



Proportional Directional Valves pilot operated type 4WRZ,  
external pilot operated type 4WRH

RE24750/06.2004

Size 10 to 32

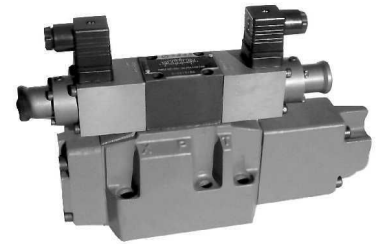
up to 35 MPa

up to 1600 L/min

Replaces:

**Features:**

- Pilot (WRZ) and direction (WRH) proportional valve
- For subplate mounting
- For the control of both direction and flow rate of a hydraulic fluid
- Spring centred ,no spool drift
- Low pressure drop across control lands
- Valve and electronic control from one source
- Proportional solenoid operation
- Porting pattern to DIN 24 340 form A,ISO4401 and CETOP-RP121H.

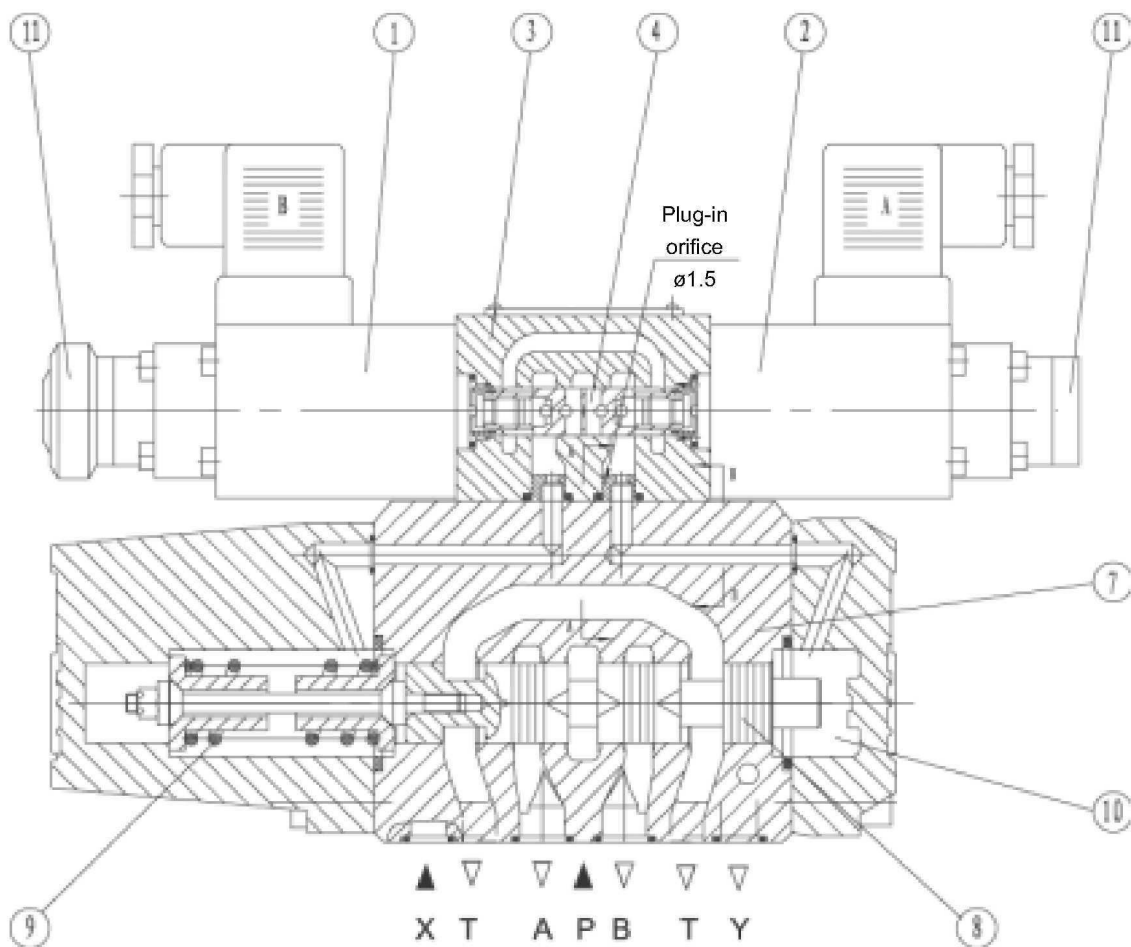


**Function,section**

Valve types 4WRZ... are 4- way valves operated by means of proportional solenoids.They control the direction and flow rate of hydraulic fluid.

They basically consist of the pilot valve (3) ,the main valve (7) with the main spool (8),and the centering spring (9).  
If solenoid "B" is energised, pilot spool (4) is moved to the right.Pilot oil is then either fed internally from port P,or "externally" from port X via the pilot valve (3) into the pressure chamber (10) and moves the main spool (8) a distance proportional to the strength of the electrical current.The throttling grooves in the main spool open progressively with increasing current, thus controlling the flow of hydraulic fluid to the actuator ports.

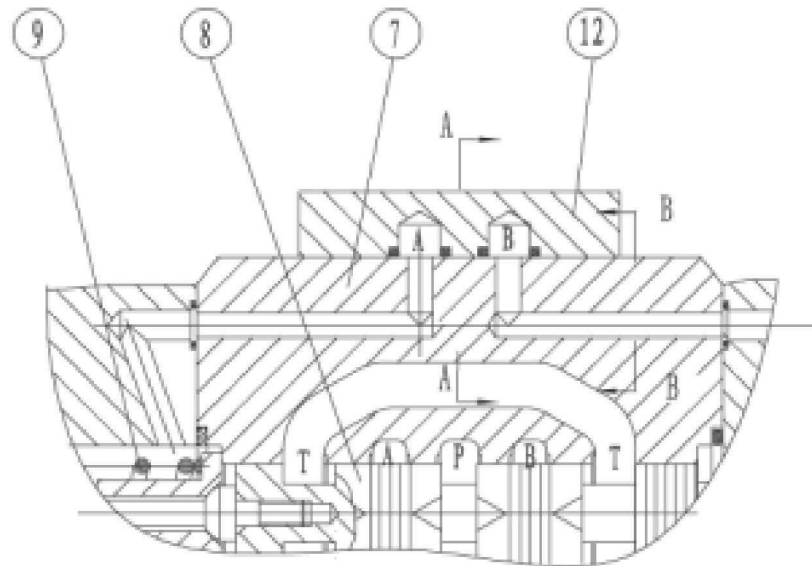
When the electrical signal is switched off, both the pilot spool (4) ,and the main spool (8) return to neutral independent of the control pressure supply.An emergency hand operator permits movement of the pilot spool position without energising the solenoids.



Proportional valve of type 4WRZ

### Type 4WRH:

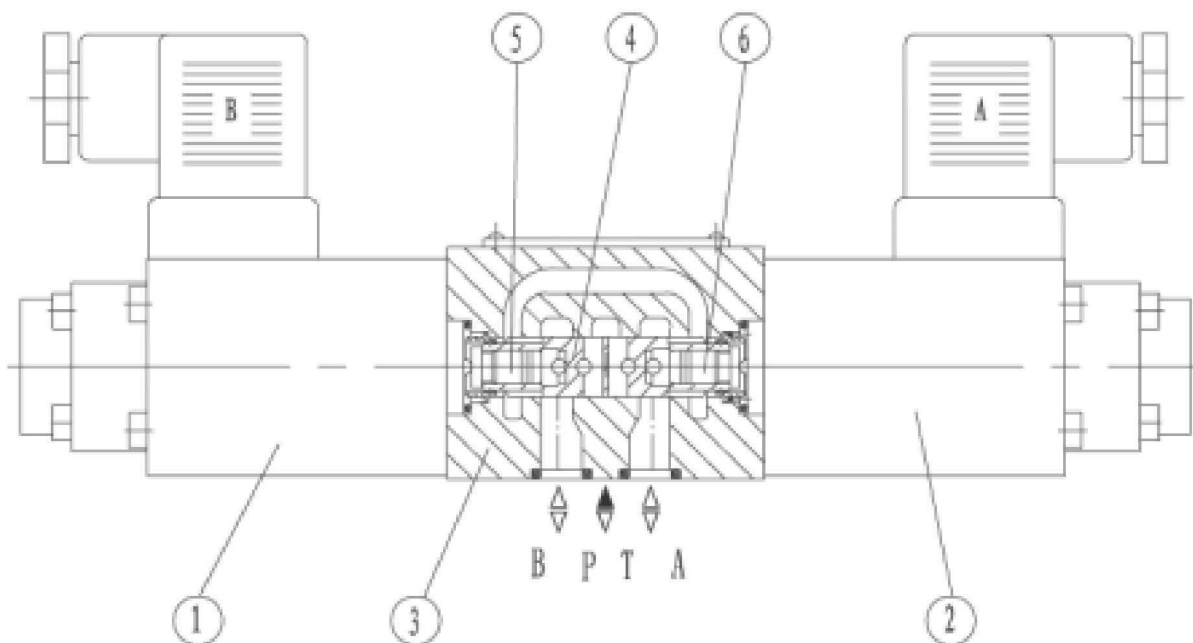
The type 4WRH valves are pilot operated proportional directional valves for external operation via pressure control valves. The function and principle is the same as that for valve type 4WRA. The inter-connecting plate (12) connects the pilot connection A with connection T(Y) and pilot connection B with P(X). The pilot pressure at the main valve must be from 0.4 MPa to 2.5 MPa, so flow is either from P to A and B to T or P to B and A to T.



proportional valve of type 4WRH

### Pilot valve:

The pilot valve is a proportional solenoid operated 3-way pressure reducing valve (type 3DREP6). Throttle insert are installed in port A and B, further details see the text of 3DREP6.

