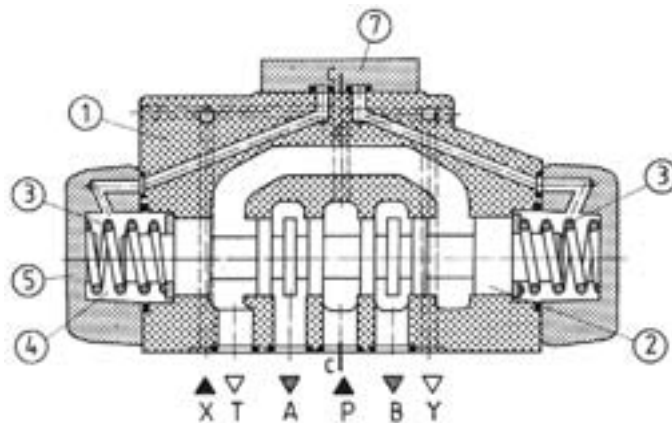


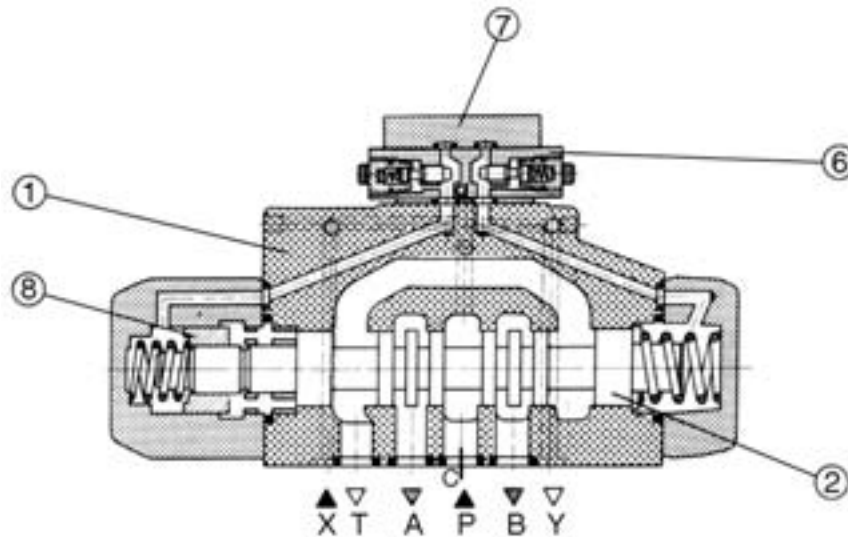
Directional control valves afford possibilities for controlling start, stop and direction of flow of a pressure fluid and thus accordingly start, stop and direction of movement of a user ( cylinder or hydraulic motor ).  
The directional valves may be mounted in hydraulic systems in any desired position together with a subplate.  
Sealing of mating faces is made by using O-rings which are included with the valve.



**DESCRIPTION OF OPERATION**



Type 4 WH 22 ... / ...



Type 4 WH 22H .... / ....

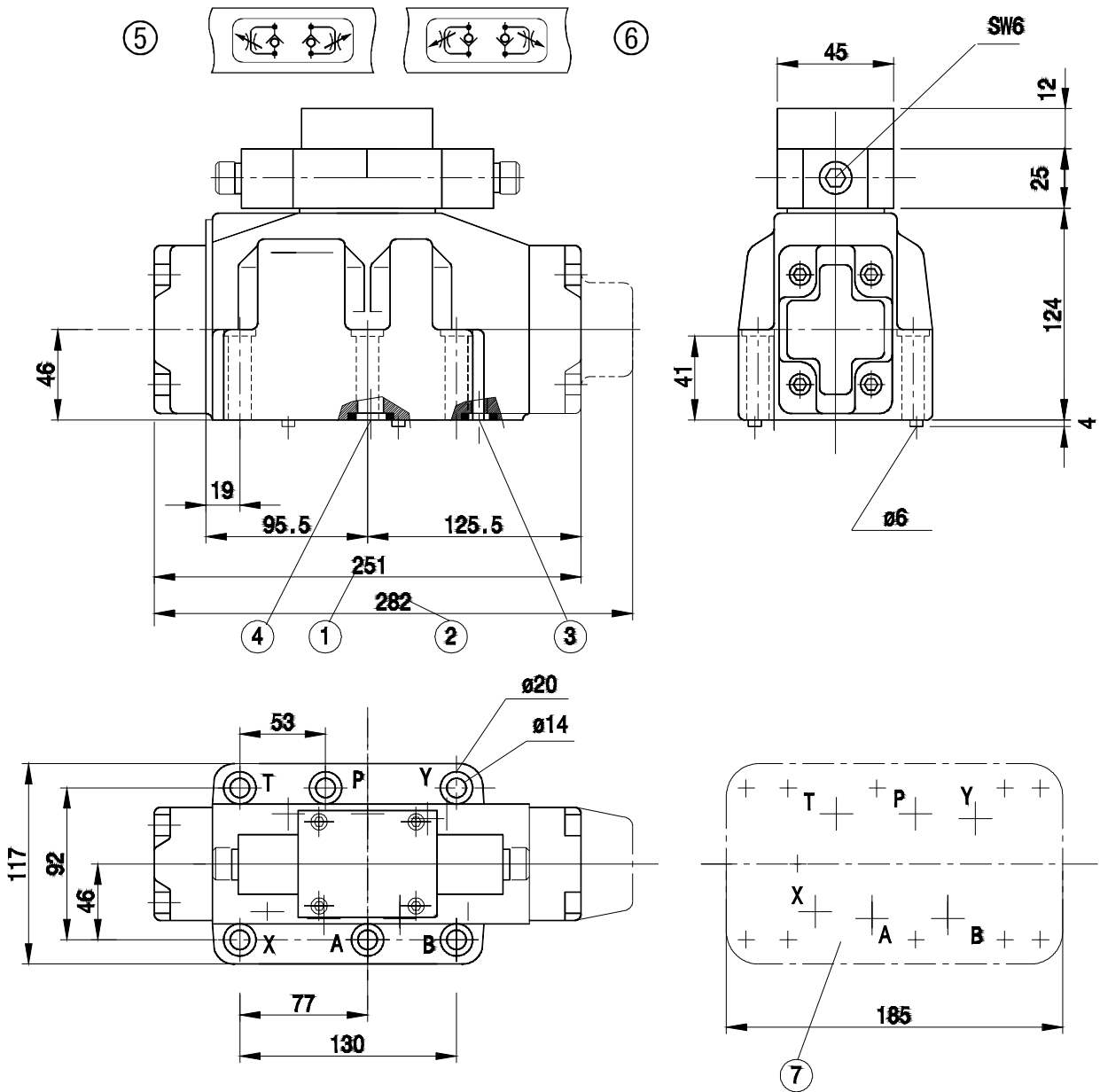
The directional valve is switched by changing position of the control spool 2 which moving along its axis separates or connects ports A, B, P or T in the housing 1. The main spool is switched from „0” position when pilot pressure is supplied to one of spring chambers. The both spring chambers are connected via the cover 7 with port X or Y.

