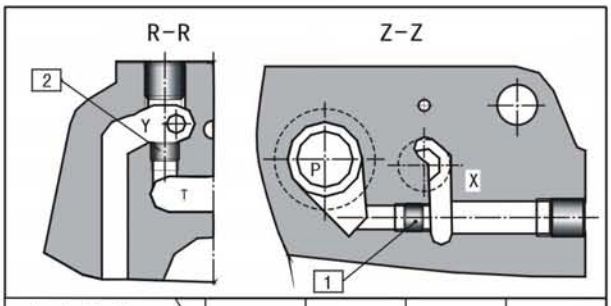
Pilot control type

4WEH10...



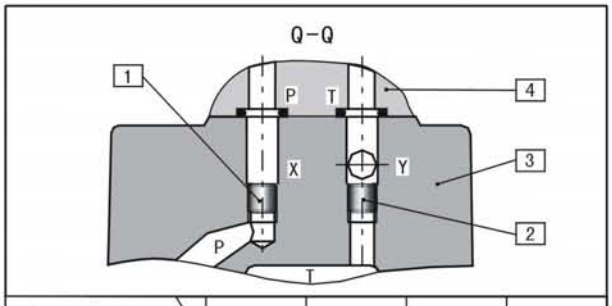
Installation	No code	ET	E	T
Screw plug 1	○	○	×	×
Screw plug 2	○	×	○	×

4WEH16...



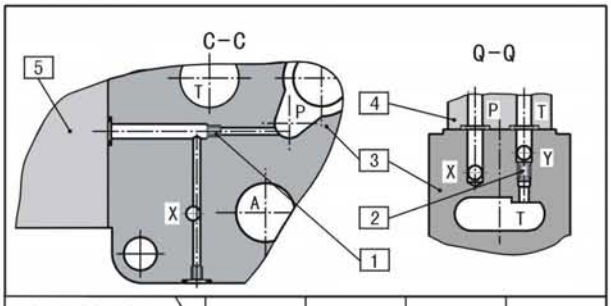
Installation	No code	ET	E	T
Screw plug 1	○	○	×	×
Screw plug 2	○	×	○	×

4WEH22...



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

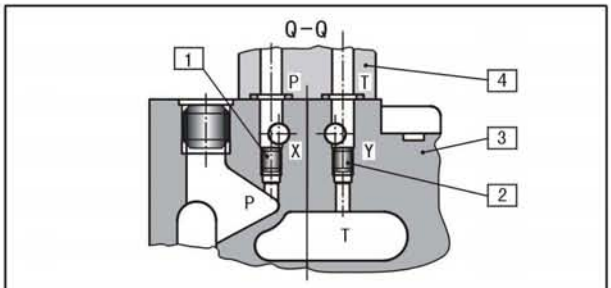
4WEH25...



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

Pilot control type

4WEH32...



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

Note: "○" express installation.
"×" express without installation.

The dimension of the Screw plug 1 and 2 is Rc1/16 (JB/ZQ4446-86)

4WEH...and 4WH...

The pilot oil supply is sourced externally via channel X from a separate circuit . And the pilot oil drain is led externally via channel Y to tank .

4WEH...E...

The pilot oil supply is sourced internally from channel P of the main valve . And the pilot oil drain is led externally via channel Y to tank . Port X in the subplate is plugged .

4WEH...ET...

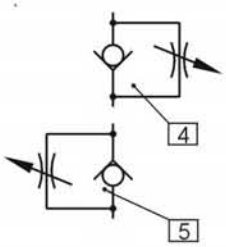
The pilot oil supply is sourced internally from channel P of the main valve . And the pilot oil drain is led internally via channel T to tank . Port X and Port Y in the subplate is plugged .

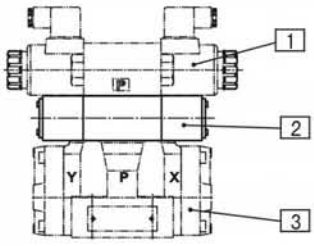
4WEH...T...

The pilot oil supply is sourced externally via channel X from a separate circuit . And the pilot oil drain is led internally via channel T to tank . Port Y in the subplate is plugged .

Shifting time adjustment

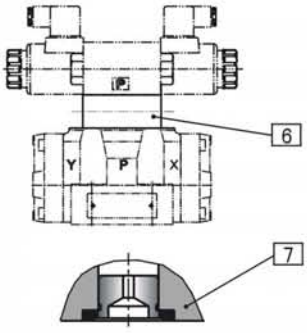
In order to adjust the shifting time adjustment , there is a modular check relief valve 2 (Type: Z2FS6) during pilot valve 1 andMain valve 3. Adjustment way:Circumgyrate adjustment bolt as clockwise,the main valve's shift time is longer. Otherwise, shifting time is shorter. Inlet relief 4 changes to outlet relief 5's way:Dismantle Pilot valve.Reassembling modular type check relief valve to circle longshaft to circumgyrate 180. Then assembling Pilot valve again.





Pilot pressure and folw adjustment

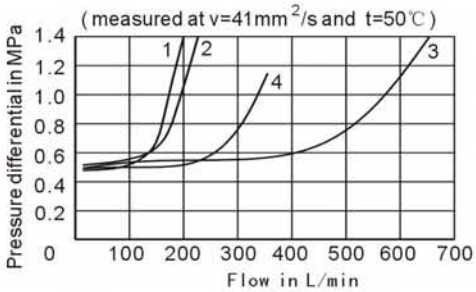
In order to reduce impact of main valve shift, it must install modular type fix rate reducing valve 6 when control oil pressure more than 25MPa. Reduce rate is 1:0.66.After assembling fix rate reducing valve, min. control oil pressure must imporve 1/0.66=1.515 times in technical data.
It can't install fix rate reducing valve when control type chooses pilot oil drain internal, installs prefill valve(P0.45) and control pressure reduces to 0.3MPa.It can install throttle 7 when control oil's flow need Limit. There are 0.6,0.8,1.0,1.2(mm)four dimensions for throttle aperture.



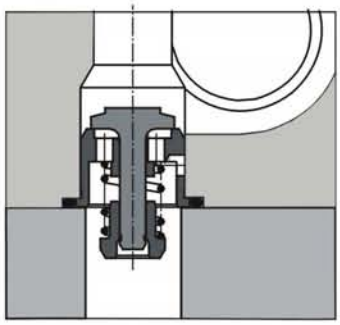
Pre-load valve

In order to ensure lowest control oil pressure,it must install a preload valve at P port when control oil inside supply and there is unload pass way.
After installing prefill valve, the total pressure lose of valve is the sum for main valve's and preload valve's pressure lose.

Pre-load valve characteristic curve



1: Size 16
2: Size 25 (standard type)
3: Size 25 (high power type)
4: Size 32



Technical data

Nominal size (ordering code)					10	16	22	25	32
Max . operating pressure									
4WEH	Port P、A、B	4WEH		MPa	28	28	28	—	28
		H-4WEH		MPa	35	35	35	35	35
	Port T	Pilot oil drain external		MPa	31.5	25	25	25	25
		Pilot oil drain internal		MPa	21 (DC); 16 (AC)				
	Port Y	Pilot oil supply external		MPa	21 (DC); 16 (AC)				
4WH				MPa	25	25	21	25	25
Max . pilot pressure					25	25	21	25	25
Min . pilot pressure									
Pilot oil supply internal (For spool D, K,E,J,L,M,Q, U,W) Pilot oil supply external	3-position valve spring-centered	H-4WEH		MPa	1.0	1.4	1.25	1.3	0.85
		4WEH		MPa	1.0	1.4	1.05	1.3	0.85
	3-position valve hydraulic-centered			MPa		1.4		1.8	0.85
	2-position valve spring return	H-4WEH		MPa	1.0	1.4	1.4	1.3	1.0
		4WEH		MPa	1.0	1.4	1.1	1.3	1.0
	2-position valve hydraulic return			MPa	0.7	1.4	0.8	0.8	0.5
Pilot oil supply internal (For spool C,F,G,H,P,T,V,Z,D)				MPa	0.45	0.45	0.45	0.45	0.45

Pilot oil colume for the main valve shifting									
3-position valve , spring-centred				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 middleposition 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	about 35	about 35	about 35	about 35	about 45

Weight (data only for reference)						
Single solenoid valve	kg	6.4	8.5	11.5	17.6	40.5
Double solenoids valve spring-centred	kg	6.8	8.9	11.9	18.0	41.0
Double solenoids 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	℃	-30 TO +50

Installation position	Valves for HC,HD,HK,HX,HZ,HY symbols must install flatly . It can choose freely for others.