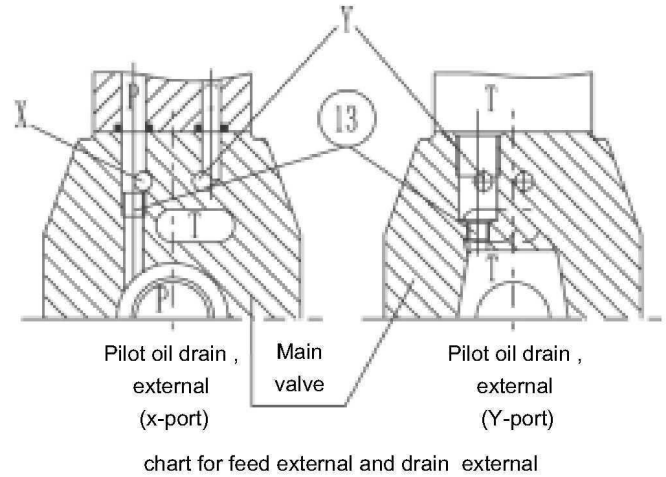


Pilot valve type 3DREP6

## Pilot Oil Supply

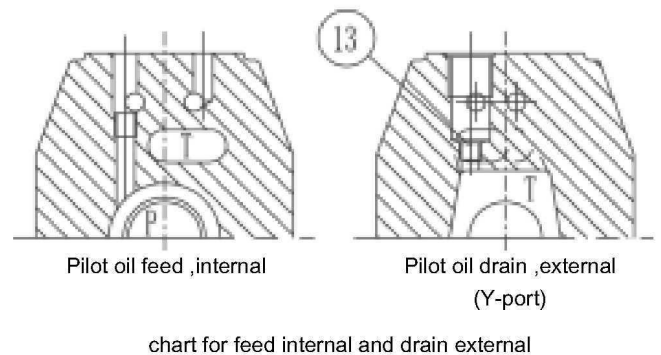
1. Pilot oil feed , external ; drain , external.  
On this model,the pilot oil feed via the port "X" , return is not directed into the T-port of main valve, but is led separately via port Y to tank(externaily)

13. Plug M6

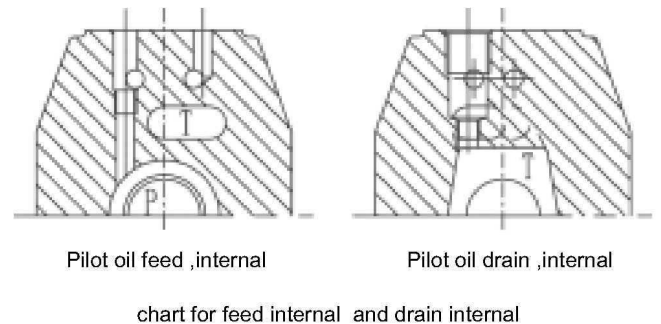


2. Pilot oil feed , internal ; drain , external.  
On this model,the pilot oil inlet is supplied from the P-port of the main valve(internaliy).The polit oil return is not directed into the T-port of main valve, but is led separately via port Y to tank(externaily)

13. Plug M6

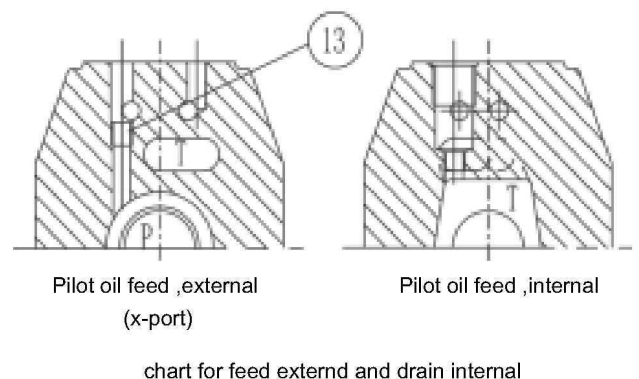


3. Pilot oil feed , internal ; drain , internal.  
On this model,the pilot oil inlet is supplied from the P-port of the main valve(internaliy).The polit oil return is taken directly into the T-port of the main valve (internaliy).Ports "X" and "Y" in the subplate are both plugged.

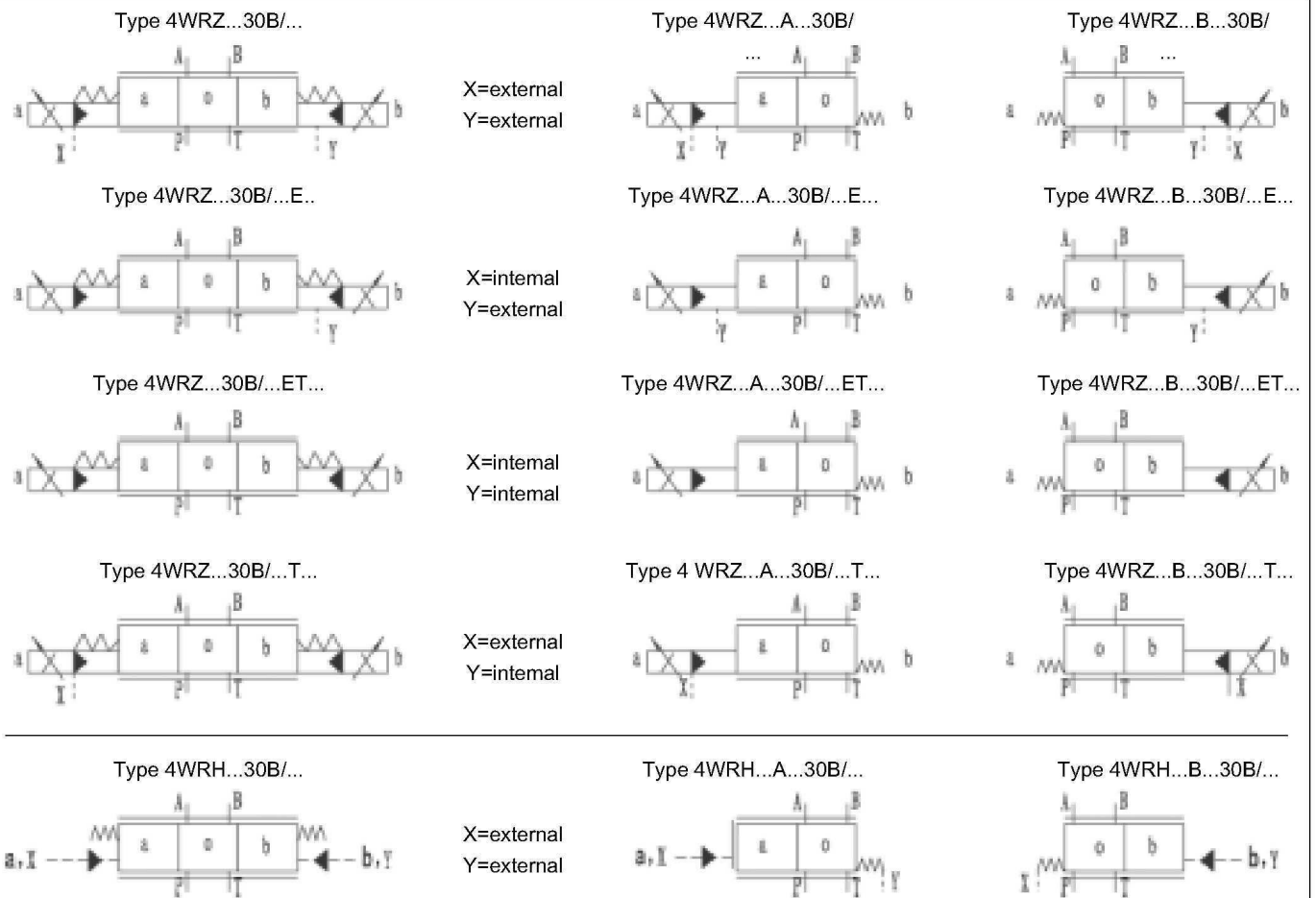


4. Pilot oil feed , external ; drain , internal.  
On this model,the pilot oil inlet is feed from port "X", The polit oil return is taken directly into the T-port of the main valve (internaliy).Port "Y" in the subplate is plugged.

