

BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	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 basiclly consist of the pilot valve (3) ,the main valve (7) with the main spool (8),and the centering spring (9).

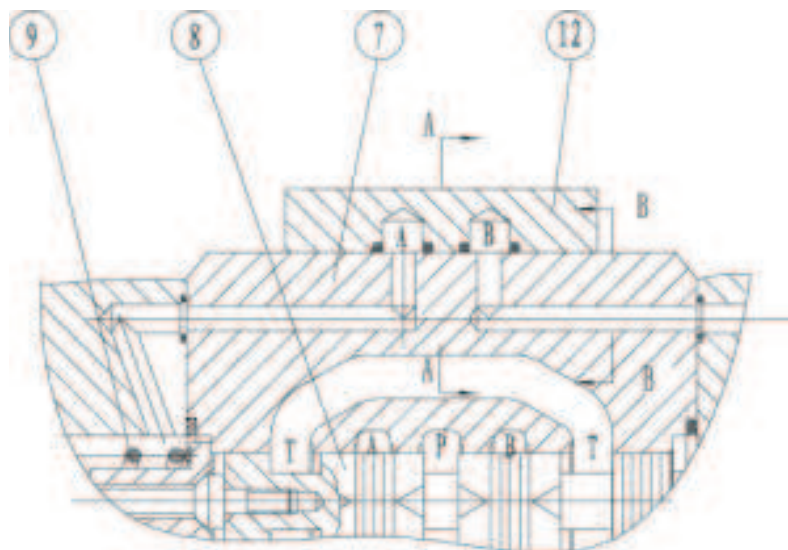
If solenoid "B" is energised, pilot spool (4) is moved to the right.Pilot oil is then either fed internally from port P,or "externally" from port X via the pilot valve (3) into the pressure chamber (10) and moves the main spool (8) a distance proportional to the strength of the electrical current.The 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 singal is switched off, both the pilot spool (4) ,and the main spool (8) return to neutral independent of the control pressure supply.An enenergy hand operator permits movement of the pilot spool position without energising the solenoids.

Proportional valve of type 4WRZ

Type 4WRH:

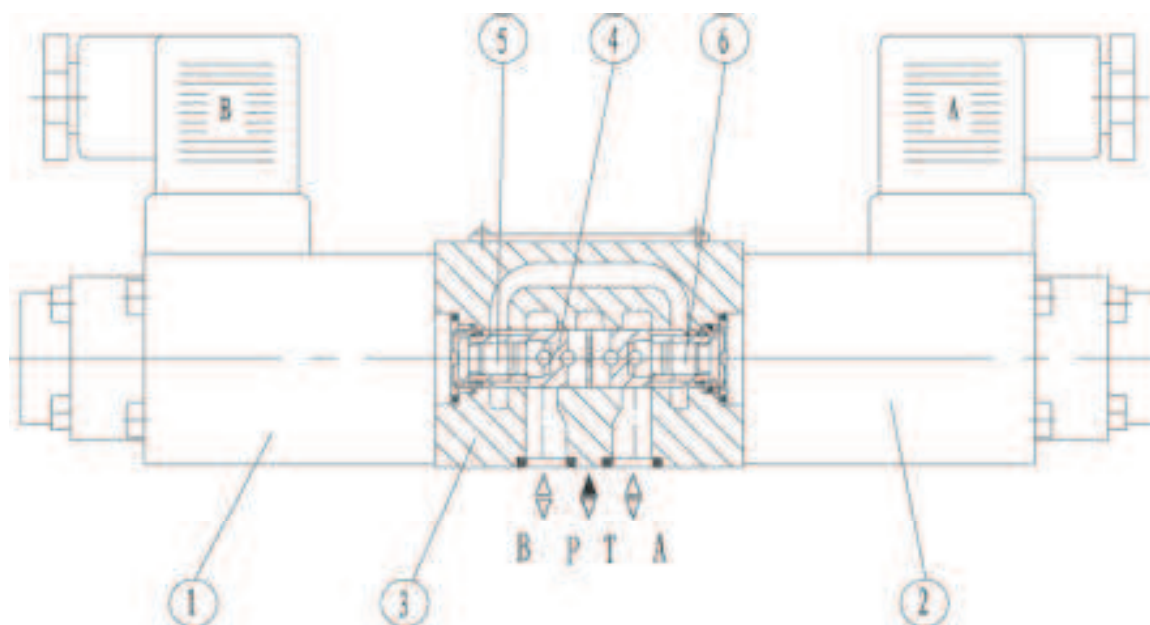
The type 4WRH valves are pilot operated proportional directional valves for external operation via pressure control valves. The function and principle is the same as that for valve type 4WRA. The inter-connecting plate (12) connects the pilot connection A with connection T(Y) and pilot connection B with 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.



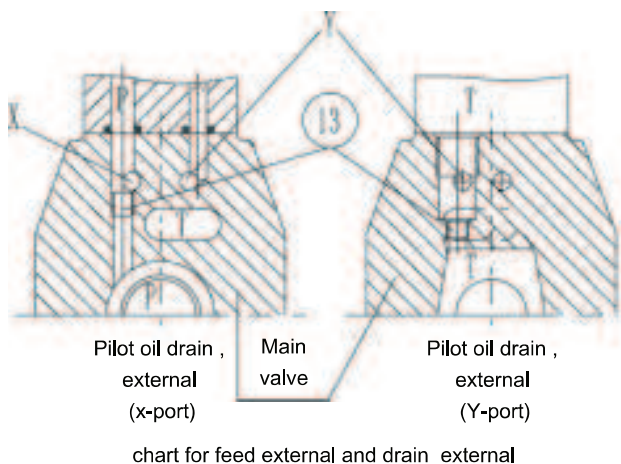
Pilot valve type 3DREP6

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(externailly)

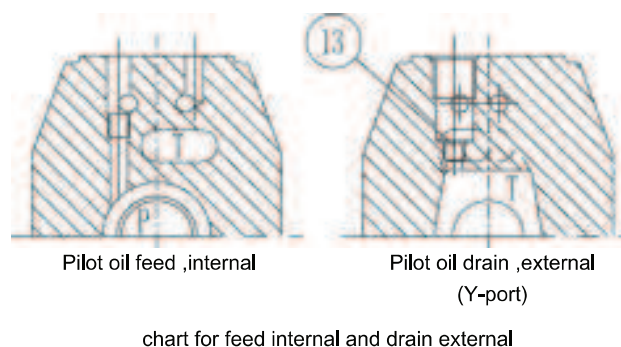
- 13、 Plug M6



- 2、 Pilot oil feed , internal ; drain , external。

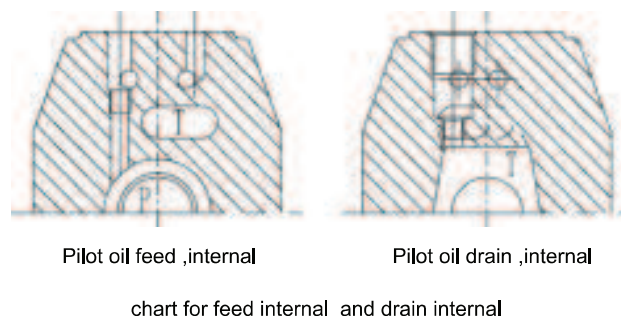
On this model,the pilot oil inlet is supplied from the
P-port of the main valve(internaliy).The polit oil
return is not directed into the T-port of main valve,
but is led separately via port Y to tank(externailly)