Shifting times

Nominal size 10 AC (～) and DC (=)											
Pilot pressure			MPa	7		14		21		25	
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	65
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			MPa	7		14		21		25	
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 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			MPa	3.5		7		14		21	
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

Nominal size 25 (High power standard) AC (～) and DC (=)											
Pilot pressure			MPa	7		14		21		25	
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 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

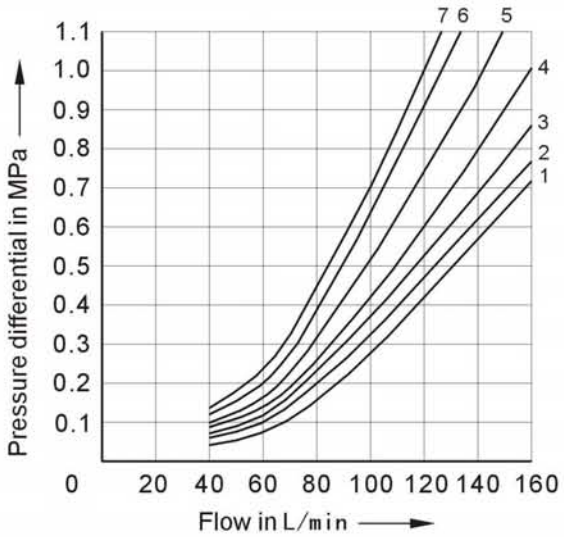
Nominal size 32 AC (～) and DC (=)											
Pilot pressure			MPa	7		14		21		25	
Voltage type				～	=	～	=	～	=	～	=
Shifting time of the valve from neutral position to shifted position	3-position valve spring-centred		ms	65	80	50	90	35	105	41.5	80
	2-position valve		ms	100	130	75	100	60	115	90	125
	3-position 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 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

Characteristic curves (measured at v=41mm^2/s and t=50℃)

- 4W.H10...

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=41mm^2/s and t=50℃)

- 4W.H10...

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

Symbol	Operating pressure in MPa		
	20	25	31.5
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

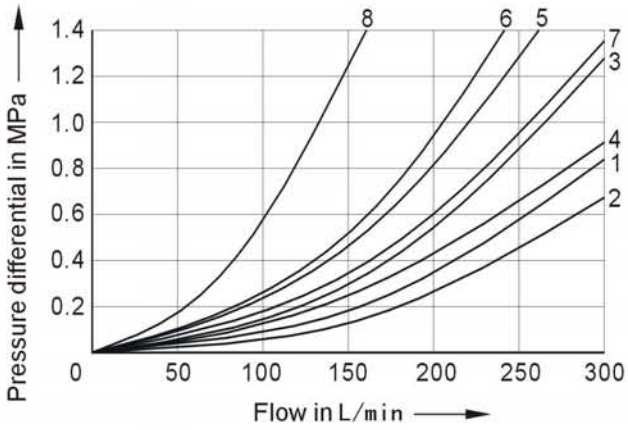
Note:

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

Characteristic curves (measured at v=41mm²/s and t=50℃)

- 4W.H16...

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℃)

- 4W.H16...

2-position valves permissible flow in L/min

	Symbol	Operating pressure in MPa				
		7	14	21	28	35
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

- 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.

Note:

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

- Main valve spring return and pilot oil supplyexternal type. Main valve permit flow is 300L/min within adjustment pressure range when smallest pilot control oil pressure is 1.2MPa.

3-position valves permissible flow in L/min

	Symbol	Operating pressure in MPa				
		7	14	21	28	35
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 spool'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 .

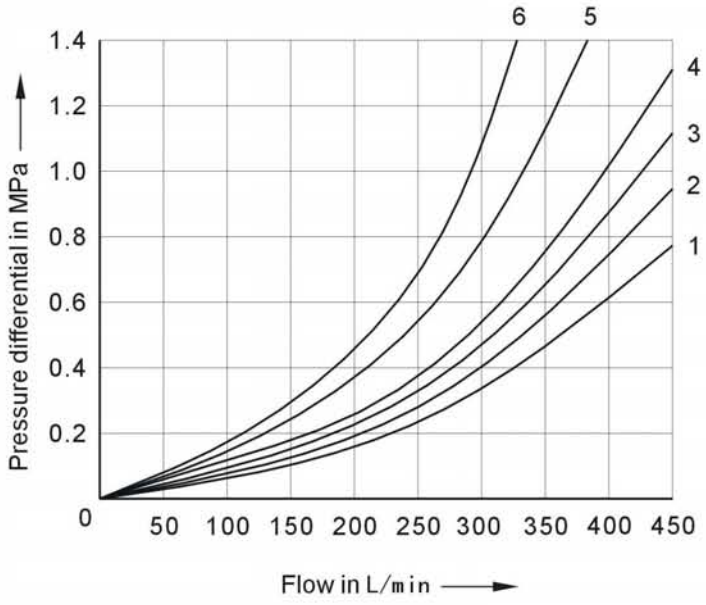
- It must improve control pressure when using 3-position,4-pass direction valve of main spool spring centred and using pressure more than limit. For example,work pressure is 35MPa,flow is 300L/min,pilot control pressure should be 1.6MPa.

Characteristic curves (measured at v=41mm^2/s and t=50℃)

● 4W.H22...

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=41mm^2/s and t=50℃)

● 4W.H22...

2-position valves permissible flow in L/min

	Symbol	Operating pressure in MPa				
		7	14	21	28	35
① Spring 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 MPa				
		7	14	21	28	35
Spring centred	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:

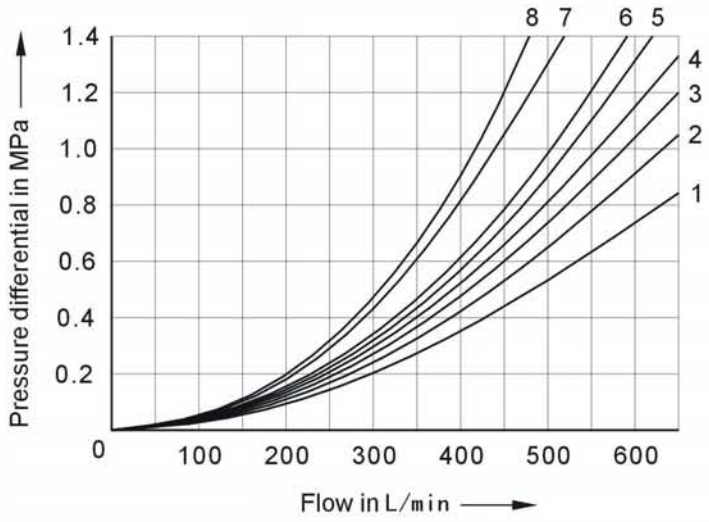
① Showing flow data is the limit data of driving spool back to end position when pilot pressure disappear.

● 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.

Characteristic curves (measured at v=41mm^2/s and t=50℃)

4W.H25...

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	6
V	2	4	3	6
W	1	1	1	3
T	3	1	2	4



Shifting performance limits (measured at v=41mm^2/s and t=50℃)

4W.H25...