The control spool of the main valve is either spring returned or hydraulically (pressure affecting both faces of the spool) returned to the neutral or start position. The return springs 3 are installed in the covers 5. The centering sleeve 8 serves centering functions. The directional valve may be equipped with the pilot choke adjustment 6.

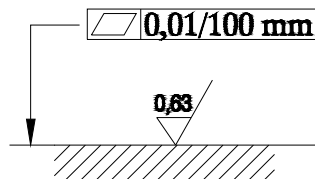
## TECHNICAL DATA

|                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Hydraulic fluid                                                                                                                                                                                                                                                                                                                                                                     | Mineral oil, phosphate ester                                                                                                                    |
| Required filtration                                                                                                                                                                                                                                                                                                                                                                 | up to 16 µm                                                                                                                                     |
| Recommended filtration                                                                                                                                                                                                                                                                                                                                                              | up to 10 µm                                                                                                                                     |
| Nominal fluid viscosity                                                                                                                                                                                                                                                                                                                                                             | 37 mm <sup>2</sup> at temp. of 328 K                                                                                                            |
| Viscosity range                                                                                                                                                                                                                                                                                                                                                                     | 2.8 to 380 mm <sup>2</sup> /s                                                                                                                   |
| Optimum working temperature ( fluid in a tank )                                                                                                                                                                                                                                                                                                                                     | 313 - 328 K                                                                                                                                     |
| Fluid temperature range                                                                                                                                                                                                                                                                                                                                                             | 243 - 343 K                                                                                                                                     |
| Weight                                                                                                                                                                                                                                                                                                                                                                              | 13 kg                                                                                                                                           |
| Maximum operating pressure<br>- in ports A, B, P<br><br>- in port T                                                                                                                                                                                                                                                                                                                 | 35 MPa for H-WH 22<br>28 MPa for WH 22<br>25 MPa                                                                                                |
| Maximum allowable pilot pressure                                                                                                                                                                                                                                                                                                                                                    | 25 MPa                                                                                                                                          |
| Minimum pilot pressure<br>- three-position directional valve<br>- two-position directional valve spring centered<br>- two-position directional valve hydraulically centered                                                                                                                                                                                                         | 0.8 MPa<br>1.0 MPa<br>0.5 MPa                                                                                                                   |
| Pilot fluid volume for valve operation<br>- three-position directional valve spring centered<br>- two-position directional valve<br><br>Three-position directional valve hydraulically centered<br>- from neutral to operated position " a "<br>- from operated position " a " to neutral<br>- from neutral to operated position " b "<br>- from operated position " b " to neutral | 9.65 cm <sup>3</sup><br>19.3 cm <sup>3</sup><br><br>5.0 cm <sup>3</sup><br>4.65 cm <sup>3</sup><br>9.65 cm <sup>3</sup><br>4.65 cm <sup>3</sup> |