- 13、 Plug M6



- 3、 Pilot oil feed , internal ; drain , internal。

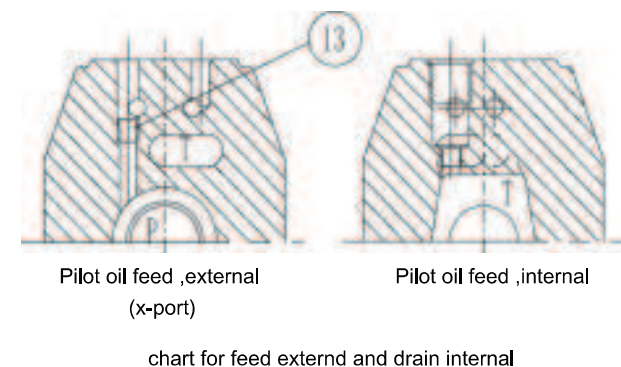
On this model,the pilot oil inlet is supplied from the
P-port of the main valve(internaliy).The polit oil
return is taken directly into the T-port of the main
valve (internaliy).Ports "X" and "Y" in the subplate
are both plugged.



- 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)

Type 4WRZ...30B/...

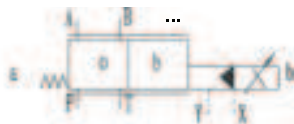


X=external
Y=external

Type 4WRZ...A...30B/...



Type 4WRZ...B...30B/...



Type 4WRZ...30B/...E...



X=internal
Y=external

Type 4WRZ...A...30B/...E...



Type 4WRZ...B...30B/...E...



Type 4WRZ...30B/...ET...



X=internal
Y=internal

Type 4WRZ...A...30B/...ET...



Type 4WRZ...B...30B/...ET...



Type 4WRZ...30B/...T...

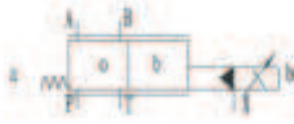


X=external
Y=internal

Type 4WRZ...A...30B/...T...



Type 4WRZ...B...30B/...T...



Type 4WRH...30B/...



X=external
Y=external

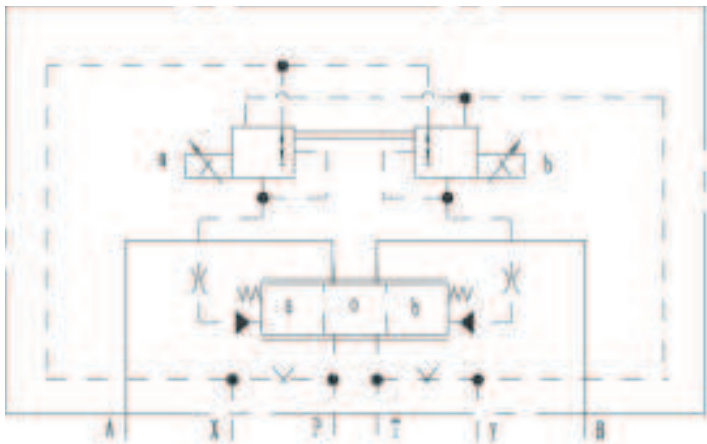
Type 4WRH...A...30B/...



Type 4WRH...B...30B/...

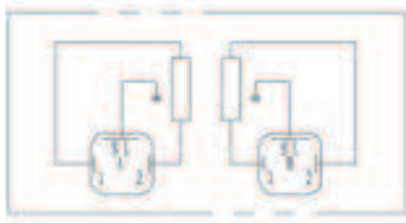


Symbols(detailed):

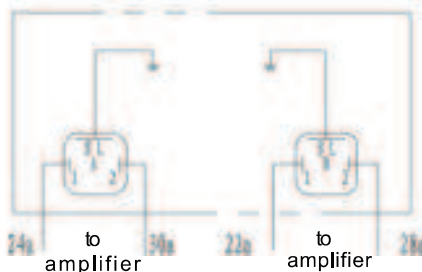


Example: 4WRZ...
Polit oil feed,external
polit oil drain,external


Coil connections



Plug connections



Ordering code

4WR			30 B			*		
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					
Spools  E = E1- (*) E2- (**) E3- (***) M W = W1- (*) W2- (**) W3- (***) EA MA WA EB MB WB			no code= without press.reducing valve D 2= with press.reducing valve ZDR6DP2-30/75 YM(not for 4WRH or 4WRZ without pilot valve) 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) B=Technology of Beijing Huade Hydraulic 30=Series 30 (30 to 39 unchanged installation and connection dimensions)					
Nominal flow at 1MPa pressure drop across 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								

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

Technical data

Hydraulic data

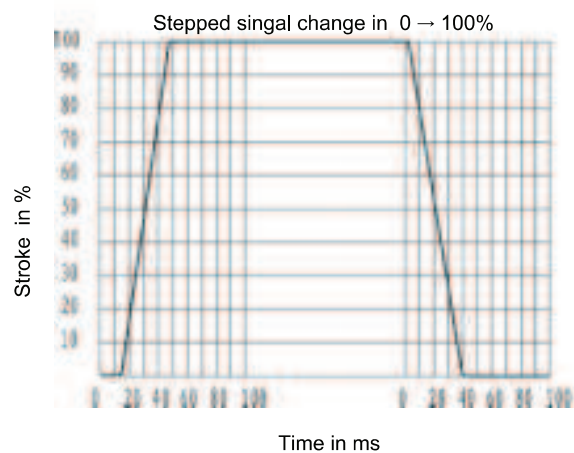
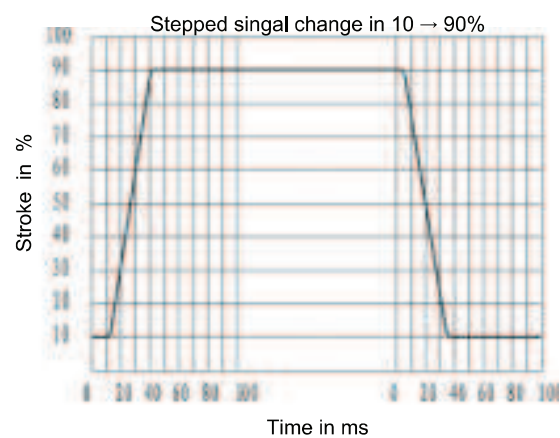
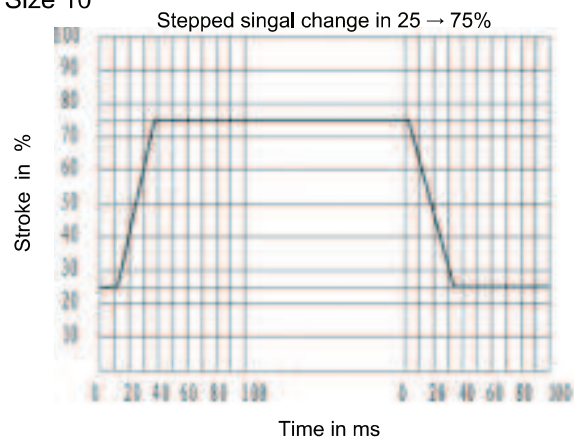
size		10	16	25	32
pilot valve pressure (MPa)	external pilot oil supply	3 to 10			
	internal pilot oil supply	Up to 10 (over 10 must install ZDR6DP ₂ -30B/75YM)			
Main valve pressure (MPa)		31.5	35		
Return pressure (MPa)	port T(external pilot oil return)	31.5	25		15
	port T(internal pilot oil return)	3			
	port Y	3			
Pilot oil volume (cm ³) 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 through main valve (L/min)		270	460	877	1600
Hysteresis (L/min)		6			
Repeatability (%)		3			
degree of contamination (μ m)		≤ 20			
Fluid		Mineral oil(for NBR seal),Phosphate ester (for FPM seal)			
Viscosity range (mm ² /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 (at 20°C) 19.5; max. valve, hot 28.8
Environment 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