2-position valves permissible flow in L/min

	Symbol	Operating pressure in MPa				
		7	14	21	28	35
Spring return ①	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 MPa				
		7	14	21	28	35
Spring centred	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:

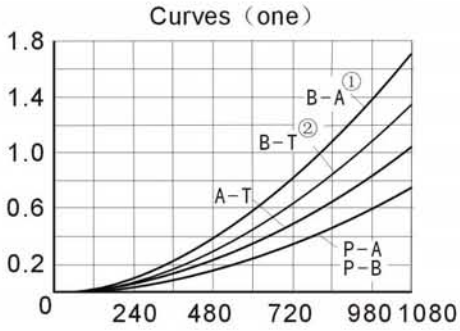
① Showing flow data is the limit data of driving spool back to end position when pilot pressure disappear.

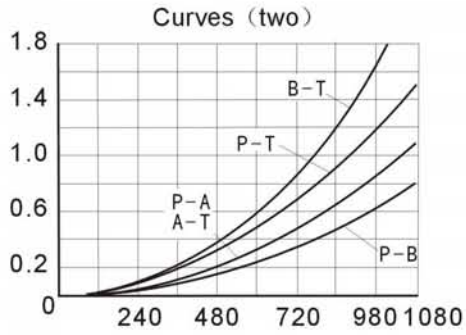
- If using pilot oil supply internal type and flow is smaller than 180L/min, it needs to install prefill valve on main valve P port for H、HZ、V、C、HC、F、P、T spools.

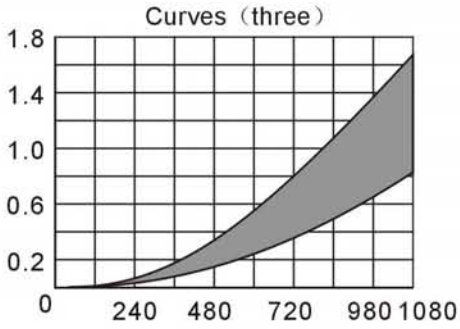
- Main valve spring return and choosing pilot oil supply external type. Main valve permit flow is 700L/min under 28MPa when smallest pilot control oil pressure is 1.3MPa.The flow should be 650L/min when pressure is 35MPa.

Characteristic curves (measured at v=41mm²/s and t=50℃)

- 4W.H32...







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℃)

- 4W.H32...

2-position valves permissible flow in L/min
(Pilot oil supply external)

	Symbol	Operating pressure in MPa				
		7	14	21	28	35
Spring return①	C、D、K、Z、Y	1100	1040	860	750	680
Spring return②	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 MPa				
		7	14	21	28	35
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 disappear.

② Main valve spring return and choosing pilot oil supply external type. Main valve permit flow is 700L/min under 28MPa when smallest pilot control oil pressure is 1.0MPa.

- 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 Z、HZ、V 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 35MPa,flow is 1100L/min ,pilot control pressure should be 1.6MPa.

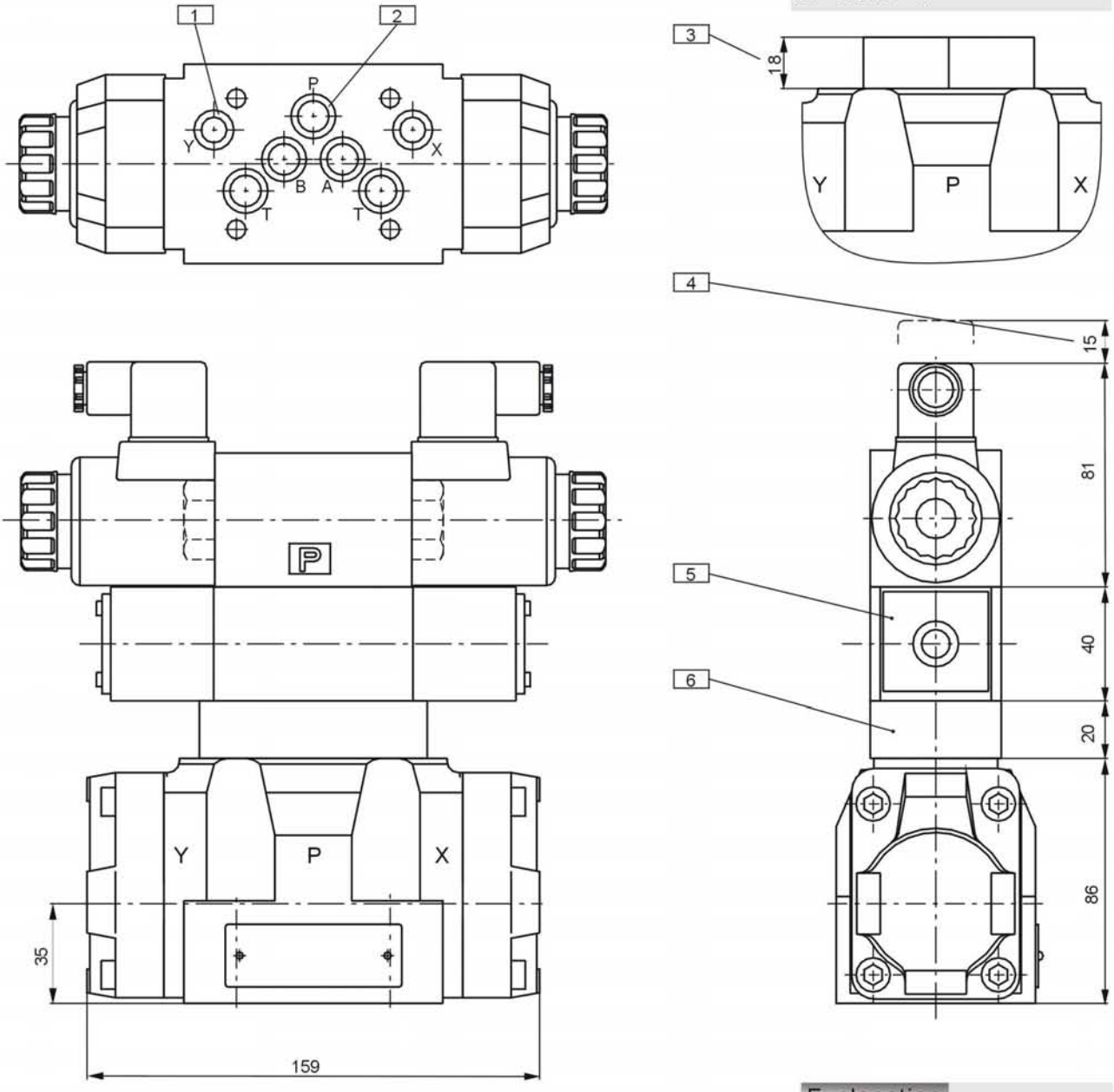
- If using pilot oil supply internal type and flow is smaller than 180L/min, it needs to install prefill valve on main valve P port for C、HC、F、G、H、P、T spools.

4W.H10...