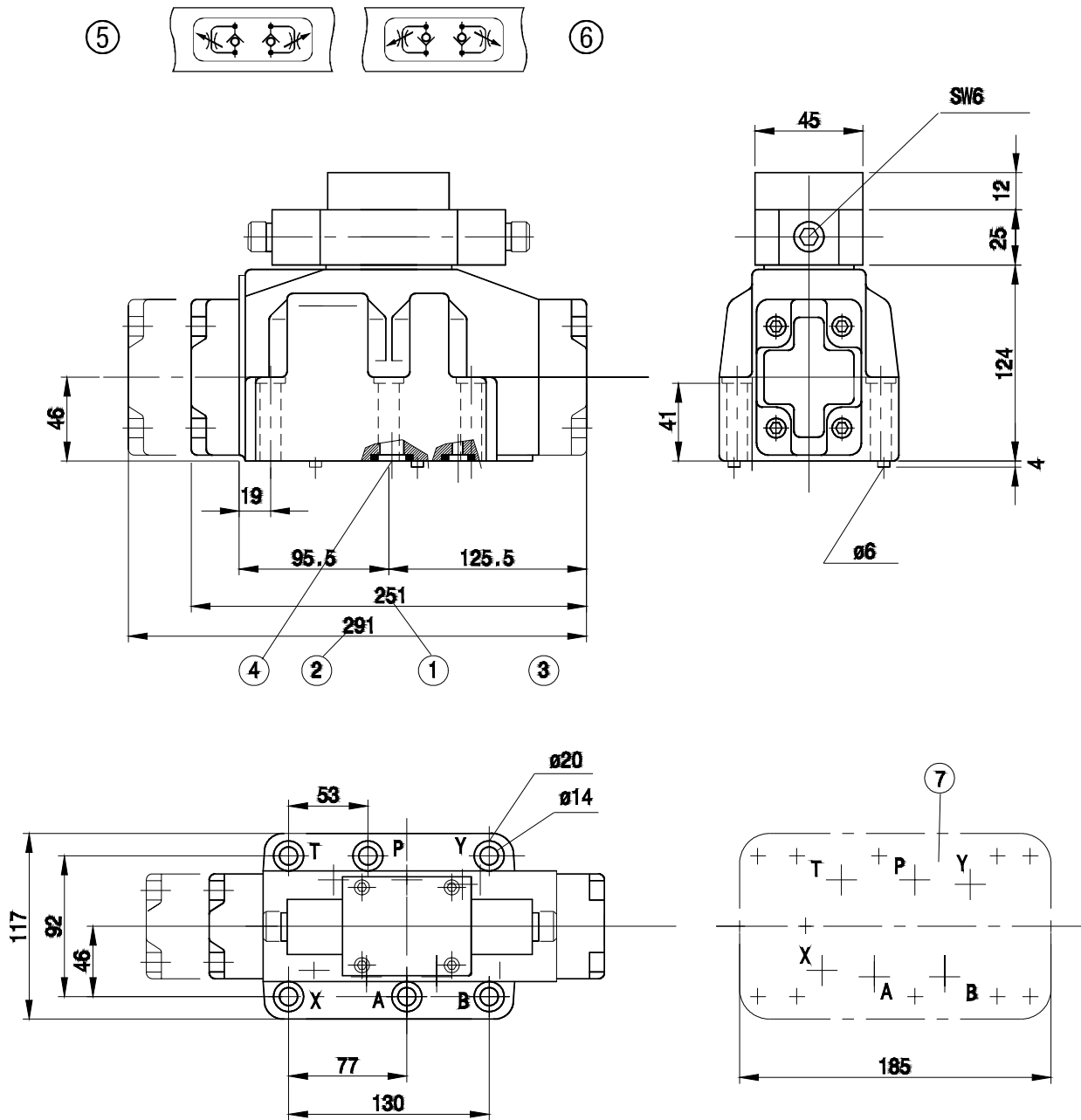
# OVERALL DIMENSIONS



- item 1 - 2-position valve hydraulically centered
- item 2 - 2-position valve spring centered
- item 3 - o-ring 19.2 × 3 - 3 pieces ( L, X, Y )
- item 4 - o-ring 27 × 3 - 4 pieces ( A, B, P, T )
- item 5 - pilot choke adjustment, meter - out
- item 6 - pilot choke adjustment, meter - in
- item 7 - mounting face of valve

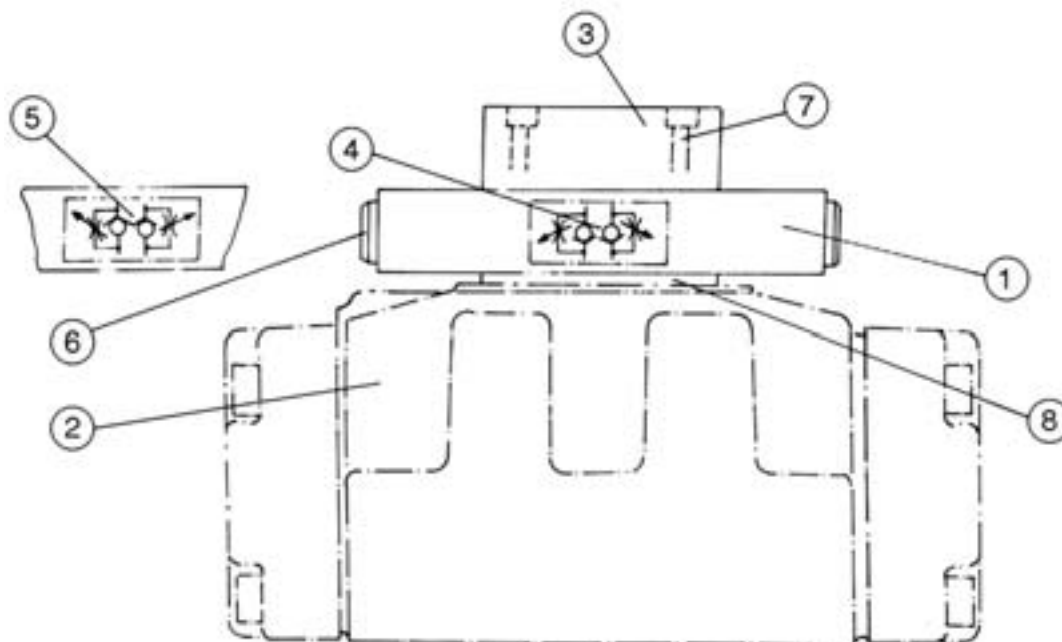


Admissible surface roughness and flatness deviation for a subplate face.