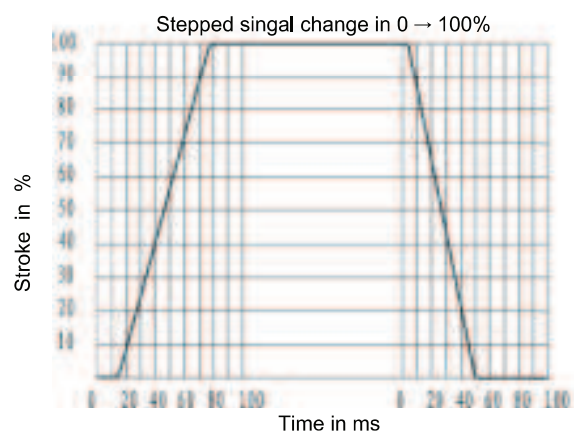
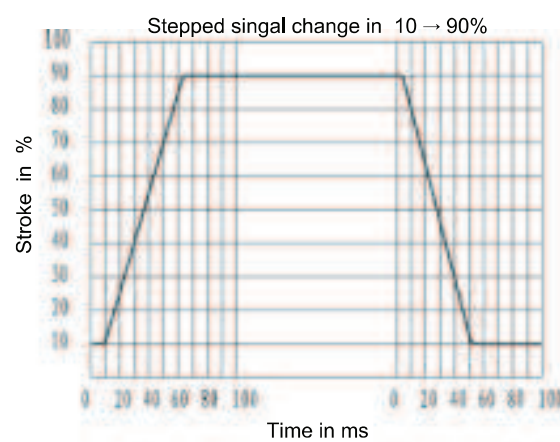
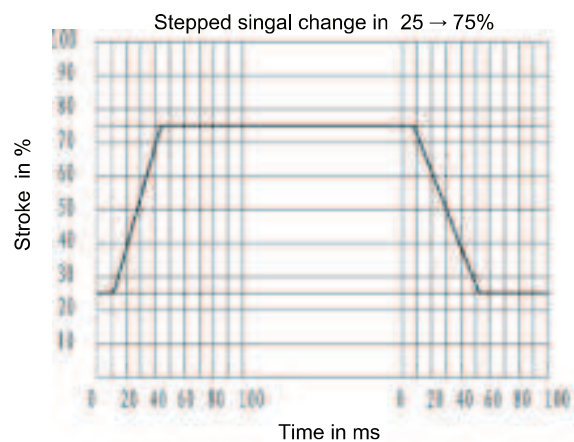
Valve Movement with Stepped Electrical Input Singal