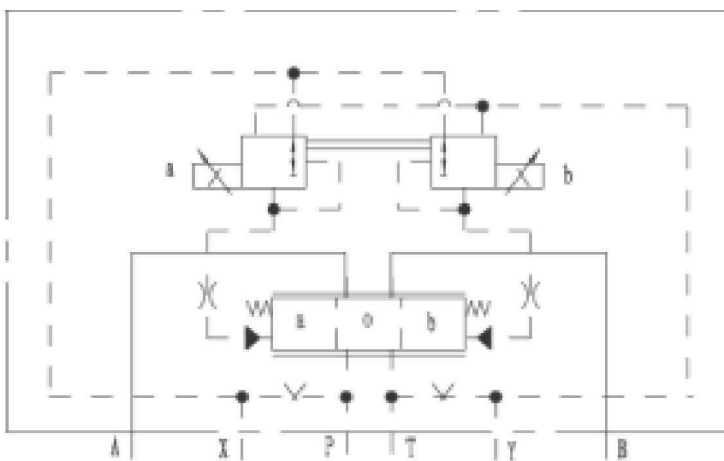
13. Plug M6



**Symbols(simplified)**

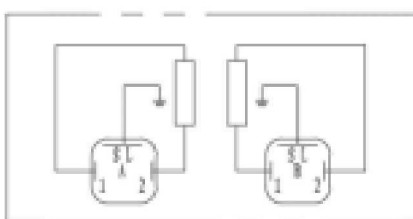


**Symbols(detailed):**

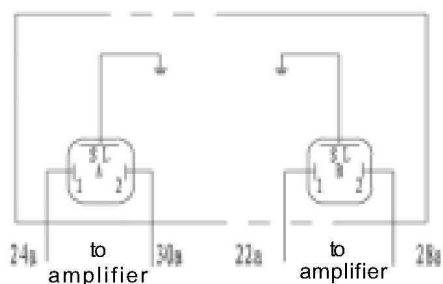


Example: 4WRZ...  
 Polit oil feed,external  
 polit oil drain,external

Coil connections



Plug connections



# Ordering code

4WR      30      \*

Hydraulic operation =H  
Electro-hydraulic operation =Z

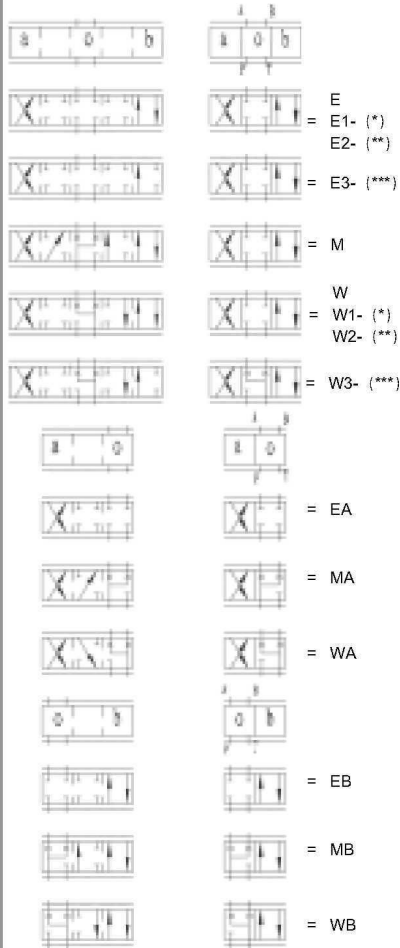
Further details in clear text

size 10 =10  
16 =16  
25 =25  
32 =32

M= mineral oils  
V= Phosphateester

no code= without press.reducing valve  
D 2= with press.reducing valve  
ZDR6DP2-30/75 YM( not for 4WRH or 4WRZ without pilot valve)

## Spools



Z4=Pulg-in connector (not for 4WRH or 4WRZ without pilot or type J)

No code = Pilot oil supply external, drain external  
E= Pilot oil supply internal, drain external  
ET = Pilot oil supply internal, drain interna  
T= Pilot oil supply external, drain internal (type 4WRH without E,ET,T)

No code = Without special protection  
J = Sea water resistant

No code = Without hand override  
N = With hand override (not for 4WRH or 4WRZ without pilot valve)

24 = 24V DC (standard version) (not for 4WRH or 4WRZ without pilot valve)

6A= Pilot control valve size 6 (not for 4WRH or 4WRZ without pilot valve)

## Nominal flow at 1MPa pressure drop accross valve

Size 10	25 L/min	=25
	50 L/min	=50
	85 L/min	=85
E1, E2, E3, W1, W2, W3 only 85L/min		
Size 16	100 L/min	=100
	150 L/min	=150
E1, E2, E3, W1, W2, W3 Only 150L/min		
Size 25	270 L/min	=270
	325 L/min	=325
E1, E2, E3, W1, W2, W3 only 325L/min		
Size 32	360 L/min	=360
	520 L/min	=520
E1, E2, E3, W1, W2, W3 only 520L/min		

30=Series 30 (30 to 39 unchanged installation and connection dimensions)

(for regenerative control, connect full bore of cyl.to port A)

## Technical data

### Hydraulic data

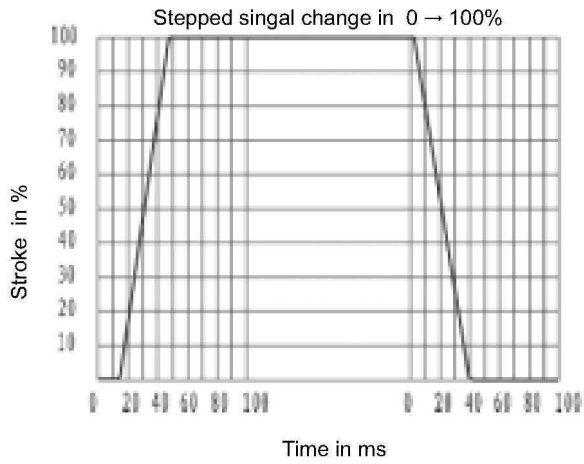
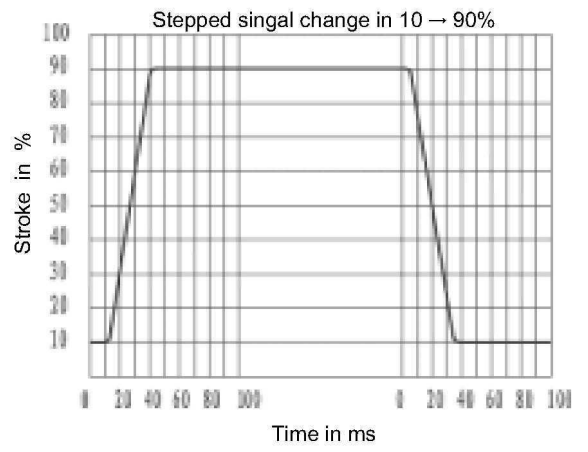
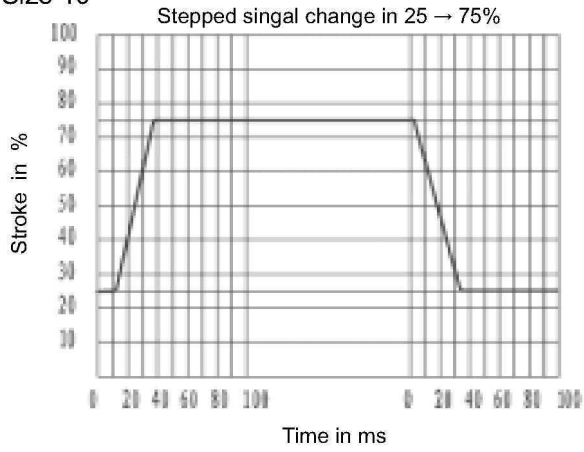
size		10	16	25	32
pilot valve pressure (MPa)	external pilot oil supply	3 to 10			
	internal pilot oil supply	Up to 10 (over 10 must installate ZDR6DP <sub>2</sub> -30B/75YM)			
Main valve pressure (MPa)		31.5	35		
Return pressure (MPa)	port T(external pilot oil return)	31.5	25	15	
	port T(internal pilot oil return)	3			
	port Y	3			
Pilot oil volume (cm <sup>3</sup> ) or spool movement 0~100%		1.7	4.6	10	26.5
Pilot oil flow at port X or Y (L/min) for spool movement 0~100%		3.5	5.5	7	15.9
Flow throught main valve (L/min)		270	460	877	1600
Hysteresis (L/min)		6			
Repeatability (%)		3			
degree of contamination (μm)		≤ 20			
Fluid		Mineral oil(for NBR seal),Phosphate ester (for FPM seal)			
Viscosity range (mm <sup>2</sup> /s)		2.8 to 380			
Fluid temperature range (°C)		-20 to +70			
mounting position		optional			
Weight (Kg)	valve with one solenoid	7.4	12.7	17.5	41.8
	valve with two solenoids	7.8	13.4	18.2	42.2

### Electrical data

Type of supply		DC
Nominal current of solenoid (A)		0.8
Coil resistance (Ω)		cold (at20°C) 19.5;max.valve,hot 28.8
Enviornment temperature (°C)		+50
Coil temperature (°C)		+150
Duty cycle		Continuous
Pilot current (A)		≤ 0.02
Insulation		IP65
Associated amplifier	With 1 ramp time	VT-3000S30
	With 5 ramp times	VT-3006S30
Electrical connection		Plug connection