- item 1 - 3-position valve spring centered
- item 2 - 3-position valve hydraulically centered
- item 3 - o-ring 19.2 × 3 - 3 pieces ( L, X, Y )
- item 4 - o-ring 27 × 3 - 4 pieces ( A, B, P, T )
- item 5 - pilot choke adjustment, meter - out
- item 6 - pilot choke adjustment, meter-in
- item 7 - mounting face of valve

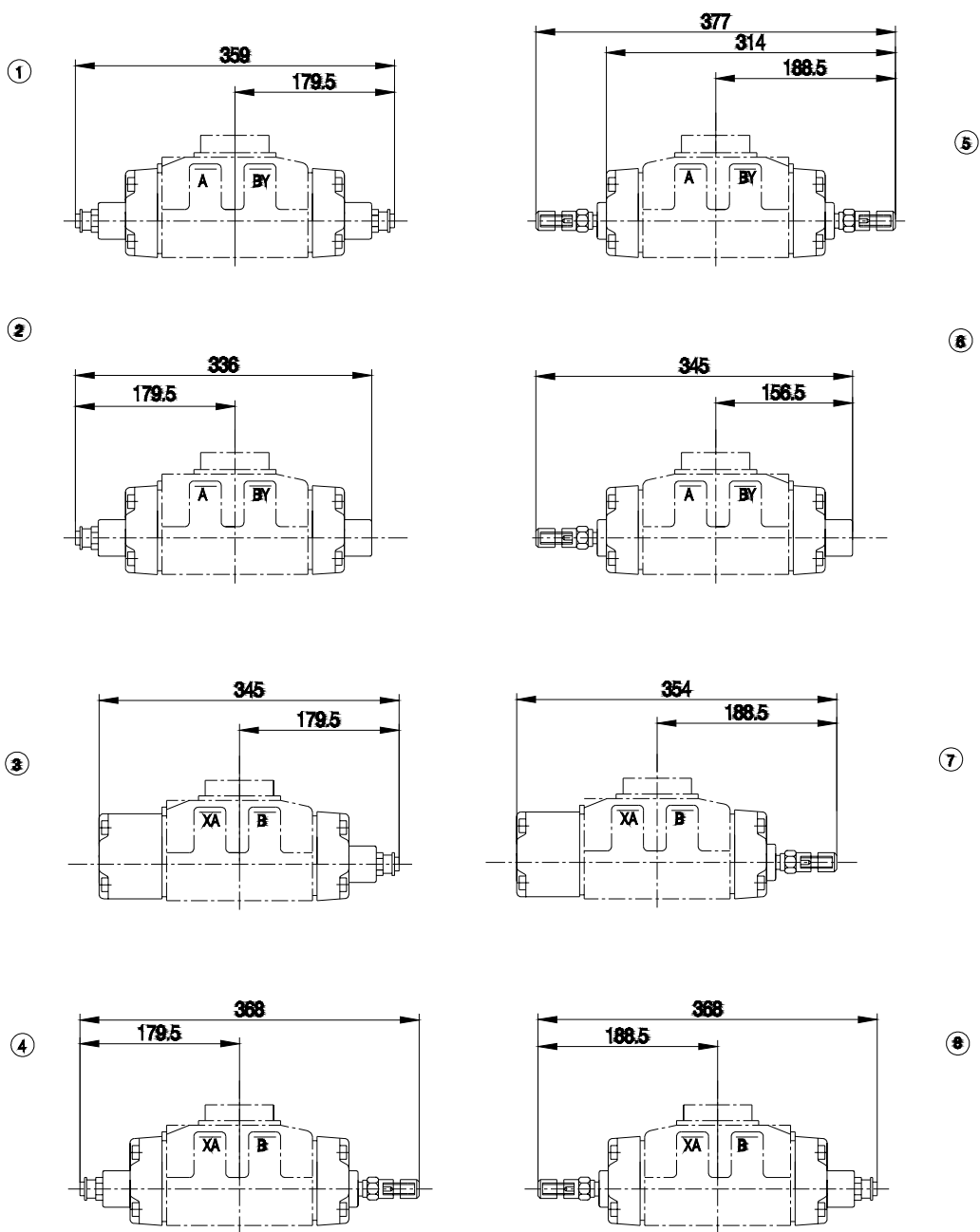
## Installation method for pilot choke adjustment



Rotation of the adjusting screw SW 6 to the right increases and to the left decreases switching time of the valve. The pilot choke adjustment is fixed by means of 4 bolts M5 × 40 - 10.9 ( DIN 912 ) with tightening torque of 5 Nm. The change of adjustment on inlet for adjustment on outlet is made by rotating the pilot choke adjustment round its longitudinal axis.