Size 10



Pilot pressure at 5MPa

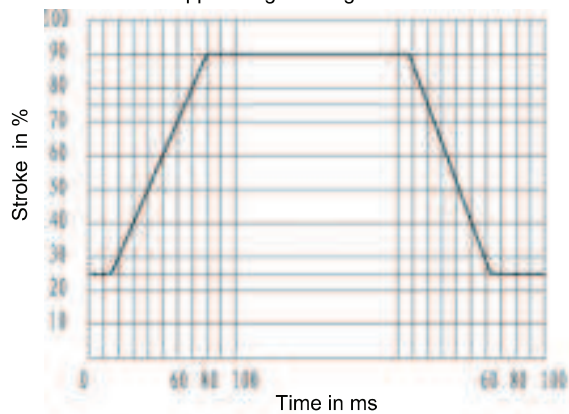
Size 16



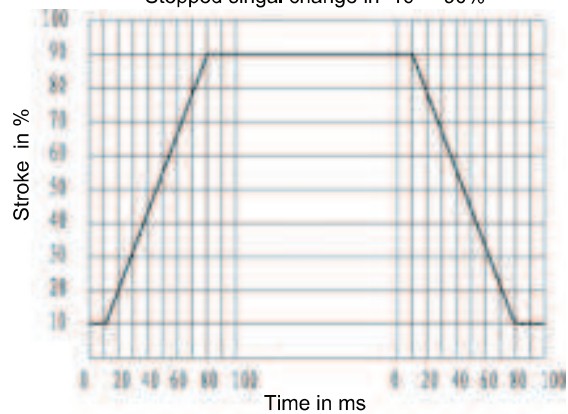
Pilot pressure at 5MPa

Size 25

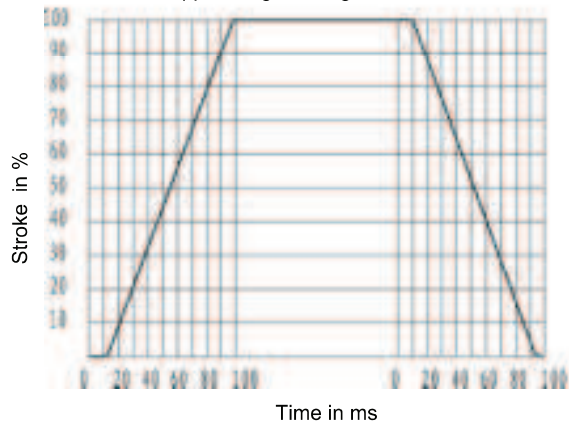
Stepped singal change in 25 → 75%



Stepped singal change in 10 → 90%



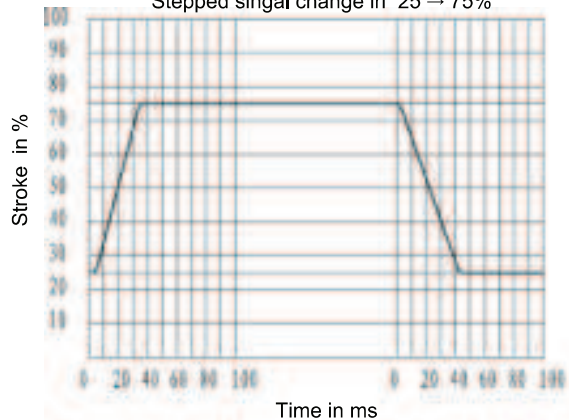
Stepped singal change in 0 → 100%



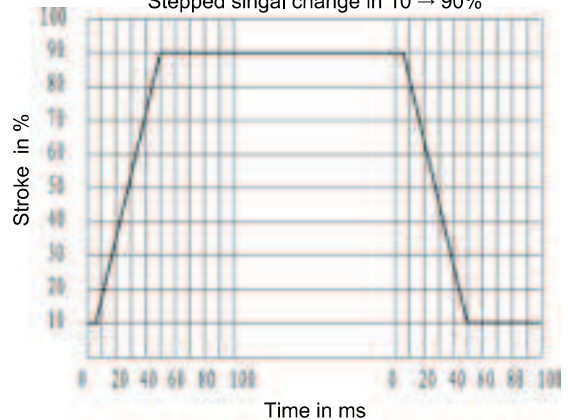
Pilot pressure at 5MPa

Size 32

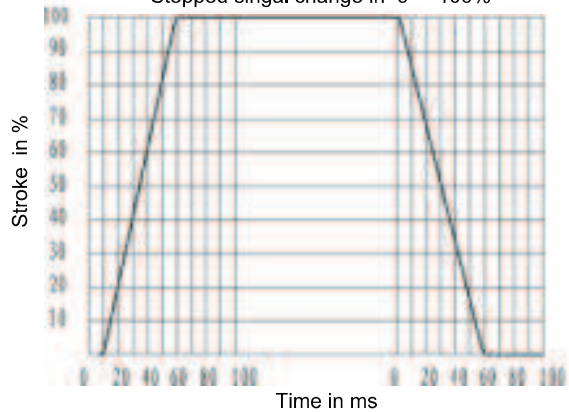
Stepped singal change in 25 → 75%



Stepped singal change in 10 → 90%

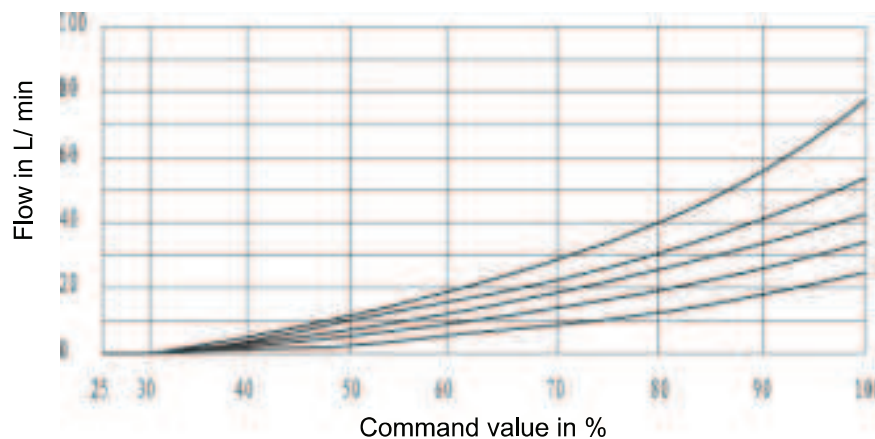


Stepped singal change in 0 → 100%



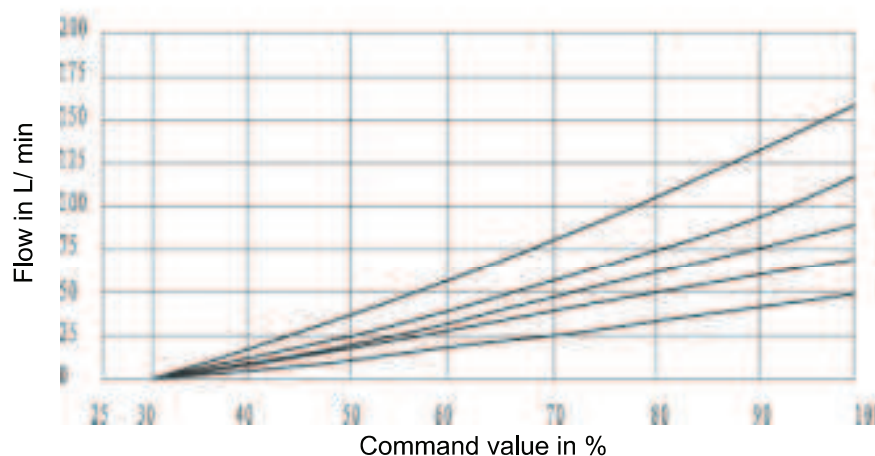
Pilot pressure at 5MPa

Size 10



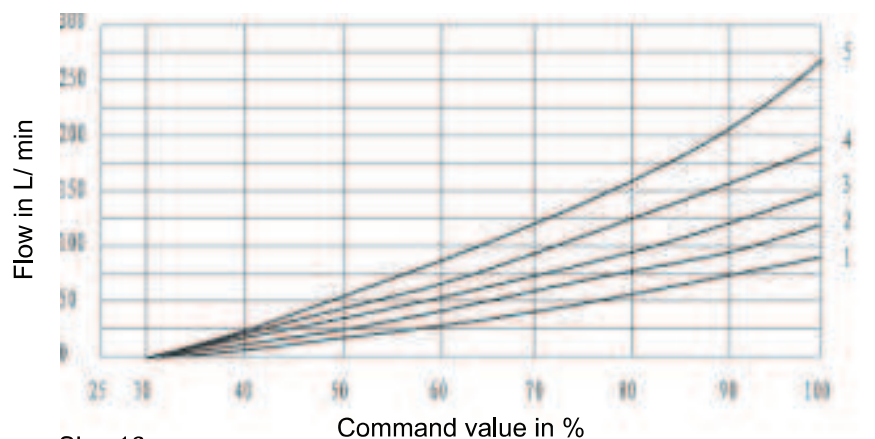
25L/min Nominal flow at
1MPa valve pressure dif-
ference

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



50L/min Nominal flow at
1MPa valve pressure dif-
ference

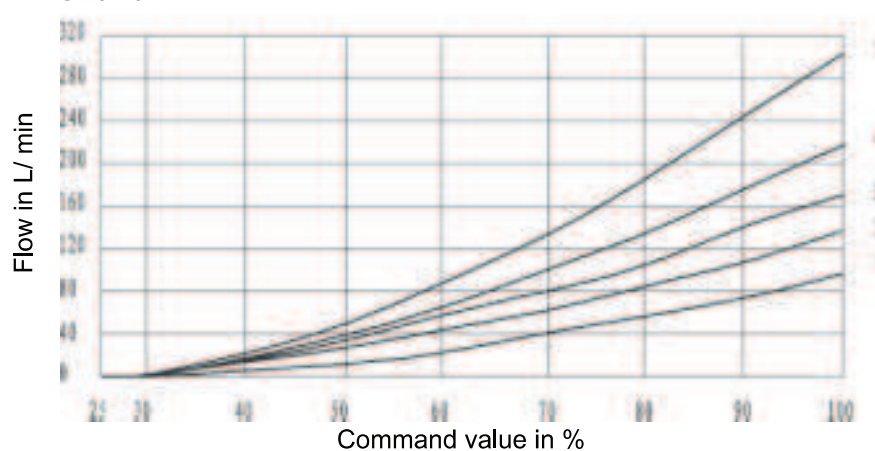
- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant