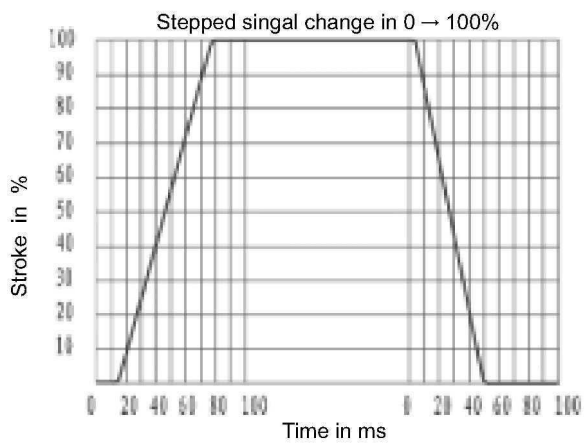
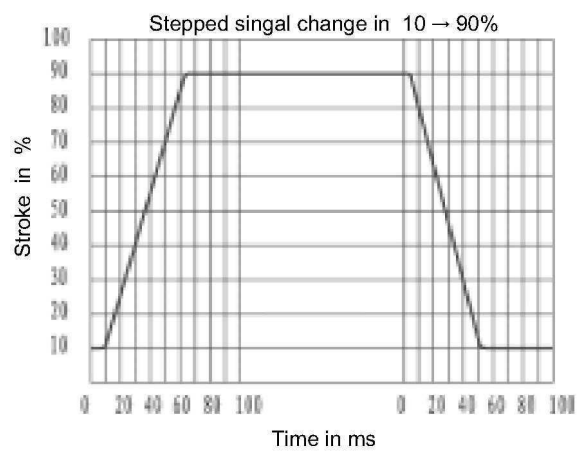
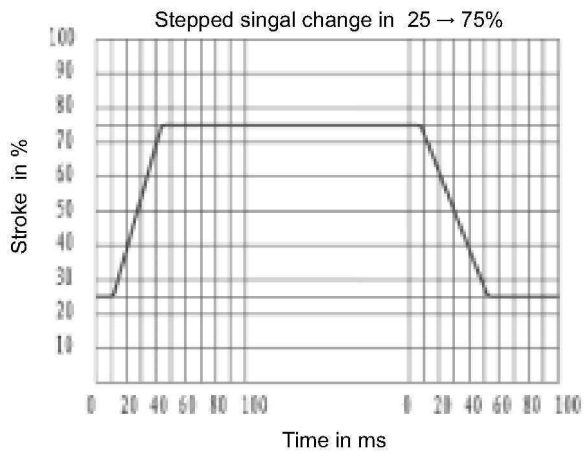
# Valve Movement with Stepped Electrical Input Singal