- item 1 - pilot choke adjustment
- item 2 - main valve
- item 3 - cover
- item 4 - adjustment on inlet or outlet
- item 5 - adjustment on outlet
- item 6 - adjusting screw
- item 7 - mounting bolts
- item 8 - plate with socket for o-rings

# OVERALL DIMENSIONS FOR DIRECTIONAL VALVE WITH ACCESSORIES



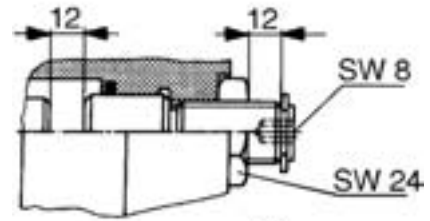
## Optional auxiliary equipment

- item 1 - 2-position directional valve, hydraulically centered and 3-position directional valve spring centered, optional accessories 10, 11, 12
- item 2 - 2-position directional valve ( spool schemes C - D - K - Z ), optional accessory 11
- item 3 - 3-position directional valve hydraulically centered, optional accessory 12
- item 4 - 2-position directional valve hydraulically centered and 3-position directional valve spring centered, optional accessory 16

- item 5 - 2 - position directional valve and 3 - position directional valve spring centered, optional accessories 13, 14, 15
- item 6 - 2 - position directional valves ( spool schemes C - D - K - Z ), optional accessory 14
- item 7 - 3- position directional valve, hydraulically centered, optional accessory 15
- item 8 - 2-position directional valve hydraulically centered, 3-position directional valve spring centered, optional accessory 17

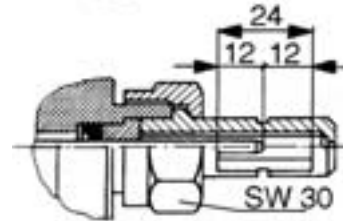
### Main spool stroke adjustment

Adjustment of the stroke of the main spool is by loosening the locknut SW 24 and rotating the pin SW 6. The rotation to the right reduces the stroke of the spool ( 1 turn = 1.5 mm ). While adjusting the stroke the control chamber must be at 0 pressure.



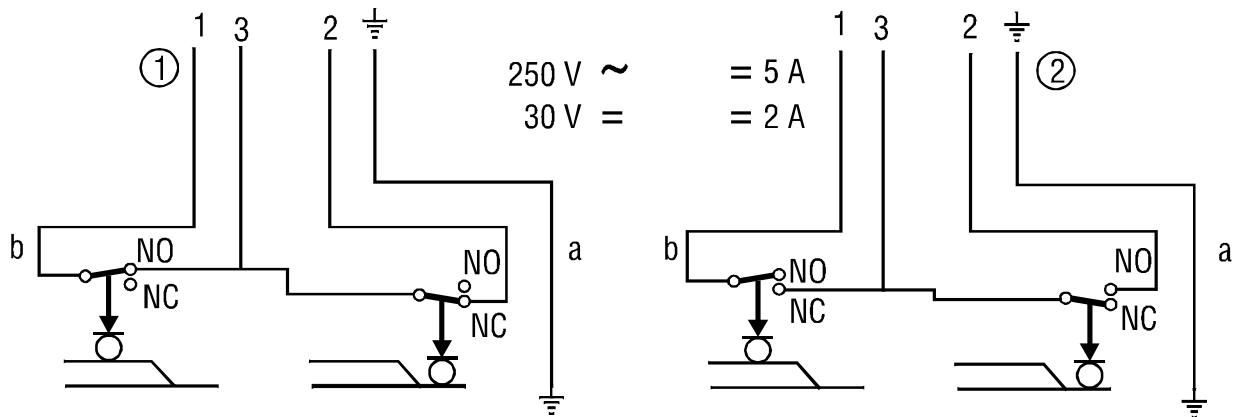
### End position monitor

By loosening the clamp nut SW 30, the sleeve with viewing window may be rotated through 360° and set up in any position. While loosening the nut, the control chamber must be at 0 pressure.

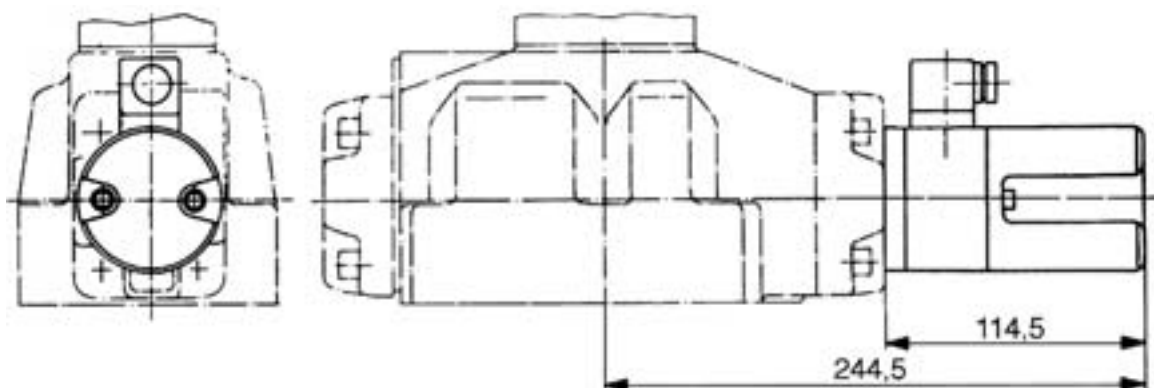


### Limit switch

Electrical scheme for limit switch



item 1 - scheme for limit switch normally closed  
 item 2 - scheme for limit switch normally open



Installation of limit switch ( optional accessory )

- 2-position directional valve and 3-position directional valve,  
 spring centered, optional limit switch 18, 22