85L/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

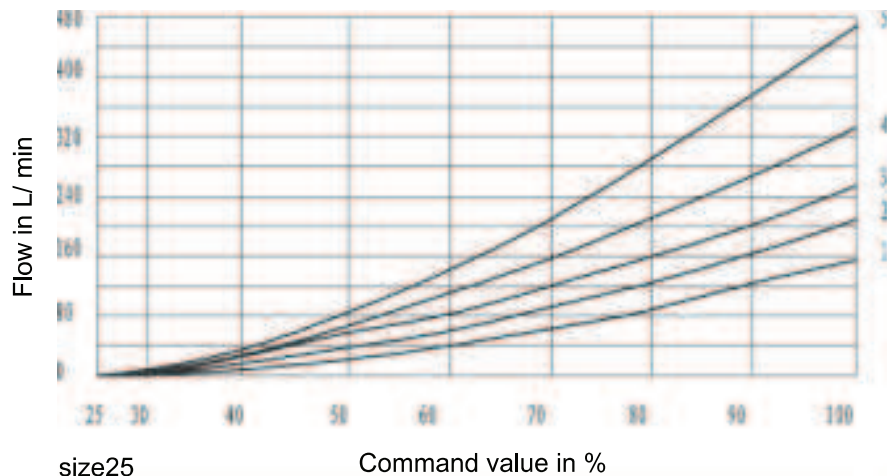
Size 16



100L/min Nominal flow at
1MPa valve pressure dif-
ference

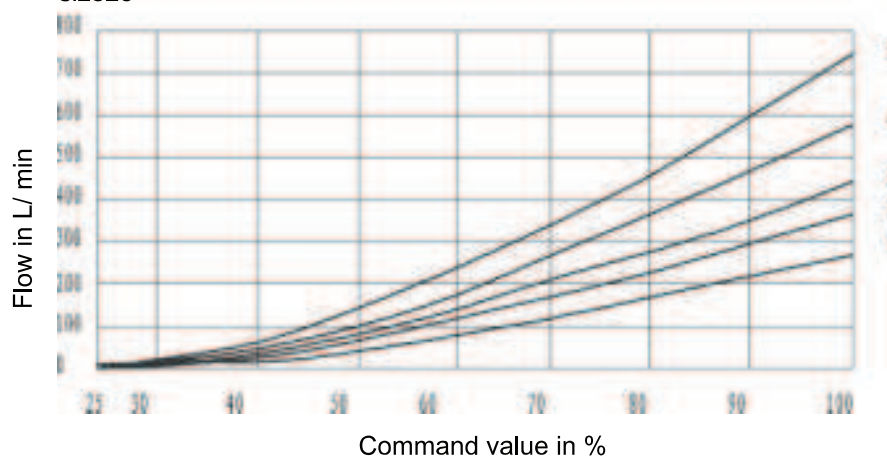
- 1 Pv = 1MPa constant
- 2 Pv = 2MPa constant
- 3 Pv = 3MPa constant
- 4 Pv = 5MPa constant
- 5 Pv = 10MPa constant

Please note power limit!



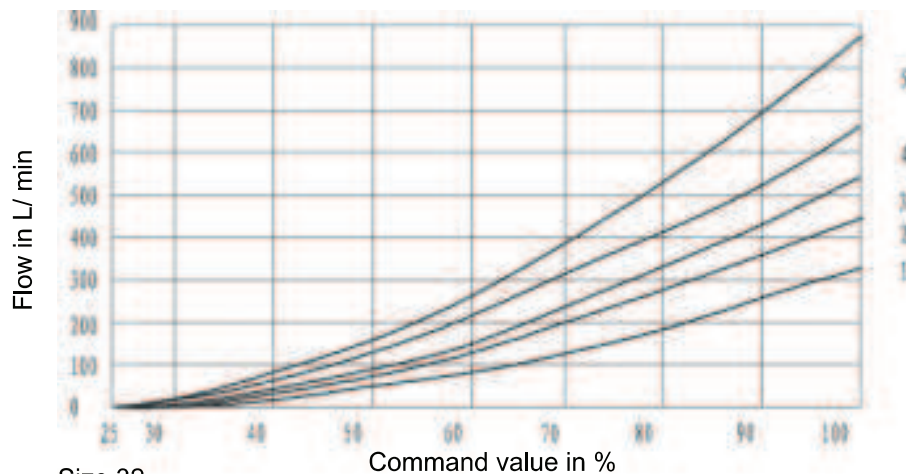
150L/min Nominal flow at
1MPa valve pressure dif-
ference

- 1 $P_v = 1\text{MPa}$ constant
- 2 $P_v = 2\text{MPa}$ constant
- 3 $P_v = 3\text{MPa}$ constant
- 4 $P_v = 5\text{MPa}$ constant
- 5 $P_v = 10\text{MPa}$ constant



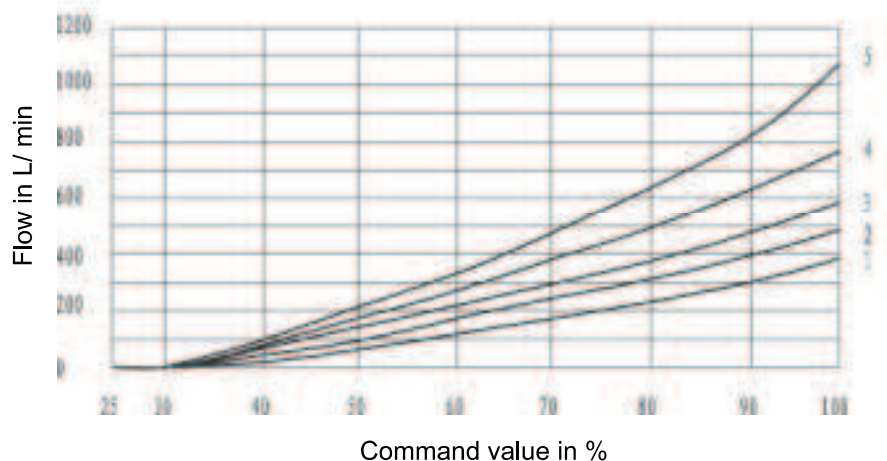
270L/min Nominal flow at
1MPa valve pressure dif-
ference

- 1 $P_v = 1\text{MPa}$ constant
- 2 $P_v = 2\text{MPa}$ constant
- 3 $P_v = 3\text{MPa}$ constant
- 4 $P_v = 5\text{MPa}$ constant
- 5 $P_v = 10\text{MPa}$ constant



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

- 1 $P_v = 1\text{MPa}$ constant
- 2 $P_v = 2\text{MPa}$ constant
- 3 $P_v = 3\text{MPa}$ constant
- 4 $P_v = 5\text{MPa}$ constant
- 5 $P_v = 10\text{MPa}$ constant