Size 10



Pilot pressure at 5MPa

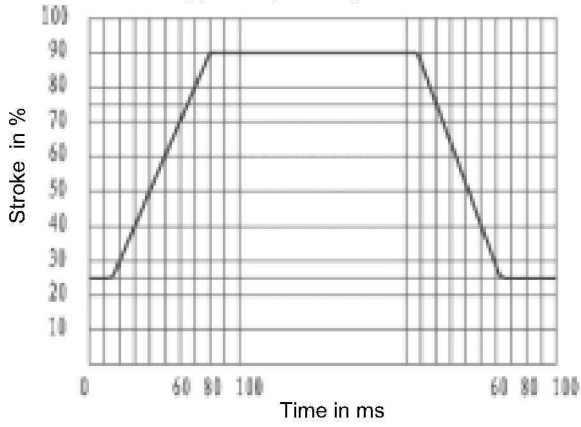
Size 16



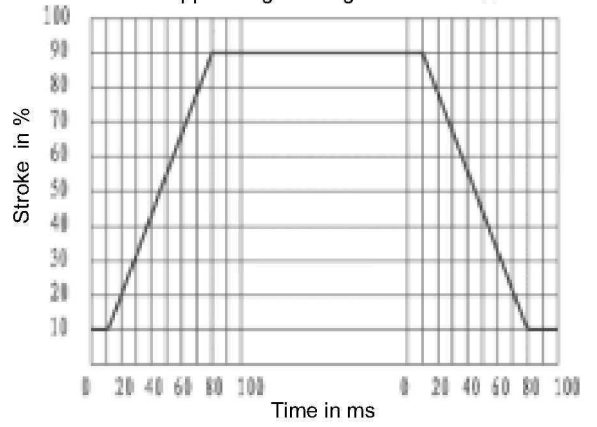
Pilot pressure at 5MPa

Size 25

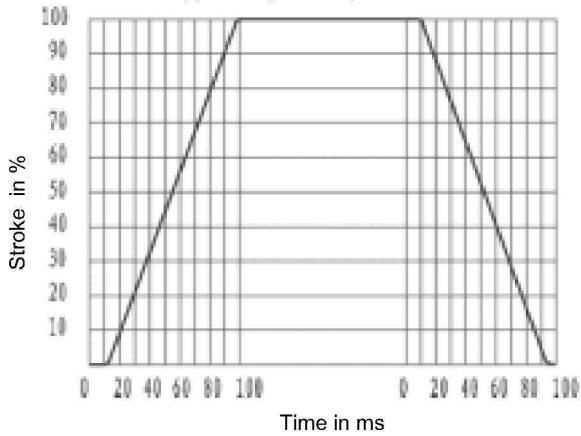
Stepped signal change in 25 → 75%



Stepped signal change in 10 → 90%



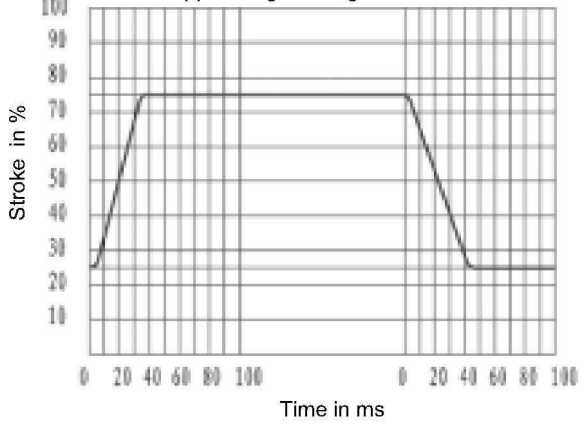
Stepped signal change in 0 → 100%



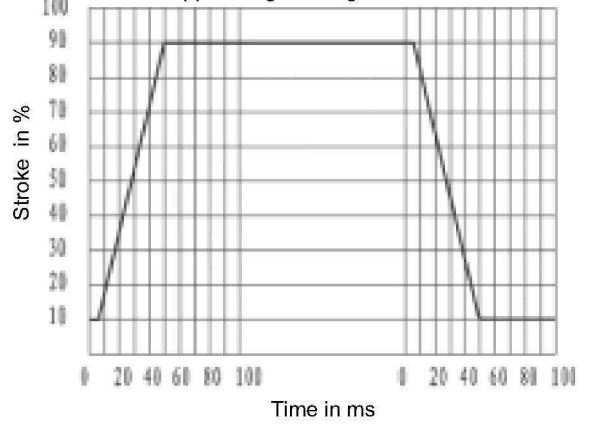
Pilot pressure at 5MPa

Size 32

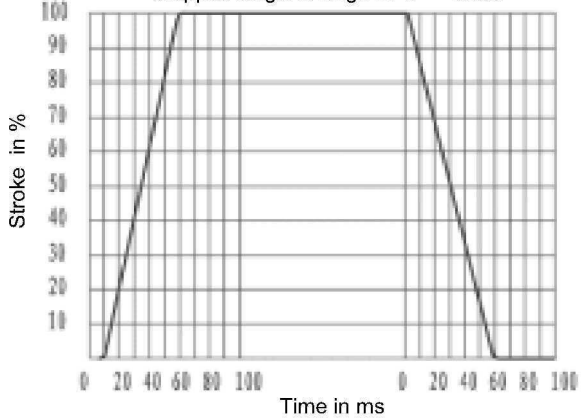
Stepped signal change in 25 → 75%



Stepped signal change in 10 → 90%



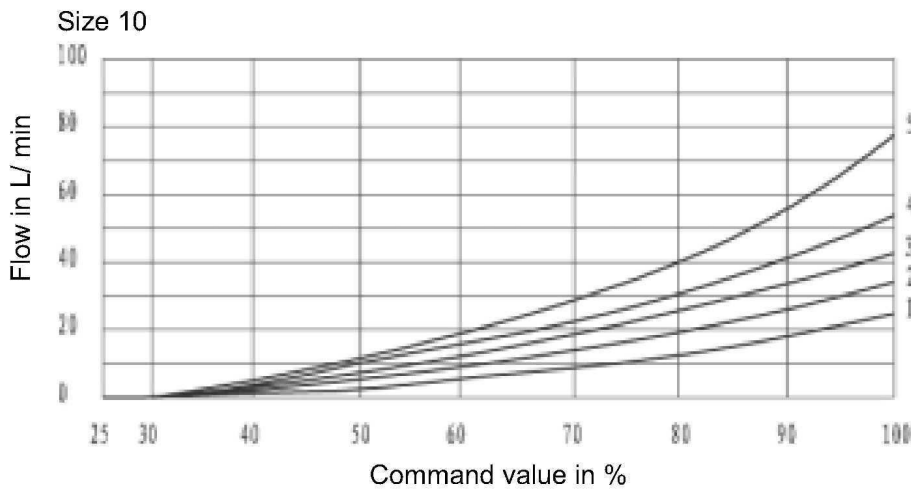
Stepped signal change in 0 → 100%



Pilot pressure at 5MPa

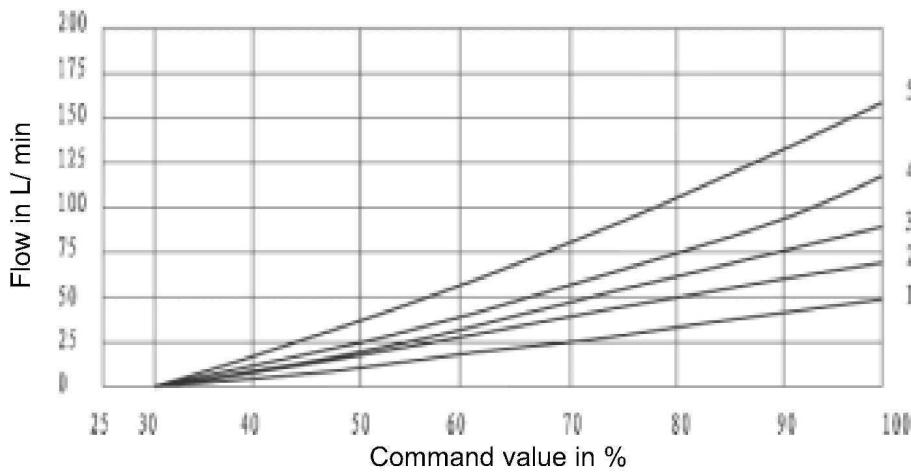


**Characteristic curves:( measured at  $v=36 \times 10^{-6}m^2/S$   $t=50^{\circ}C$  )**



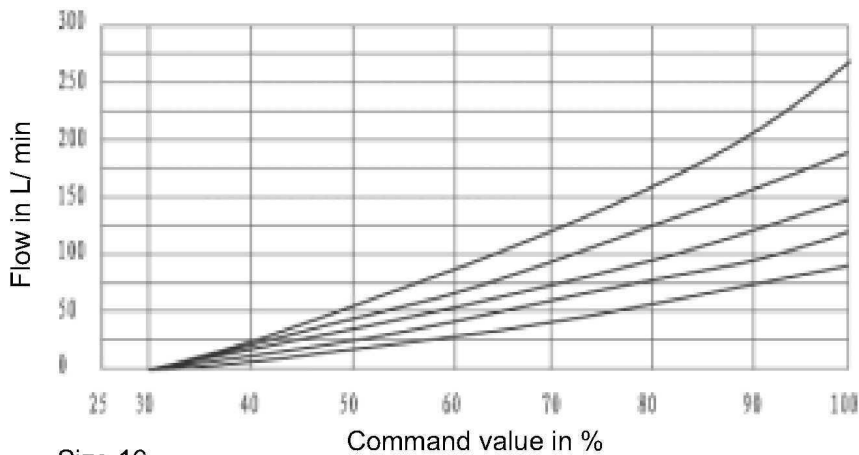
25L/min Nominal flow at 1MPa valve pressure difference

- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant



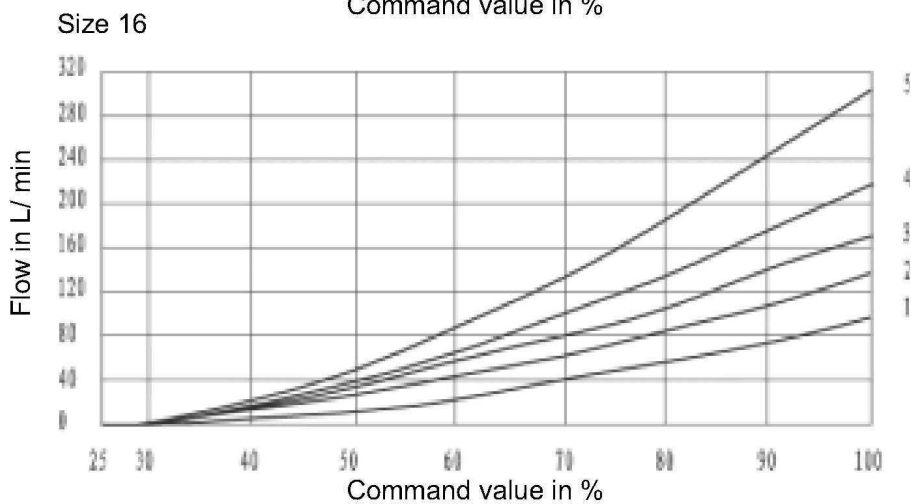
50L/min Nominal flow at 1MPa valve pressure difference

- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant



85L/min Nominal flow at 1MPa valve pressure difference

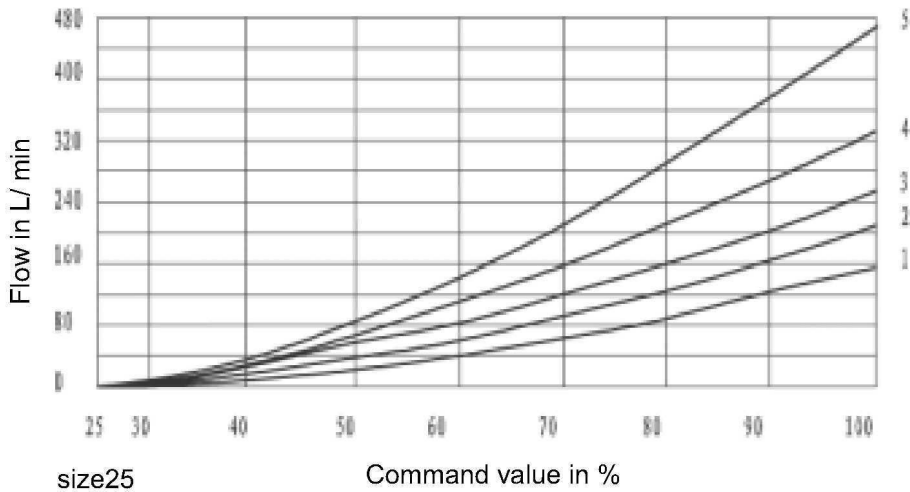
- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant



100L/min Nominal flow at 1MPa valve pressure difference

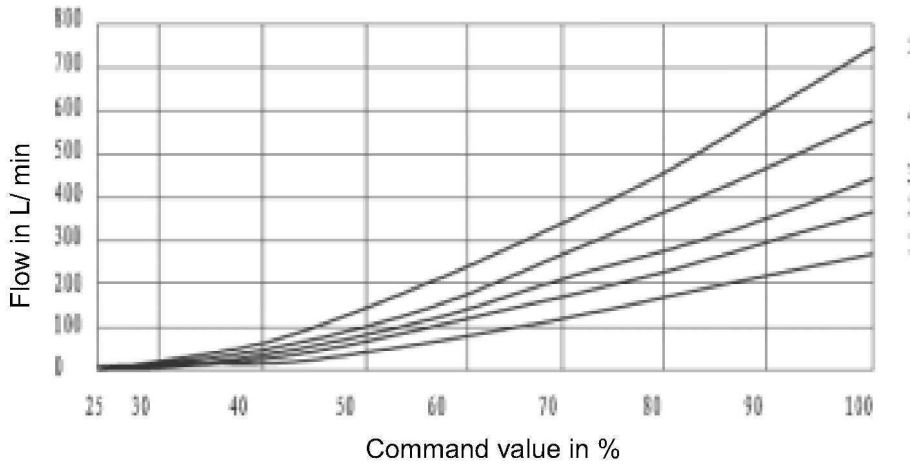
- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant

**Please note power limit!**



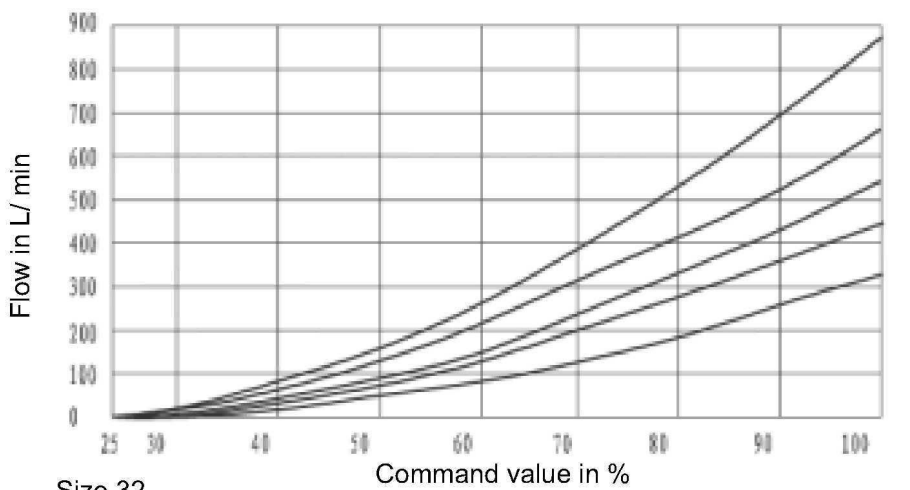
150L/min Nominal flow at  
1MPa valve pressure dif-  
ference

- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant



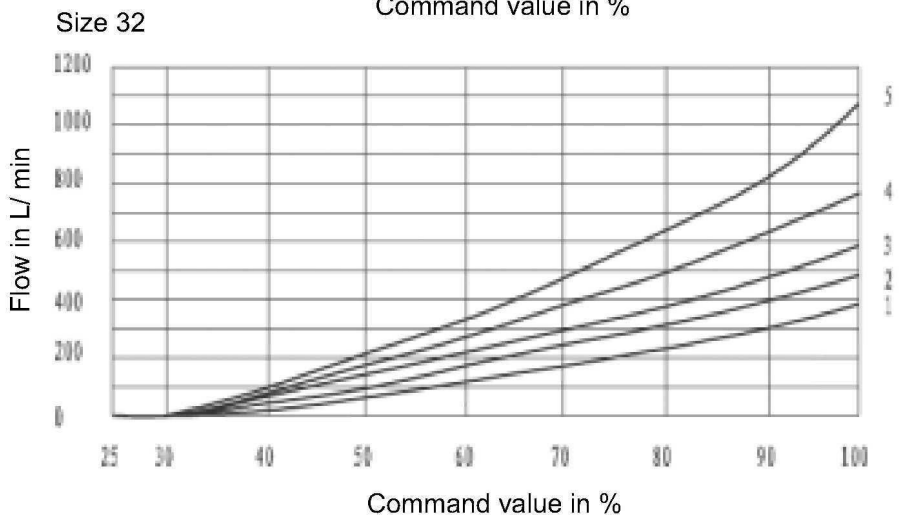
270L/min Nominal flow at  
1MPa valve pressure dif-  
ference

- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant



325L/min Nominal flow at  
1MPa valve pressure dif-  
ference

- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant

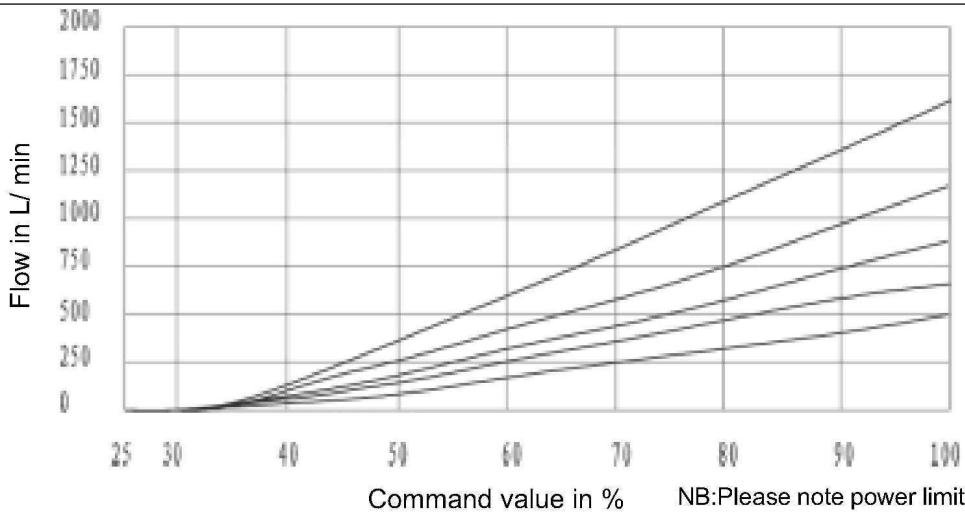


360L/min Nominal flow at  
1MPa valve pressure dif-  
ference

- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant

Pv=Pressure drop across valve  
(inlet pressure minus load pres-  
sure and return line pressure )

**Characteristic curves:( measured at  $v=36 \times 10^{-6}m^2/S$   $t=50^{\circ}C$  )**



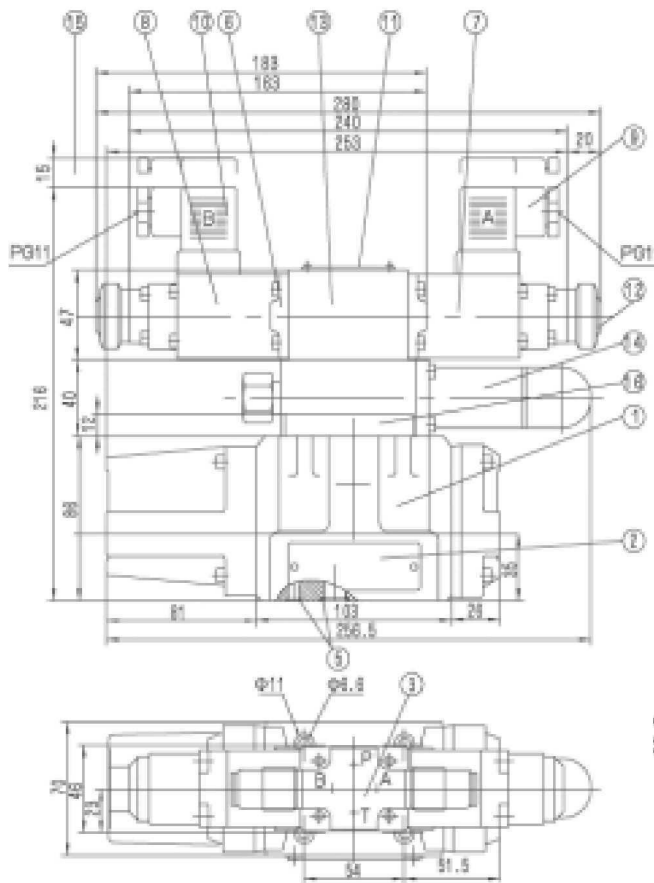
520L/min Nominal flow at 1MPa valve pressure difference

- 1  $P_v = 1MPa$  constant
- 2  $P_v = 2MPa$  constant
- 3  $P_v = 3MPa$  constant
- 4  $P_v = 5MPa$  constant
- 5  $P_v = 10MPa$  constant

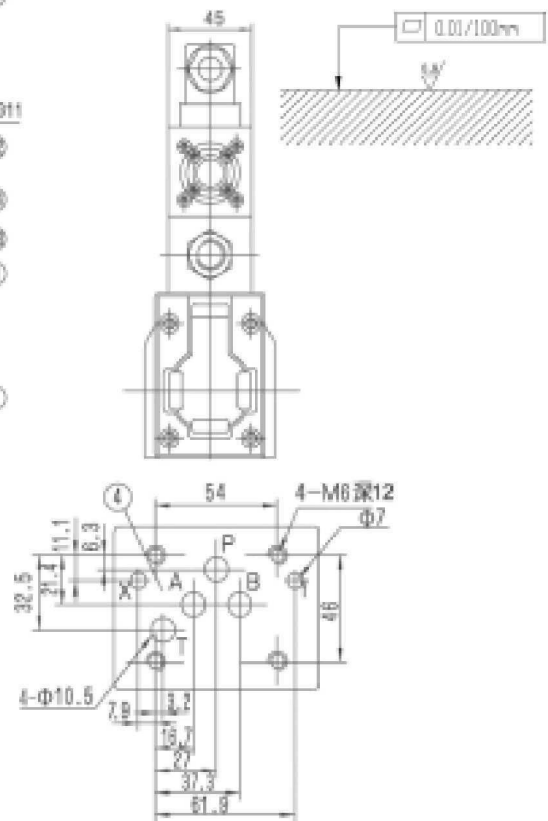
$P_v$  = Pressure drop across valve  
(Input pressure minus load pressure and return pressure)