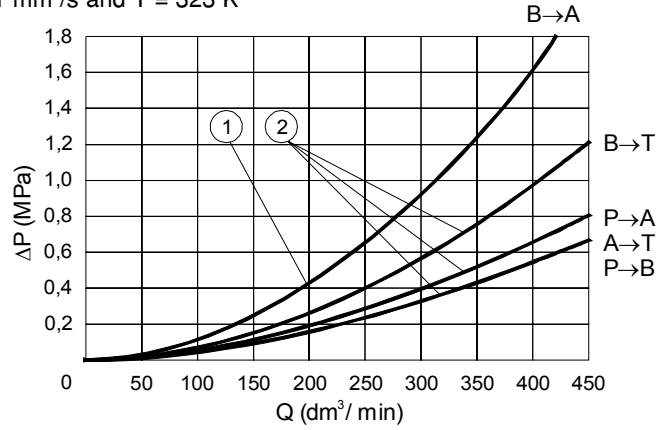
- 2-position directional valve hydraulically centered and 3-position directional valve, optional limit switch 19, 23
- 2-position directional valve hydraulically centered and 3-position spring centered, optional limit switch 20, 21, 24, 25.

# PERFORMANCE CURVES

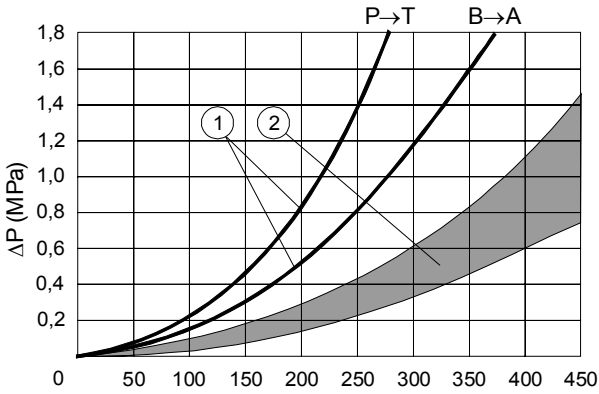
measured at  $v = 41 \text{ mm}^2/\text{s}$  and  $T = 323 \text{ K}$

## Flow limits

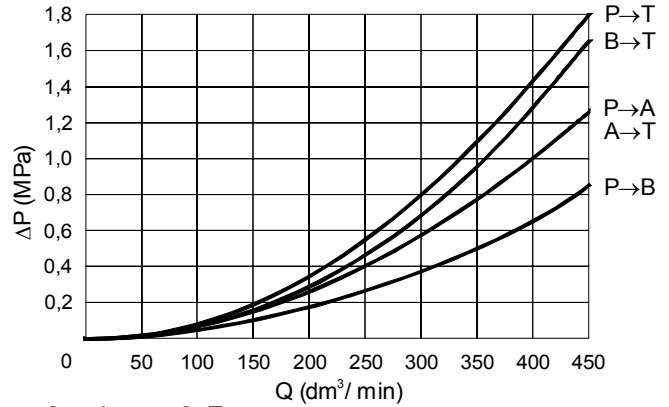
| 2 and 3-position valves, spring centered |                  |     |     |     |     |
|------------------------------------------|------------------|-----|-----|-----|-----|
| Spool types                              | Pressure ( MPa ) |     |     |     |     |
|                                          | 7                | 14  | 21  | 28  | 35  |
| E, J, L, M, Q, R, U,<br>V, W, C, D, K, Z | 450              | 450 | 370 | 320 | 300 |
| G, H, S, T, F                            | 360              | 250 | 210 | 180 | 160 |



Spool types E, W, R  
1 - Spool type R  
2 - Spool types R, E, W



Spool type S and others  
1 - Spool type S  
2 - Other spool types



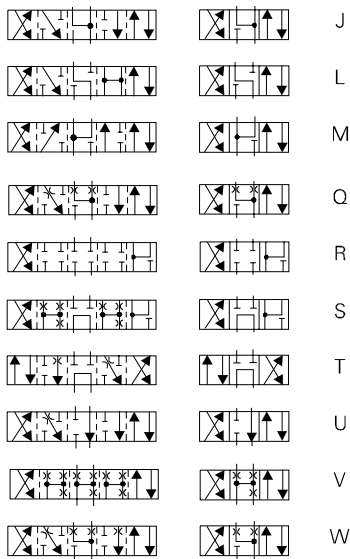
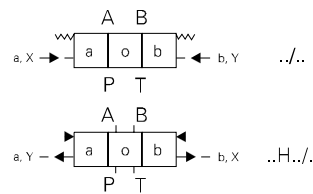
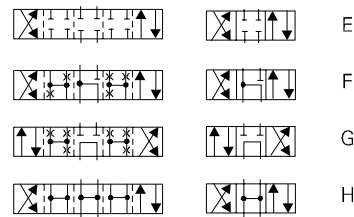
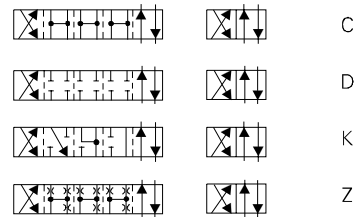
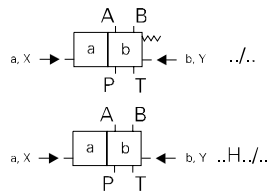
Spool types G, T

### Note:

The flow limits refer to typical application of 4-way directional control valve i.e. with using two lines e.g. P to A and B to T at the same time. In case of using 4-way directional control valve with one flow line e.g. P to A ( B plugged ) or A to T ( B plugged ) actual flow limits are considerably lower.