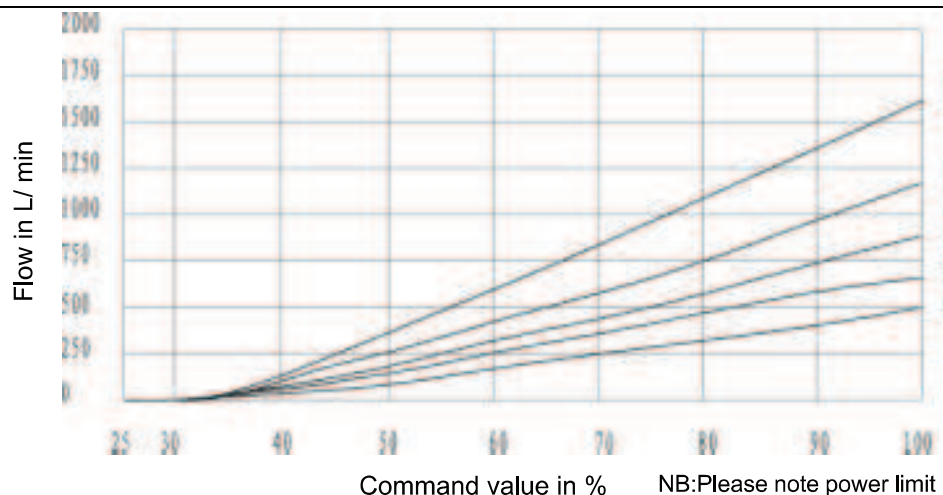


360L/min Nominal flow at
1MPa valve pressure dif-
ference

- 1 $P_v = 1\text{MPa}$ constant
- 2 $P_v = 2\text{MPa}$ constant
- 3 $P_v = 3\text{MPa}$ constant
- 4 $P_v = 5\text{MPa}$ constant
- 5 $P_v = 10\text{MPa}$ constant

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

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



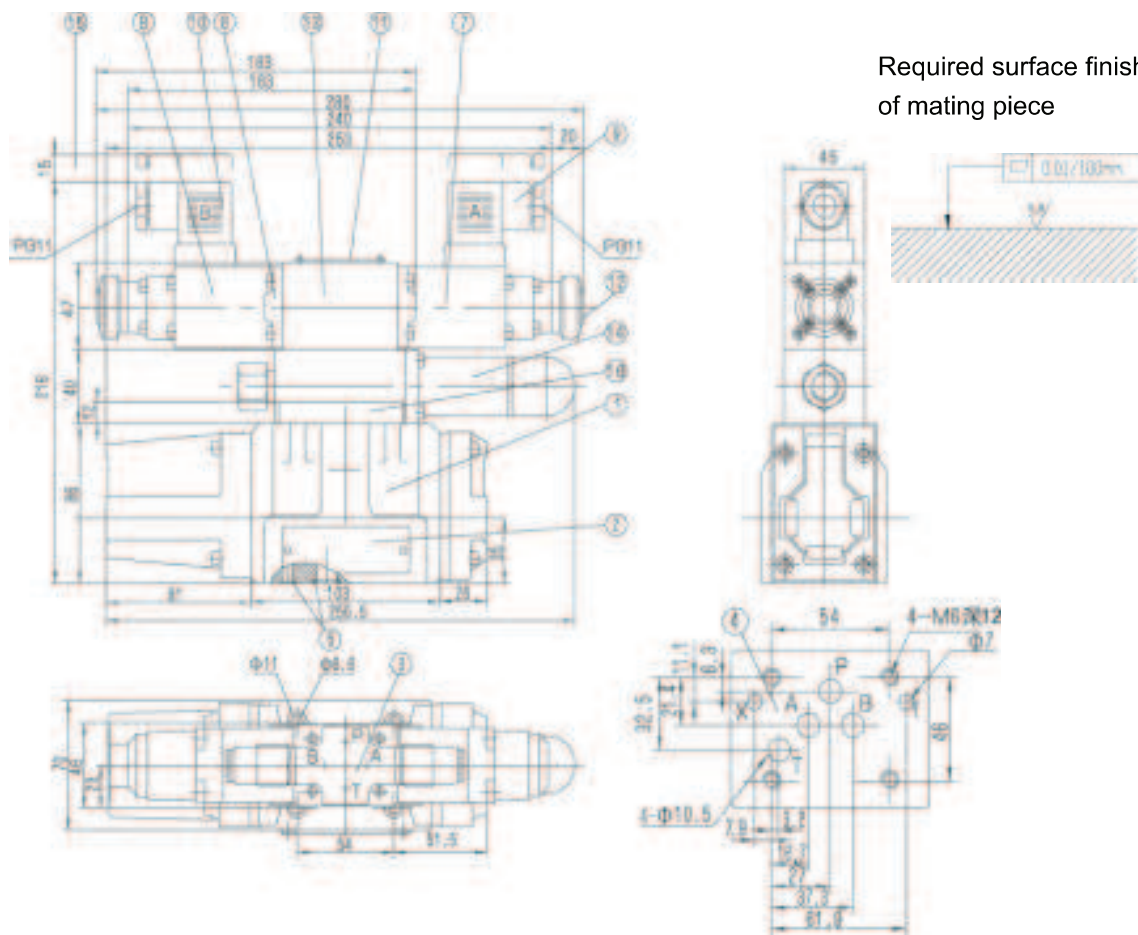
520L/min Nominal flow at
1MPa valve pressure dif-
ference

- 1 $P_v = 1\text{MPa}$ constant
- 2 $P_v = 2\text{MPa}$ constant
- 3 $P_v = 3\text{MPa}$ constant
- 4 $P_v = 5\text{MPa}$ constant
- 5 $P_v = 10\text{MPa}$ constant