**Unit Dimensions Type 4WRZ10**

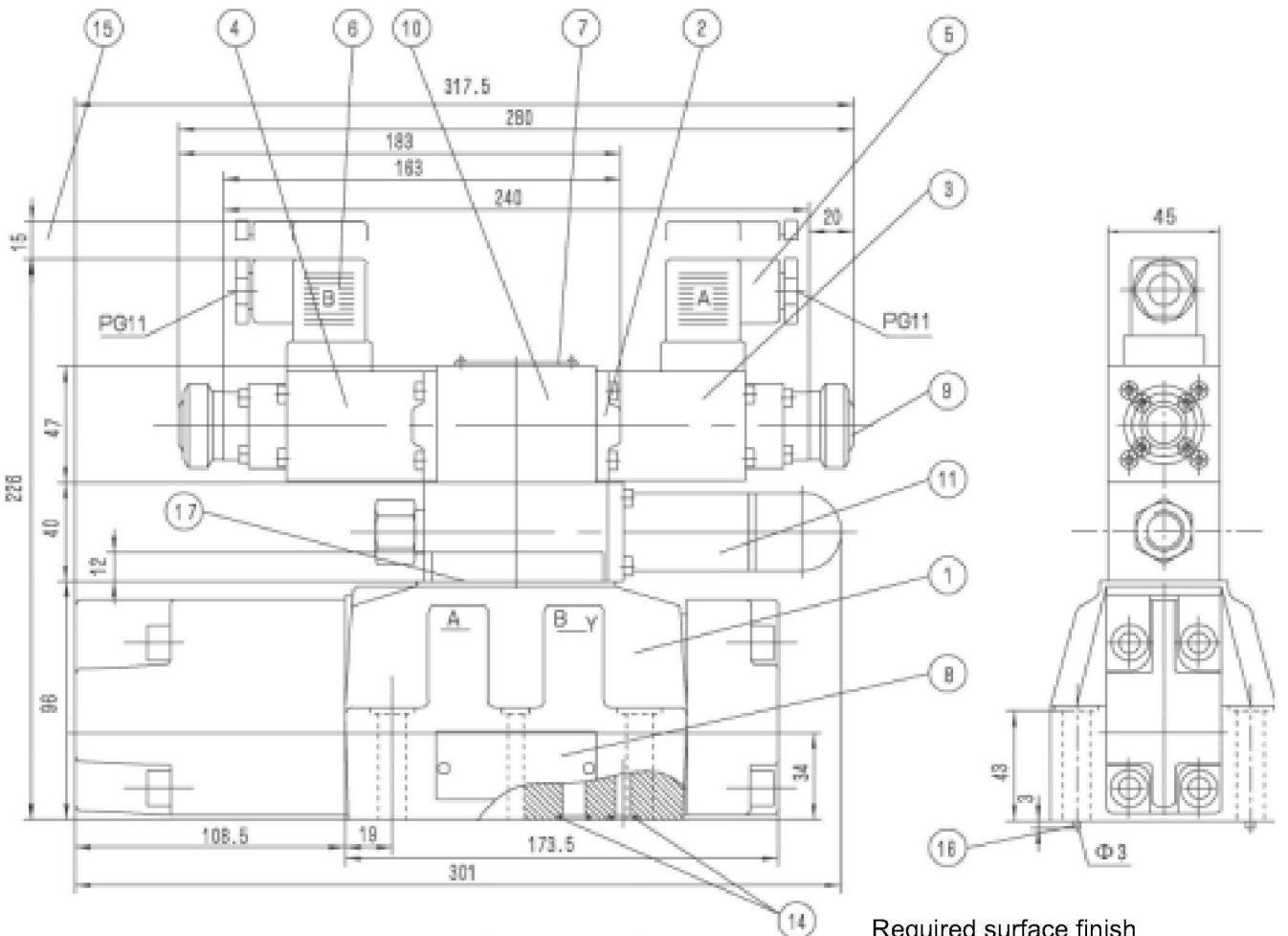
**(Dimensions in mm)**



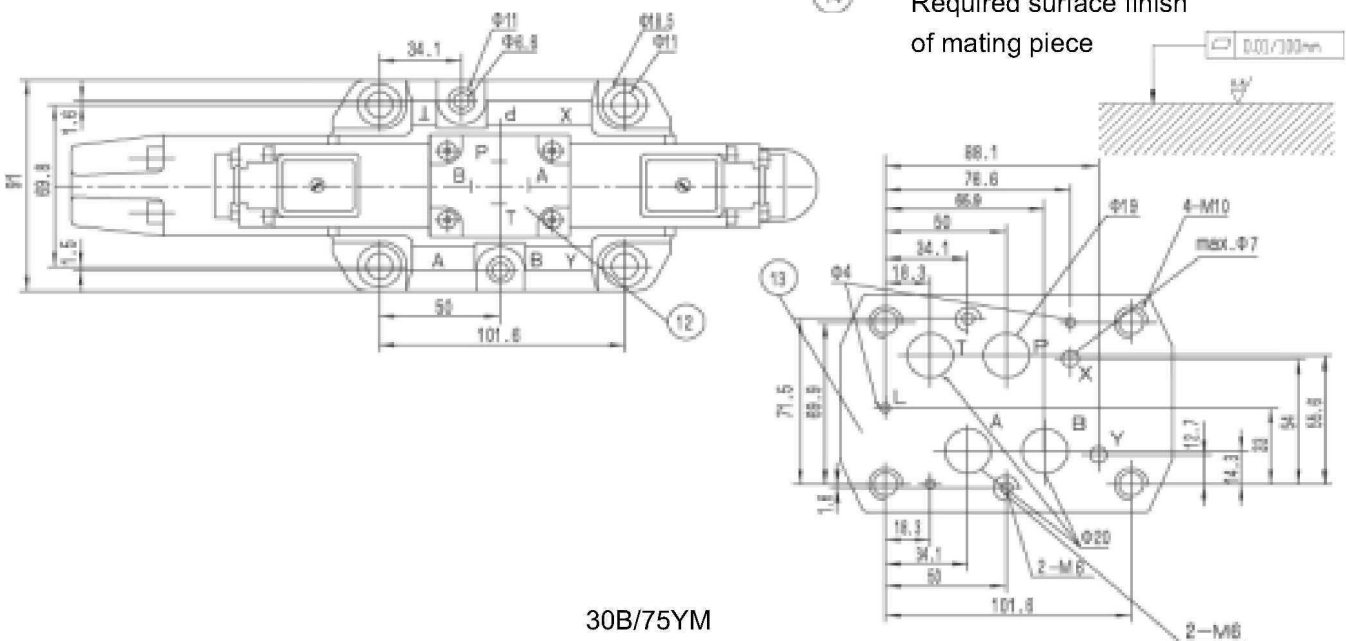
Required surface finish of mating piece



- |  |  |  |
|--|--|--|
| 1 Main valve   | 7 Proportional solenoid "a"  | 14 Pressure reducing valve ZDR6DP2-30/75YM |
| 2 Nameplate for main valve                                   | 8 Proportional solenoid "b"  | 15 Space required to remove plug           |
| 3 Ports position of poilt valve                              | 9 Plug "A",coloured grey   | 16 Connector plate(type WRH)               |
| 4 Machined mounting surface and position of ports            | 10 Plug "B",coloured black   |  |
| 5 O-ring 12X2(Ports A,B,P,T)<br>O-ring 10.82X1.78(Ports X,Y) | 11 Nameplate of pilot valve  | Subplates G534/01<br>G535/01<br>G536/01    |
| 6 Pilot valve for 2-position valve (Type A and B)            | 12 Emergency hand operator   | see page 81and 82                          |
|  | 13 Poilt valve for 3-position valve with two solenoids and plug Z4 |  |