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 ;

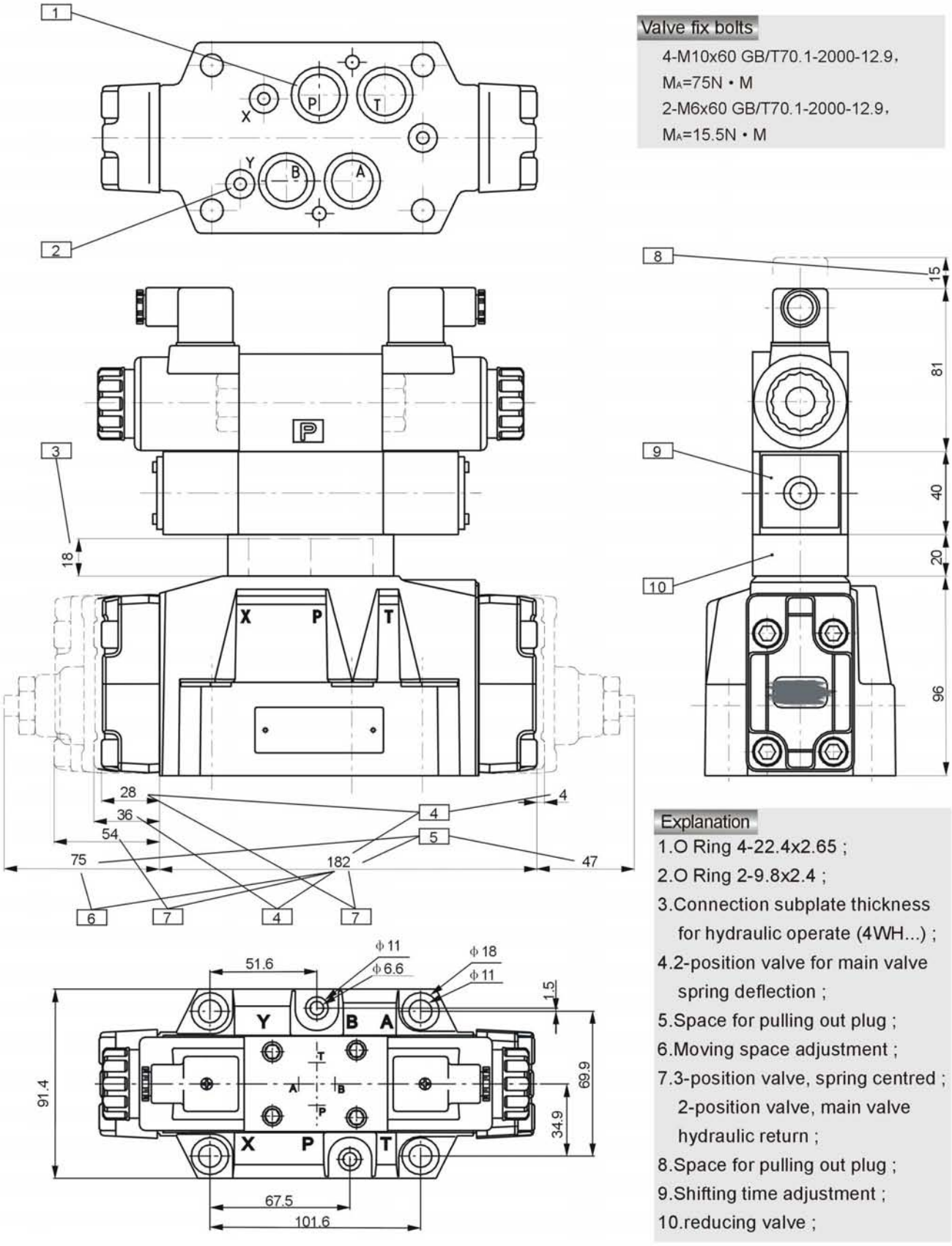
3.Connection subplate thickness for hydraulic operate (4WH...) ;

4.Space for pulling out plug ;

5.Shifting time adjustment ;

6.reducing valve ;

4W.H16...



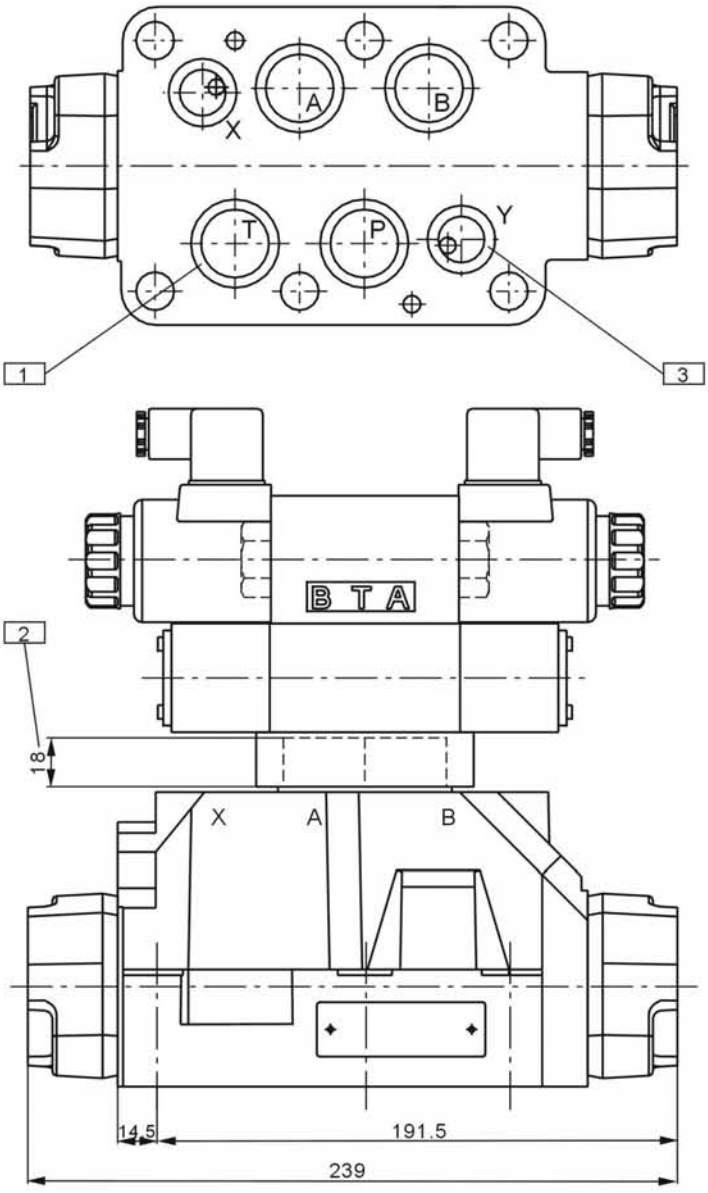
Valve fix bolts

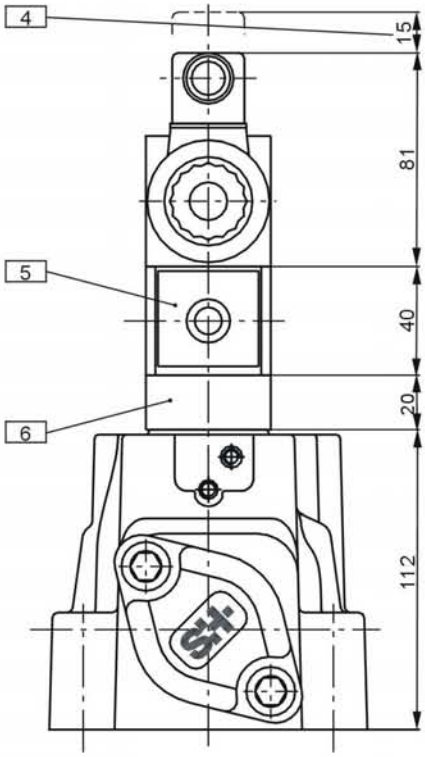
4-M10x60 GB/T70.1-2000-12.9,
M_A=75N • M
2-M6x60 GB/T70.1-2000-12.9,
M_A=15.5N • M

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 ;

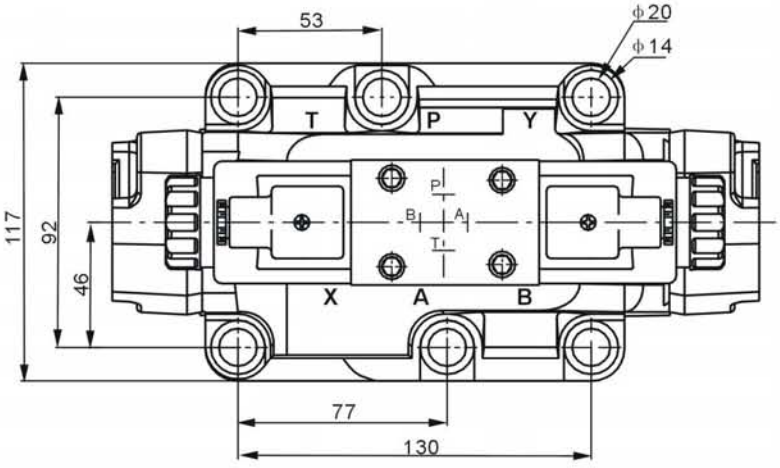
4W.H22...