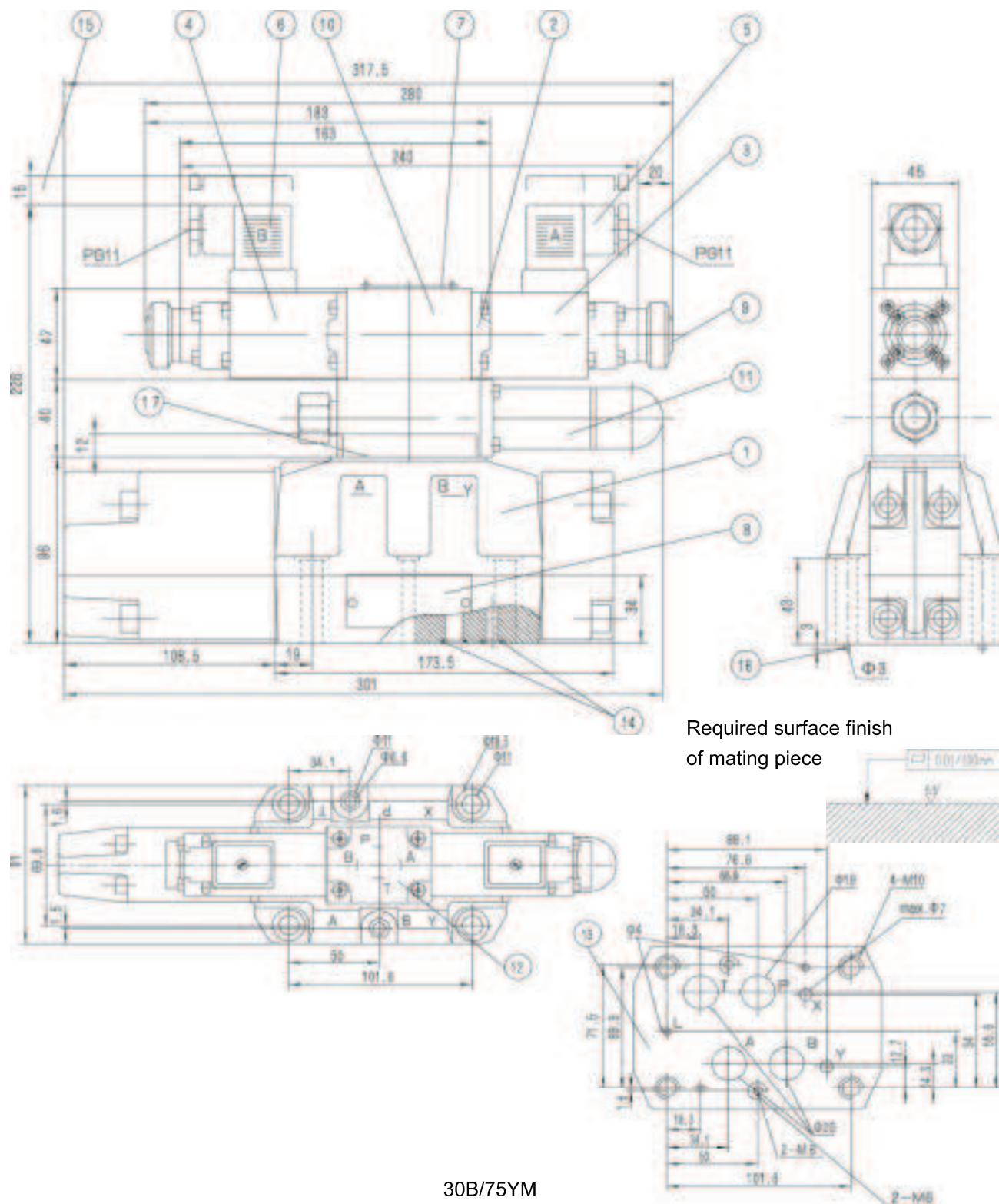
Pv = Pressure drop across valve
(Input pressure minus load pressure and return pressure)

Unit Dimensions Type 4WRZ10

(Dimensions in mm)



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



Required surface finish
of mating piece

30B/75YM

- 5 Plug "A", coloured grey
- 6 Plug "B", coloured black
- 7 Nameplate for pilot valve
- 8 Nameplate for wain valve
- 9 Emergency hand operator
- 10 Pilot valve for 3-position with two solenoid and plug "Z4"
- 11 Pressure reducing valve ZDR6DP2-

- 12 Ports position of pilot valve
- 13 Machined mounting surface and position of ports
- 14 O-ring 22X2.5 (for Ports A,B,P,T)
O-ring 10X2 (for Ports X,Y)
- 15 Space required to remove plug
- 16 Locating pin
- 17 Connector plate(type WRH)