## SCHEMES

### Spool schemes



Flow section in position „0“ for spool type W - 3%, Q, V - 16%



## HOW TO ORDER

Orders coded in the way showed below should be forwarded to the manufacturer.

|           |  |  |   |  |  |   |
|-----------|--|--|---|--|--|---|
| - 4 WH 22 |  |  | / |  |  | * |
|-----------|--|--|---|--|--|---|

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| <b>Version</b><br>High pressure up to 35 MPa = H<br>Normal pressure up to 28 MPa = no code |
|--------------------------------------------------------------------------------------------|

|                                                                                             |
|---------------------------------------------------------------------------------------------|
| <b>Spool positioning</b><br>Spring centering = with no designation<br>Hydraulic off-set = H |
|---------------------------------------------------------------------------------------------|

|                                                          |
|----------------------------------------------------------|
| <b>Control spool type</b><br>See spool schemes on page 8 |
|----------------------------------------------------------|

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| <b>Series number</b><br>10 = 10<br>( 10 - 19 ) - installation and connection dimensions unchanged |
|---------------------------------------------------------------------------------------------------|

|                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pilot choke adjustment</b><br>Without pilot choke adjustment = no designation<br>Adjustment, meter-in = S<br>Adjustment, meter-out = S2 |
|--------------------------------------------------------------------------------------------------------------------------------------------|

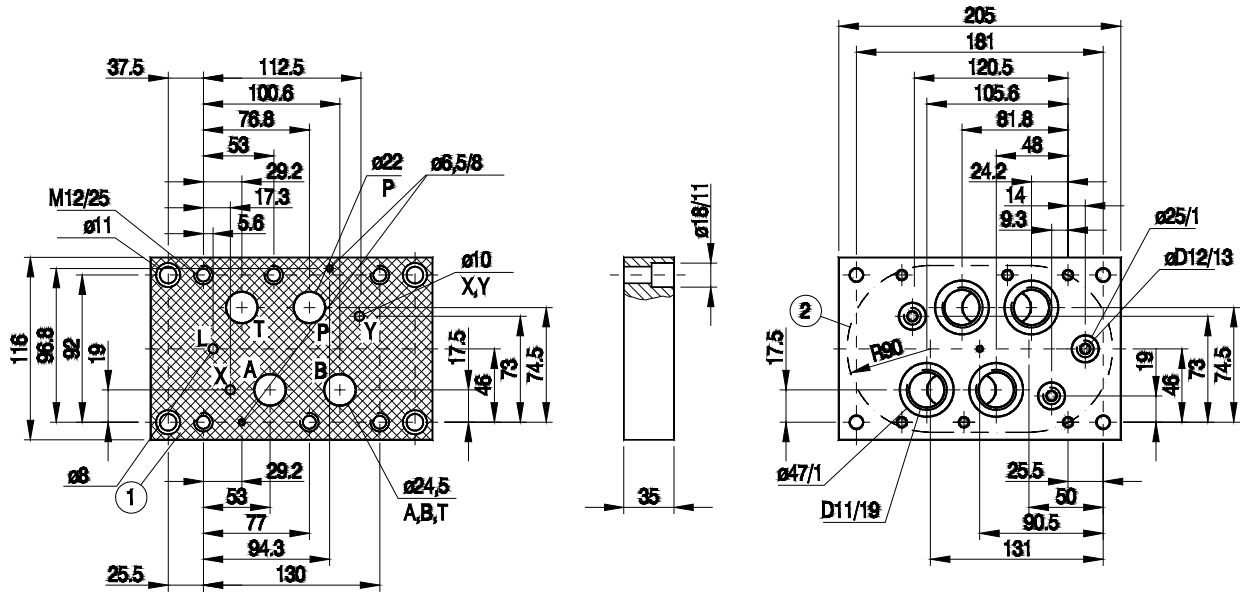
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Accessories</b><br>Without accessories = no designation<br>Stroke limiter on valve ends A and B = 10<br>Stroke limiter on valve end A = 11<br>Stroke limiter on valve end B = 12<br>End position monitor on valve ends A and B = 13<br>End position monitor on valve end A = 14<br>End position monitor on valve end B = 15<br>Stroke limiter on valve end A and end position monitor on valve end B = 16<br>Stroke limiter on valve end B and end position monitor on valve end A = 17<br>Limit switch on end A normally closed = 18<br>Limit switch on end B normally closed = 19<br>Stroke limiter on valve end A, limit switch on valve end B normally closed = 20<br>Stroke limiter on valve end B, limit switch on valve end A normally closed = 21<br>Limit switch on valve end A normally open = 22<br>Limit switch on valve end B normally open = 23<br>Stroke limiter on valve end A, limit switch on valve end B normally open = 24<br>Stroke limiter on valve end B, limit switch on valve end A normally open = 25 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------|
| <b>Sealing</b><br>For fluids on mineral oil base = with no designation<br>For fluids on phosphate ester base = V |
|------------------------------------------------------------------------------------------------------------------|

|                                                                              |
|------------------------------------------------------------------------------|
| Additional requirements in clear text ( to be agreed with the manufacturer ) |
|------------------------------------------------------------------------------|