Valve fix bolts

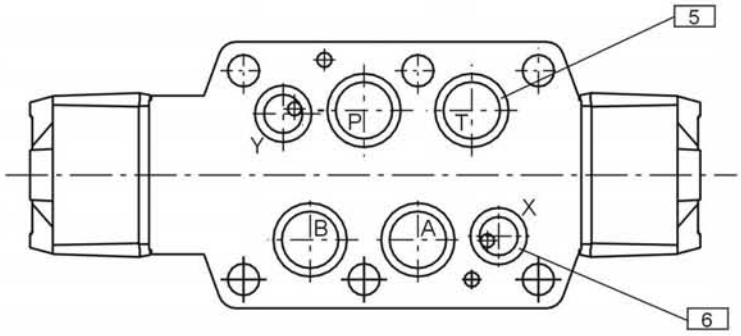
6-M12x60 GB/T70.1-2000-12.9,
M_A=150N • M



Explanation

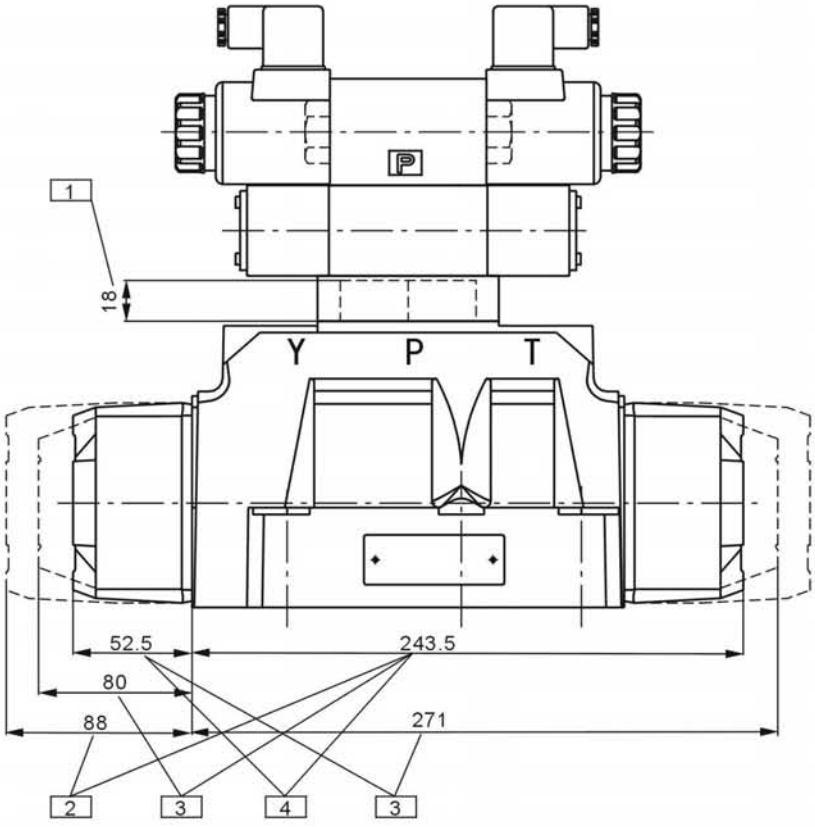
1.O Ring 4-27x3 ;
2.Connection subplate thickness for hydraulic operate (4WH...) ;
3.O Ring 2-20.8x2.4 ;
4.Space for pulling out plug ;
5.Shifting time adjustment ;
6.Reducing valve ;

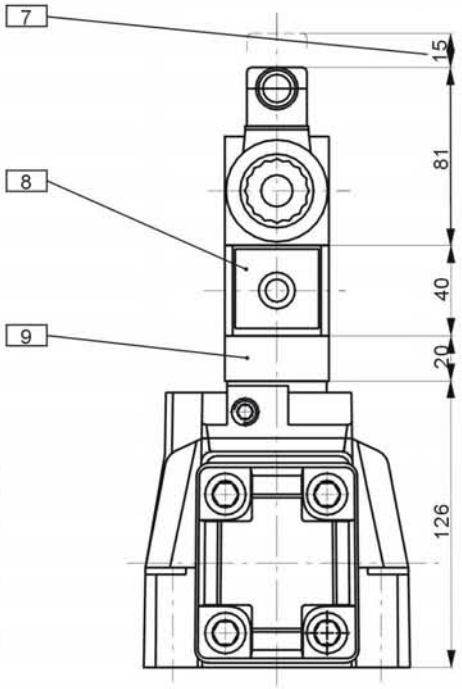
4W.H25...