Subplates

G172/01

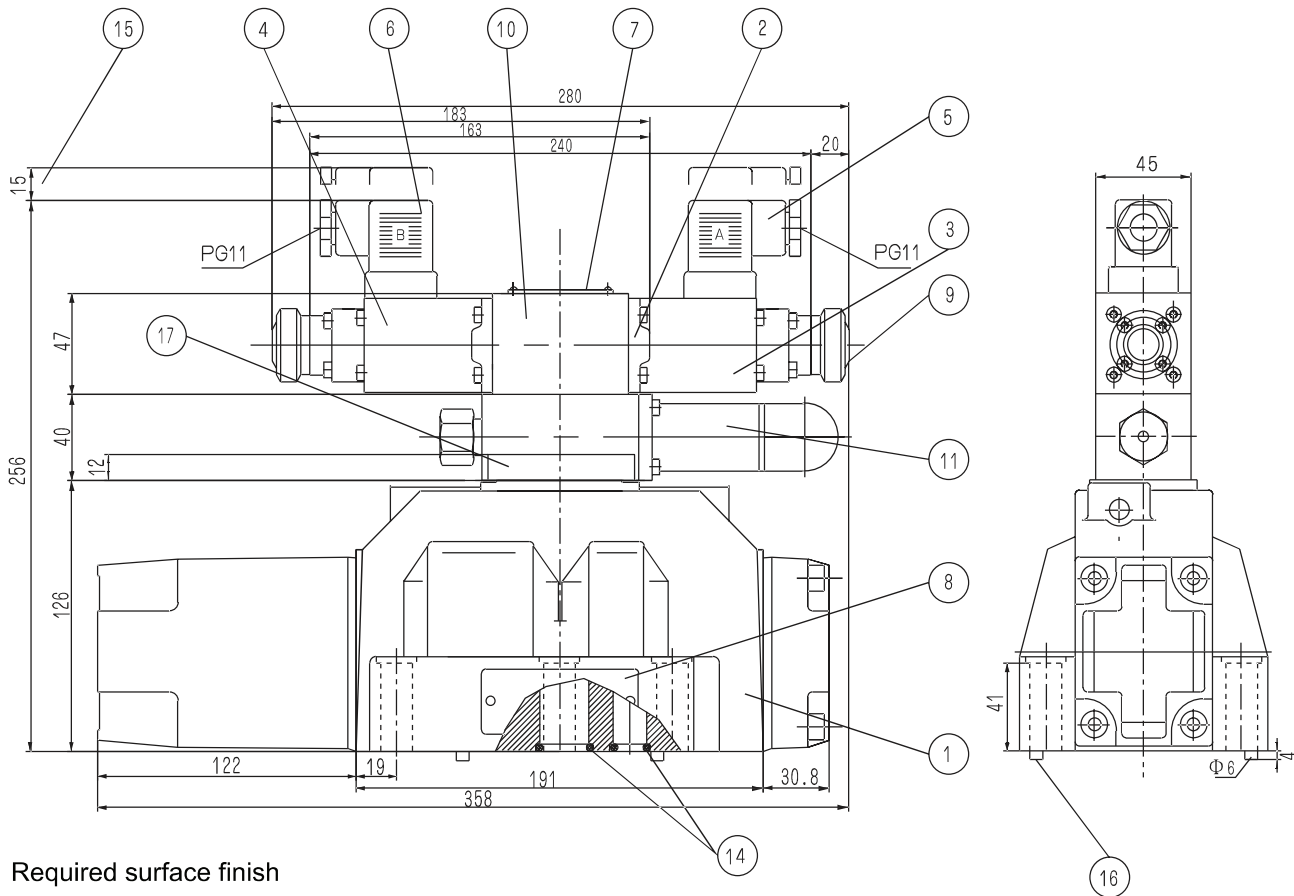
G172/01

G174/01

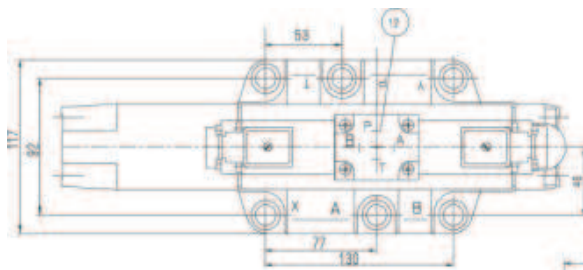
G174/02

G174/08

See page 82 and 83

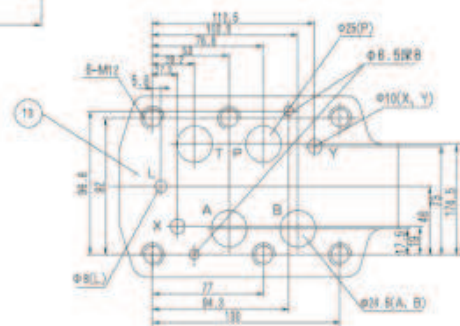


Required surface finish
of mating piece

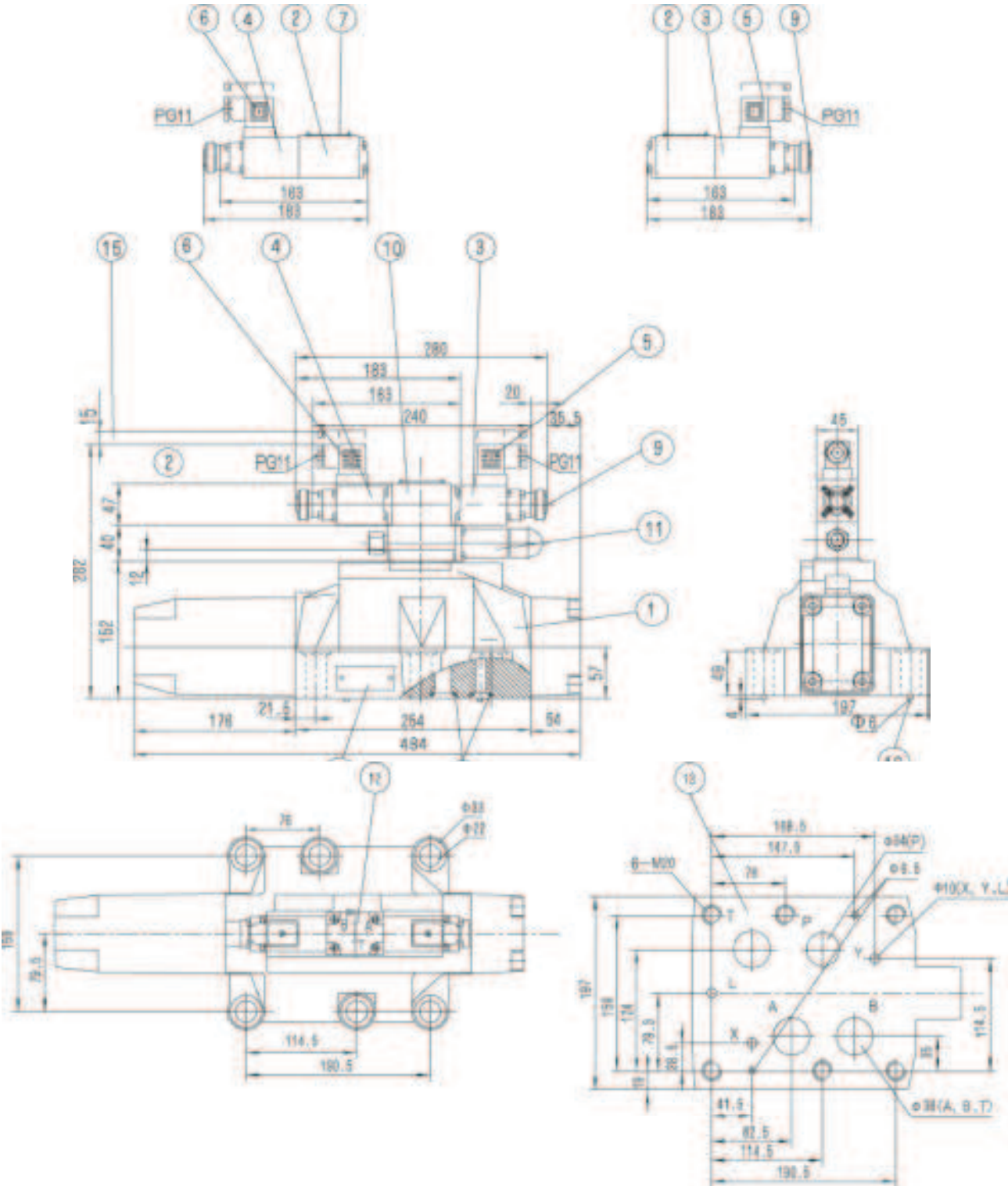


- 1 Main valve
- 2 Pilot valve for 2-position valve with one solenoid and plug "Z4" (models A and B)
- 3 Proportional solenoid "a"
- 4 Proportional solenoid "b"
- 5 Plug "A", coloured grey
- 6 Plug "B", coloured black
- 7 Nameplate for pilot valve
- 8 Nameplate for main valve
- 9 Emergency hand operator
- 10 Pilot valve for 3-position valve with two solenoid and plug "Z4"
- 11 Pressure reducing valve ZDR6DP 2-30B/75YM
- 12 Ports Position of pilot valve
- 13 Machined mounting surface

- 14 O-ring 27X3 (for Ports A,B,P,T)
- 15 Space required to remove plug
- 16 Locating pin
- 17 Connector plate(type WRH)



Subplates G151/01 G153/01
G154/01 G156/01
see page 84



(models A and B)		30B/75YM	
3	Proportional solenoid "a"	12	Ports position of pilot valve
4	Proportional solenoid "b"	13	Maachined mounting surface and position of ports
5	Plug "A",coloured grey	14	O-ring 42X3(Ports A,B,P,T)
6	Plug "B",coloured black		O-ring 19X3(Ports X,Y)
7	Nameplate for pilot valve		Subplates
8	Nameplate for wain valve	15	Space required to remove plug
9	Emergency hand operator	16	Locating pin
10	Pilot valve for 3-position valve	17	Connector plate(type WRH)
			See page 85

Required surface finish of mating piece



Notice

1. The fluid must be filtered. Minimum filter fineness is 10 μm .
2. The tank must be sealed up and an air breather/filter must be installed on air suction/entrance.
3. Subplate are not supplied, if required, please ordering separately.
4. Valve fixing bolts/screws must be high tensile (class 10.9). Please select and consult manufacturer according to the parameter listed in the datasheet.
5. Roughness of surface mating with the valve is required to $\sqrt{0.8}$.
6. Surface straightness of mating piece is required to 0.01/100mm.

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