Required surface finish of mating piece

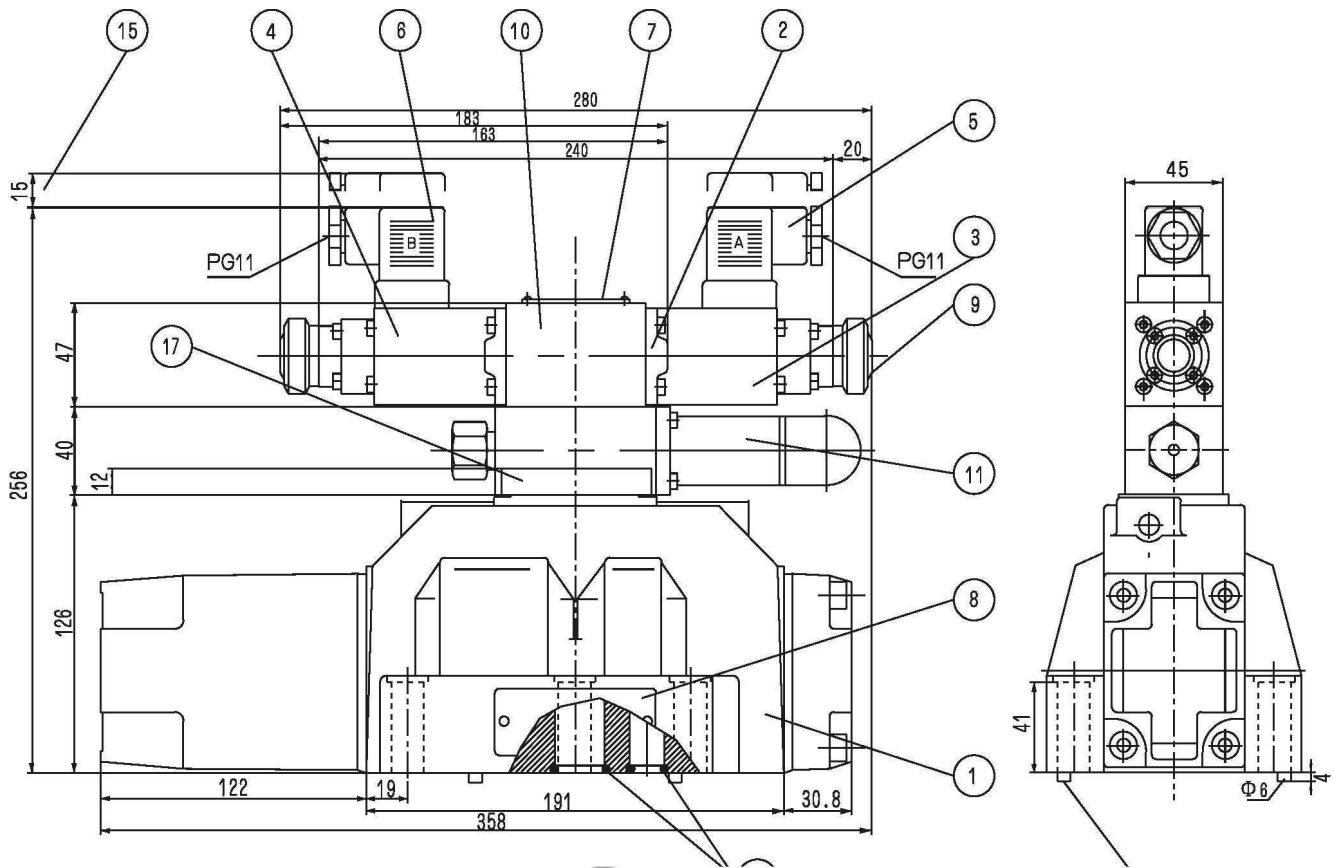


30B/75YM

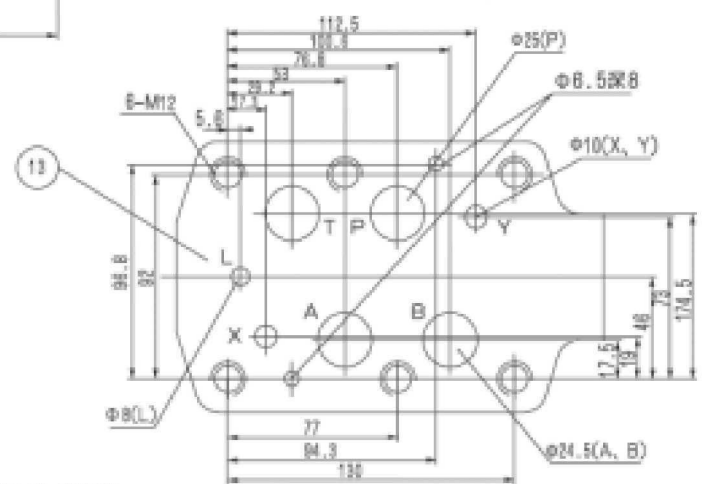
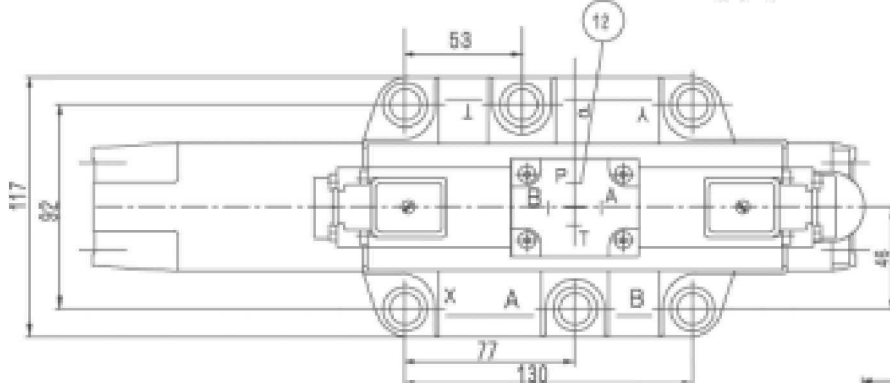
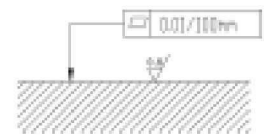
- |   |  |                    |
|---|--|--------------------|
| 5 Plug "A", coloured grey                                     | 12 Ports position of pilot valve                   | Subplates          |
| 6 Plug "B", coloured black                                    | 13 Machined mounting surface and position of ports | G172/01            |
| 7 Nameplate for pilot valve                                   | 14 O-ring 22X2.5 (for Ports A,B,P,T)               | G172/01            |
| 8 Nameplate for wain valve                                    | O-ring 10X2 (for Ports X,Y)                        | G174/01            |
| 9 Emergency hand operator                                     | 15 Space required to remove plug                   | G174/02            |
| 10 Pilot valve for 3-position with two solenoid and plug "Z4" | 16 Locating pin                                    | G174/08            |
| 11 Pressure reducing valve ZDR6DP2-                           | 17 Connector plate(type WRH)                       | See page 82 and 83 |

Unit Dimensions Type 4WRZ25

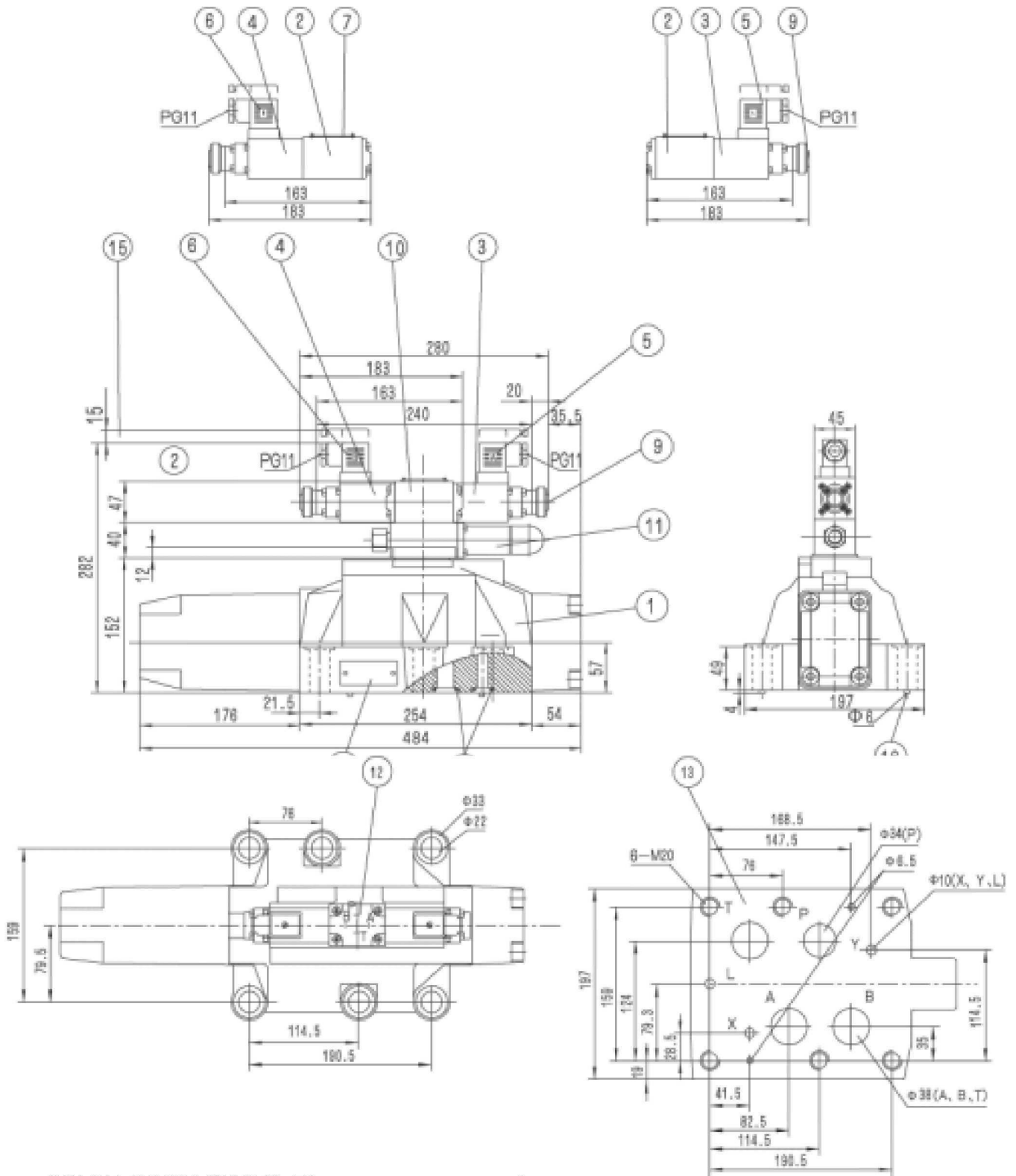
(Dimensions in mm)



Required surface finish of mating piece



- |   |                                    |                           |
|---|------------------------------------|---------------------------|
| 10 Pilot valve for 3-position valve with two solenoid and plug "Z4" | 14 O-ring 27X3 (for Ports A,B,P,T) | Subplates G151/01 G153/01 |
| 11 Pressure reducing valve ZDR6DP 2-30B/75YM                        | O-ring 19X3 (for Ports X,Y)        | G154/01 G156/01           |
| 12 Ports Position of pilot valve                                    | 15 Space required to remove plug   | see page 84               |
| 13 Machined mounting surface  | 16 Locating pin                    |                           |
|   | 17 Connector plate(type WRH)       |                           |



(models A and B)

- |                                     |   |
|-------------------------------------|---|
| 3 Proportional solenoid "a"         | 12 Ports position of pilot valve                        |
| 4 Proportional solenoid "b"         | 13 Machined mounting surface and position of ports      |
| 5 Plug "A",coloured grey            | 14 O-ring 42X3(Ports A,B,P,T)<br>O-ring 19X3(Ports X,Y) |
| 6 Plug "B",coloured black           | 15 Space required to remove plug                        |
| 7 Nameplate for pilot valve         | 16 Locating pin   |
| 8 Nameplate for wain valve          | 17 Connector plate(type WRH)                            |
| 9 Emergency hand operator           |   |
| 10 Pilot valve for 3-position valve |   |

Required surface finish of mating piece

Subplates

G157/01

G157/02

See page 85



## Notice

1. The fluid must be filtered. Minimum filter fineness is 20  $\mu\text{m}$ .
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to  $\frac{0.8}{\sqrt{\text{ }}$ .
6. Surface finish of mating piece is required to 0.01/100mm.