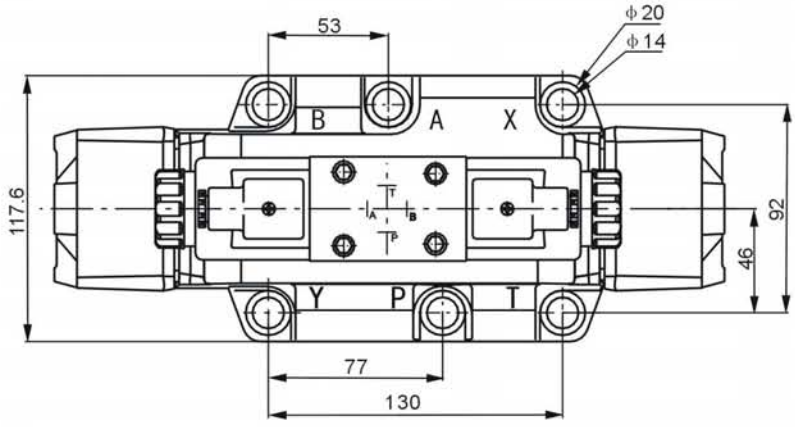


Valve fix bolts

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



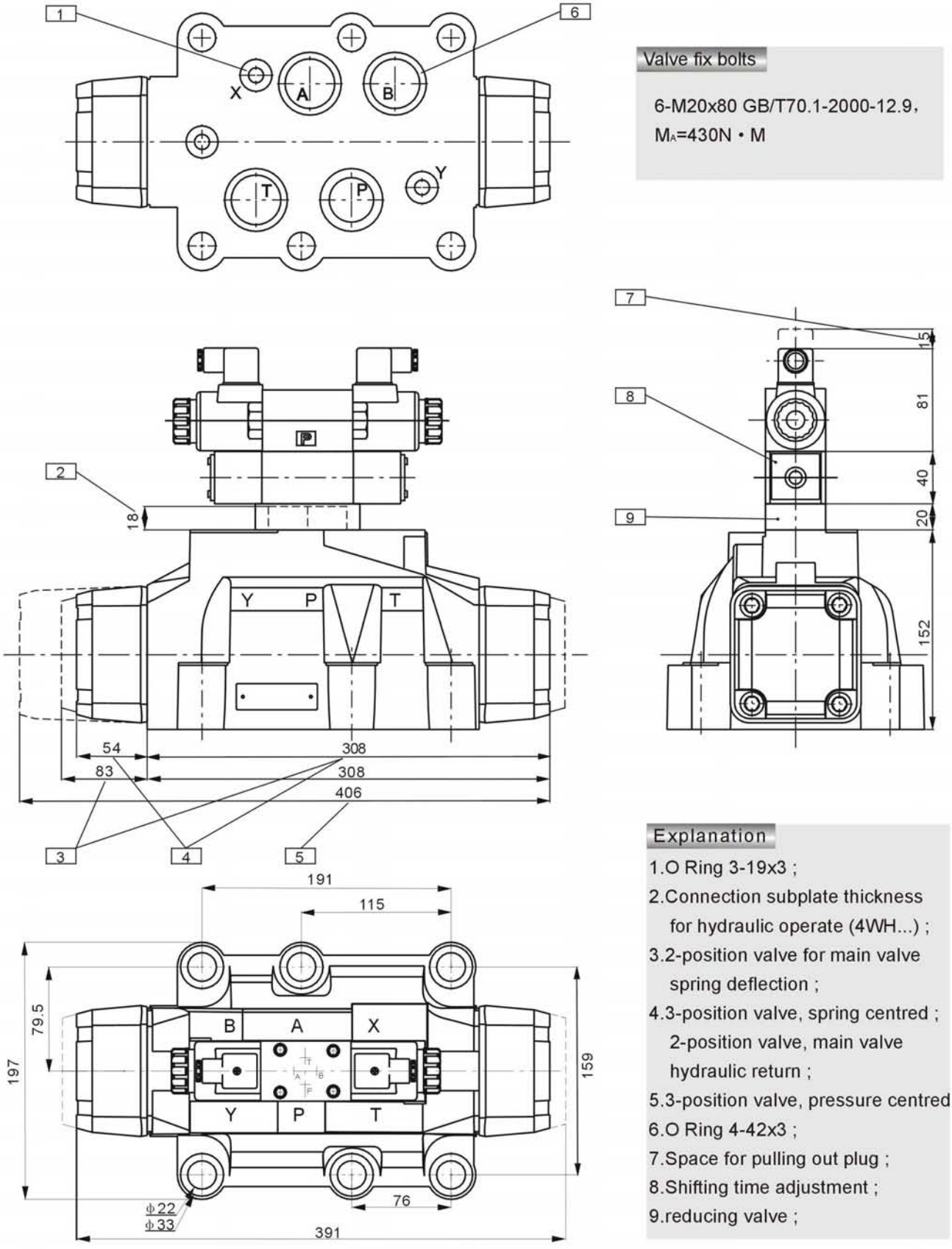




Explanation

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 ; 2-position valve, main valve hydraulic return ;
5.O Ring 4-29.7x3.5
6.O Ring 2-20.8x2.4
7.Space for pulling out plug ;
8.Shifting time adjustment ;
9.reducing valve ; .

4W.H32...



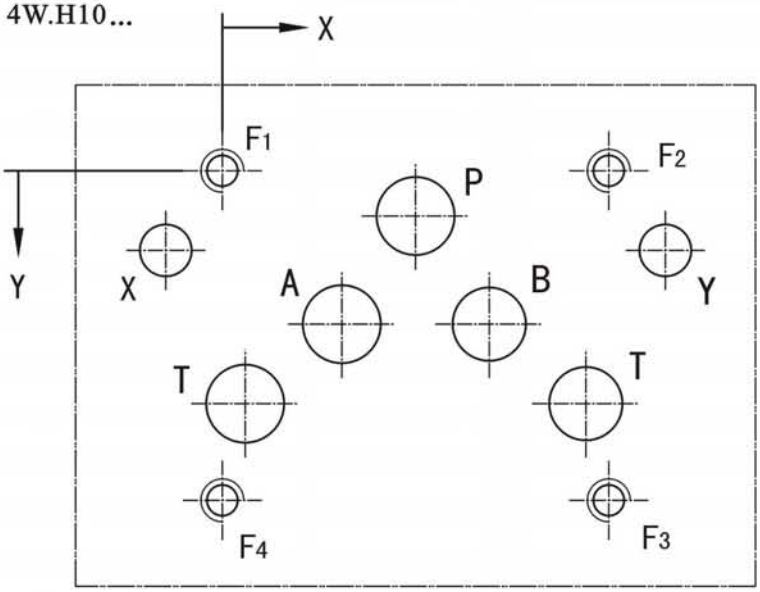
Valve fix bolts

6-M20x80 GB/T70.1-2000-12.9,
M_A=430N • M

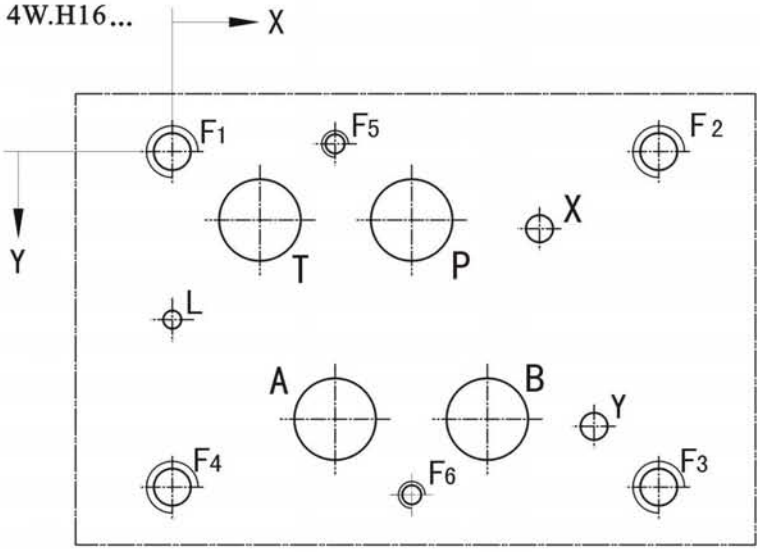
Explanation

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 ; 2-position valve, main valve hydraulic return ;
5.3-position valve, pressure centred
6.O Ring 4-42x3 ;
7.Space for pulling out plug ;
8.Shifting time adjustment ;
9.reducing valve ;

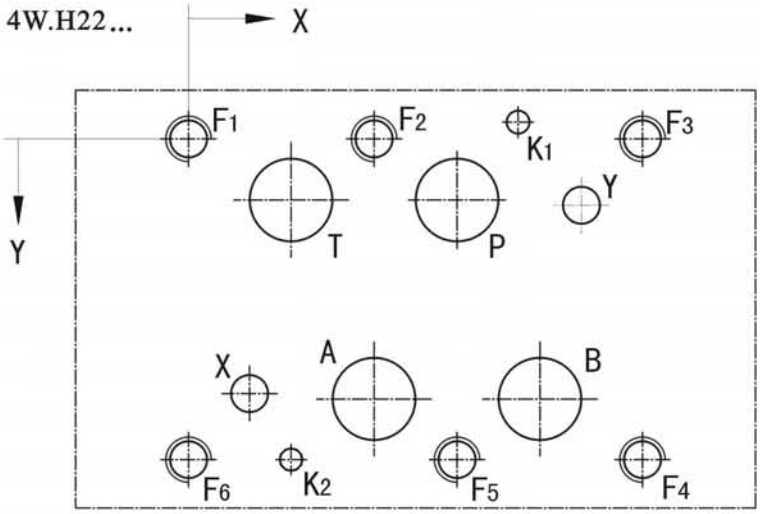
4W.H10...



4W.H16...

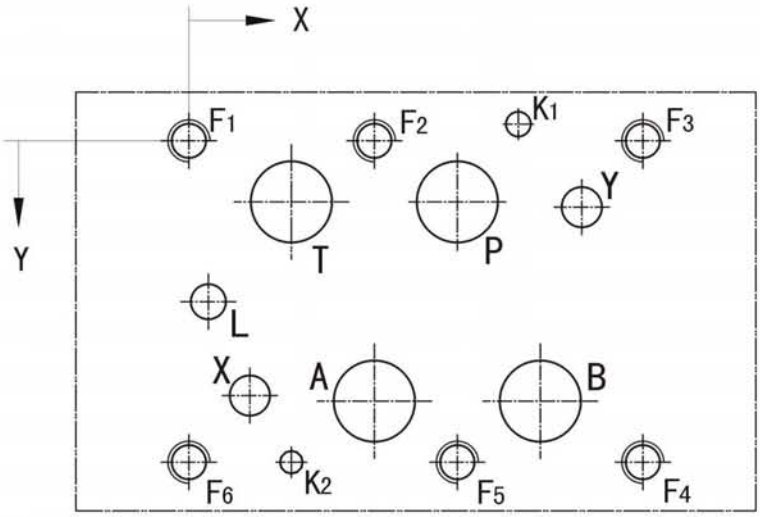


4W.H22...