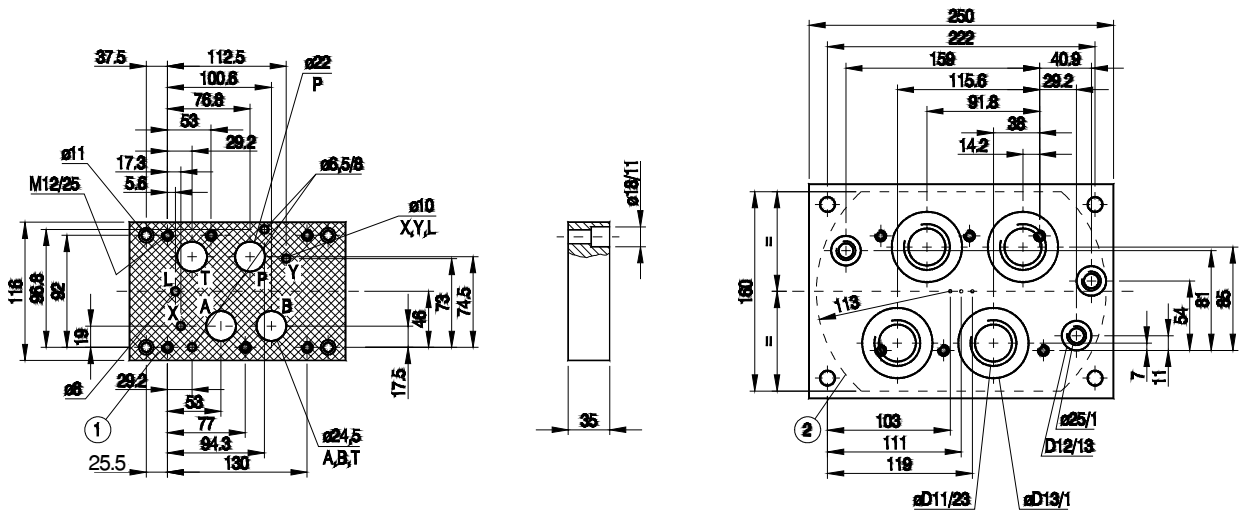
Coding example : H-4 WH 22 E 10/S

# MOUNTING DIMENSIONS FOR SUBPLATE



Weight approx. 5 kg

| Subplate type | D11     | D12     |
|---------------|---------|---------|
| G 151/01      | G1      | G 1/4   |
| G 151/02      | M33 x 2 | M14x1.5 |

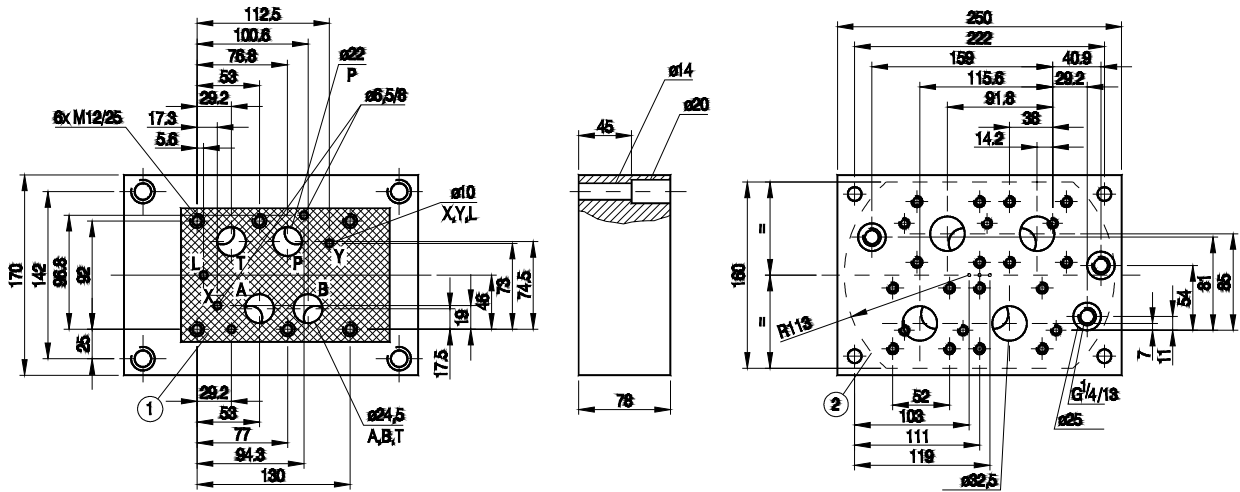


Weight approx. 16 kg

| Subplate type | D11     | D12     | D13 |
|---------------|---------|---------|-----|
| G 156/01      | G1 1/2  | G 1/2   | 61  |
| G 156/02      | M48 x 2 | M14x1.5 | 61  |

| Subplate type | D11     | D12     | D13 |
|---------------|---------|---------|-----|
| G 154/01      | G1 1/4  | G 1/4   | 56  |
| G 154/02      | M48 x 2 | M42x1.5 | 56  |

Subplate G 154/08



- 1 - Mounting face of directional valve
- 2 - Recess in subplate face

Bolts fixing directional valve  
 6 pcs M12  $\times$  60 - 10.9 per PN/M - 82302 ( DIN 912 - 10.9 )  
 Md = 105 Nm  
 Port L for directional valve with hydraulic off-set only.  
 Mounting bolts and subplate must be ordered separately.

**NOTES :**

PONAR WADOWICE S.A.  
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34-100 Wadowice  
tel. 033/ 823 39 43, 823 30 41  
fax 033/ 873 48 80  
e-mail: [ponar@ponar-wadowice.pl](mailto:ponar@ponar-wadowice.pl)