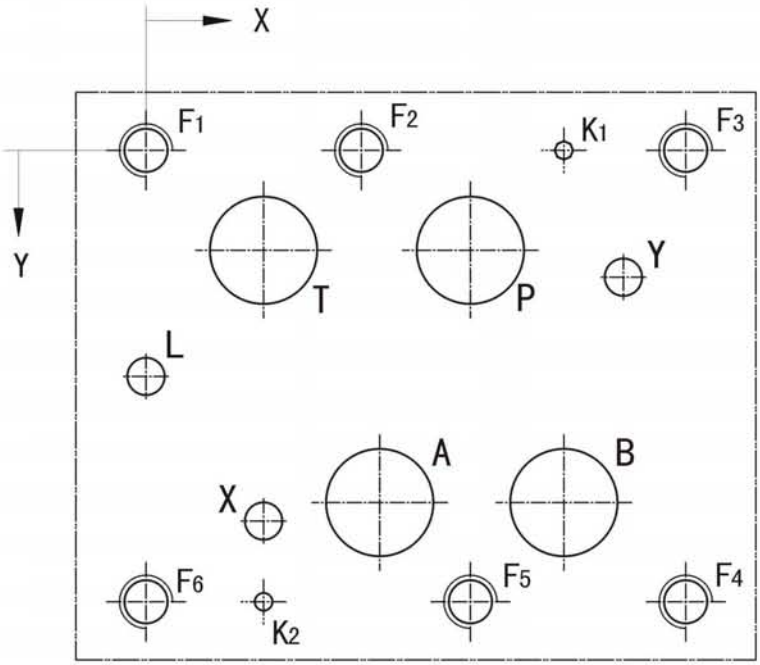


Size	Des. / Code	Position X	Position Y	Character	Deep
4W.H10...	F1	0	0	M6	12
	F2	54	0	M6	12
	F3	54	46	M6	12
	F4	0	46	M6	12
	P	27	6.3	ϕ10.5	–
	A	16.7	21.4	ϕ10.5	–
	B	37.3	21.4	ϕ10.5	–
	T	3.2 50.8	32.5	ϕ10.5	–
	X	-7.9	11.1	ϕ7	–
	Y	61.9	11.1	ϕ7	–
4W.H16...	F1	0	0	M10	19
	F2	101.6	0	M10	19
	F3	101.6	69.9	M10	19
	F4	0	69.9	M10	19
	F5	34	71.5	M6	12
	F6	50	-1.6	M6	12
	L	0	35	ϕ4	–
	T	18.3	55.6	ϕ17.5	–
	A	34	14.2	ϕ17.5	–
	P	50	55.6	ϕ17.5	–
	B	65.8	14.2	ϕ17.5	–
	X	76.7	53.8	ϕ6	–
	Y	88.1	12.7	ϕ6	–
4W. H22...	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	ϕ6.5	8
	K2	29.4	92.1	ϕ6.5	8
	T	29.4	17.5	ϕ24.5	–
	A	53.2	74.6	ϕ24.5	–
	B	100.8	74.6	ϕ24.5	–
	P	77	17.5	ϕ22	–
	X	17.5	73	ϕ11.2	–
	Y	112.7	19	ϕ11.2	–

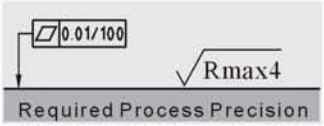
4W.H25...



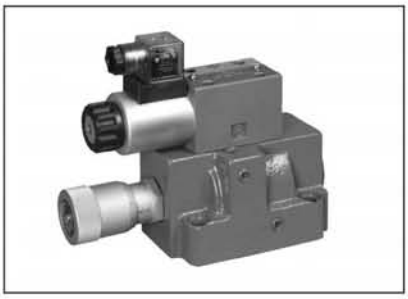
4W.H32...



Size	Des. / Code	Position X	Position Y	Character	Deep
4W.H25...	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	ϕ13	–
	K1	147.5	0	ϕ6.5	8
	K2	41.5	159	ϕ6.5	8
	T	41.5	35	ϕ35	–
	A	82.5	124	ϕ35	–
	B	147.5	124	ϕ35	–
	P	114.5	35	ϕ34	–
	X	41.5	130.5	ϕ13	–
	Y	168.5	44.5	ϕ13	–
4W.H32...	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	ϕ10	–
	K1	94.5	-4.8	ϕ6.5	8
	K2	29.4	92.1	ϕ6.5	8
	T	29.4	17.5	ϕ24.5	–
	A	53.2	74.6	ϕ24.5	–
	B	100.8	74.6	ϕ24.5	–
	P	77	17.5	ϕ22	–
	X	17.5	73	ϕ11.2	–
	Y	112.7	19	ϕ11.2	–



Solenoid Operated Flow Controlled Valves



The solenoid control throttle valve can come true single sect,double sects and three sects type speed adjustment separate and usually be used into plastic injecting mold machine,oil pressure machine tool and so on.Its good pressure tracking function can reduce pump's loading and system power lose finely .

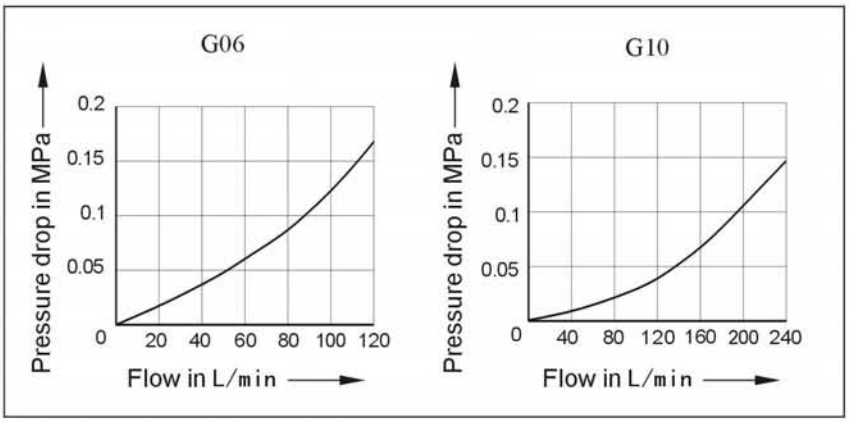
Ordering details

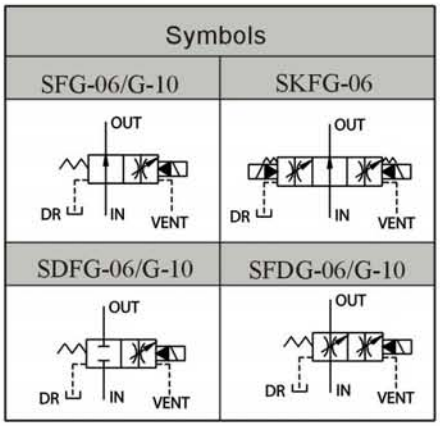
SF	G	-06	-E	T	V	-U	-L	-G
Sort	Mounting	Size	Control type			Electrical connections	Plug type	Input voltage
SF SDF SFD SKF	G: Subplate mounting	06 10 06	No code: Internal pilot E: External pilot	T: External drain	No code: Without pressure follow V:With pressure follow	U:component plug IS04400 without plug-in connector FW: Terminal box	No Code: Without plug L:With plug N:plug with indicator light	A and AJ: 120V 60Hz; 110V 50Hz; B and BJ: 120V 60Hz; 110V 50Hz; G and H: 12V, 24V;

Technical data

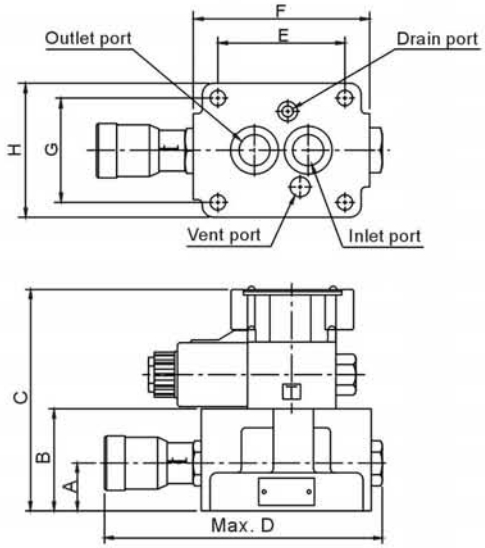
Data \ Type	SFG-06	SFG-10	SDFG-06	SDFG-10	SFDG-06	SFDG-10	SKFG-06
Max.pressure Mpa	25						
Max.flow L/min	120	240	120	240	120	240	120
Type of pilot valve	DG4V-3-2AL		DG4V-3-2A		DG4V-3-2AL		DG4V-3-6C
Weight Kg	6.4	9.9	6.4	9.9	6.7	10.4	7.7

Characteristic Curves

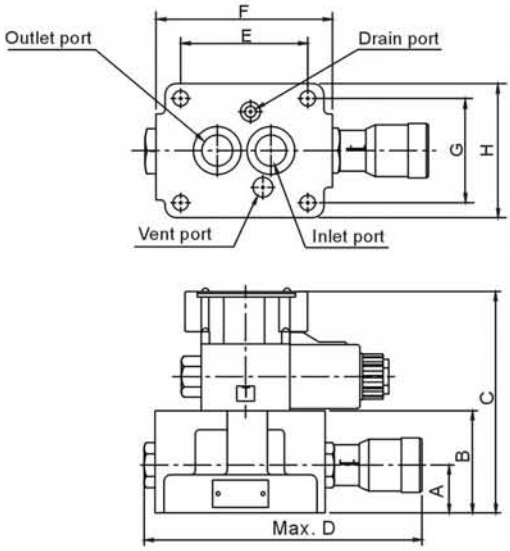




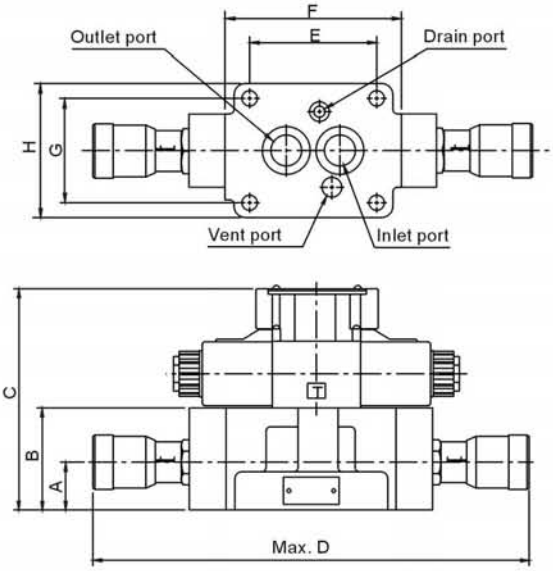
- SFG-06/10



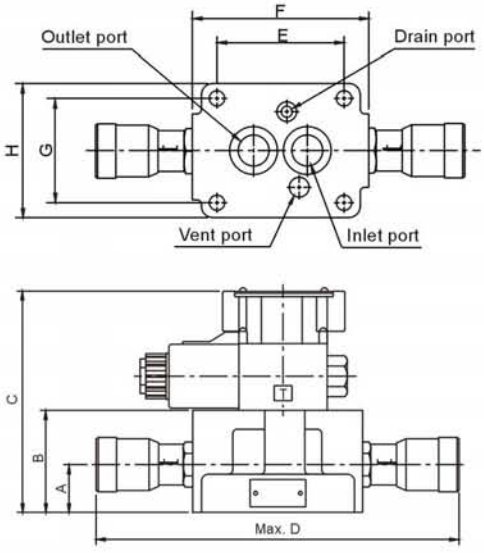
- SDFG-06/10



- SKFG-06



- SFDG-06/10



Type	A	B	C	D	E	F	G	H
SF/SDFG-06	35	75	162.5①	209	90	125	74	95
SKFG-06				315				
SFDG-06				277				
SF/SDFG-10	40	86	173.5①	248	112	150	86	115
SFDG-10				328				

Note :

① For pilot valve with plug-in connector ,the dimensions are 185;

② Please see page 140 about bolts and O rings ;

Ordering details

Solenoid operated flow controlled valves are also applied as ON/OFF valves by changing their inner structure. And their main valves can be used to mannul throttle valves sepatately . For two above applications , give some introduction as follows:

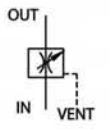
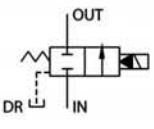
Ordering details

THF	G	-06	-T		-V
Sort	Mounting	Size	Control type ①		External vent ②
THF	G: Subplate mounting	06	No code: Internal pilot	T: External drain	No code: without external vent
SD		10			V: with external vent

Note: ① Only for SD type ; ② Only for THF type .

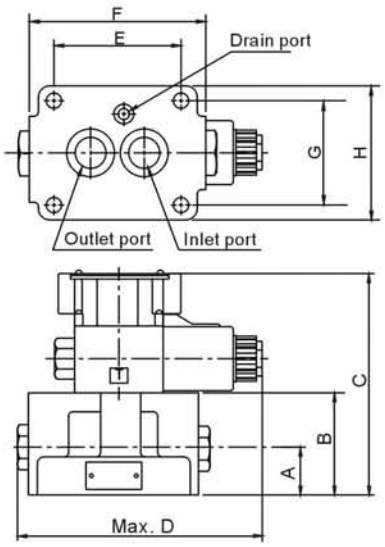
Technical data

Data \ Type	THFG-06	THFG-10	SDG-06	SDG-10
Max.pressure Mpa	25			
Max.flow L/min	120	240	120	240
Type of pilot valve			DG4V-3-2A	
Weight Kg	5	8.4	6.1	9.4

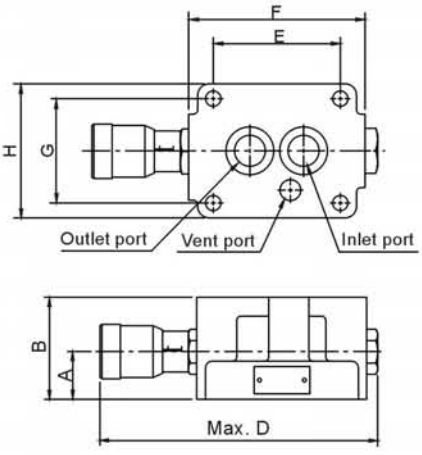
Symbols	
THFG-06/G-10	SDG-06/G-10
	

Installation Dimensions

SDG-06/10



THFG-06/10



Installation attentions:

1.Fixed bolts size and amout

Type	Size	Amo.	Standard
06	M10×45	4	GB/T70.1-2000
10	M12×55	4	GB/T70.1-2000

2.O Rings size and amout

Type	Port	Size	Amo.
06	Inlet or outlet	28×3.55	2
	Vent and drain	11.8×2.4	2
10	Inlet or outlet	33.7×3.5	2
	Vent and drain	11.8×2.4	2

Note : ① For pilot valve with plug-in connector ,the dimensions are 185; and these dimensions are not applied to THF type .

型 号	A	B	C	D	E	F	G	H
THFG-06	35	75	162.5 ①	209	90	125	74	95
SDG-06				180				
THFG-10	40	86	173.5 ①	248	112	150	86	115
SDG-10				197				