

Proportional directional control valve type USAP25

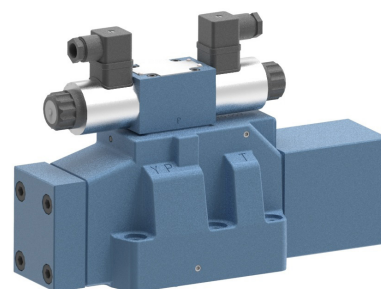
NS 25 | p_{max} 35 MPa | Q_{max} 800 dm³/min | WK 432 980



DATA SHEET - OPERATION MANUAL

APPLICATION

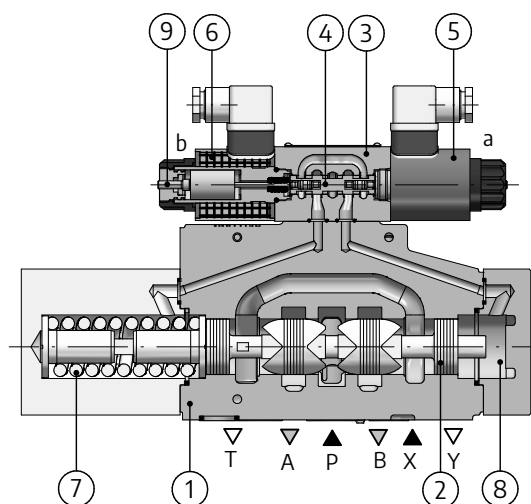
4-way proportional directional control valve type **USAP25...** operated by pilot valve type 3WZCDE6..., with proportional solenoids, is intended for the control of direction and value of flow rate in the hydraulic systems. 3-way proportional pressure reducing valve, electrically operated type 3WZCDE6... is used for reducing of the pressure, continuously, as a function of a current operating the coil of solenoid. The valve enables the control of pressure in A and B ports, independently from the supply stream value (port P), port T is connected with the tank.



DESCRIPTION OF OPERATION

proportional directional control valve, pilot operated type USAP25

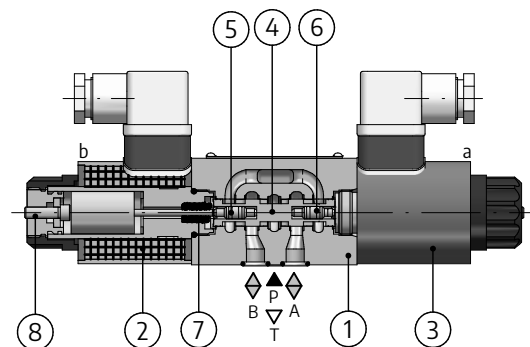
Main elements of proportional directional control valve type USAP25... are: main valve **1** with the main spool **2** and centering spring **7**, pilot valve **3** with pilot spool **4** and proportional solenoids **5** and **6**. When the solenoids **5** and **6** are not energized yet, the centering spring **7** ensures the center position of main spool **2**. By means of pilot valve **3** the main spool **2** is operated. The main spool **2** moves proportionally to energisation of solenoids **5** and **6**. For example the energisation of the solenoid **6** on the b side causes the pilot spool **4** moves right, the control oil flows by the pilot valve **3** to the pressure chamber **8** and tilts up the main spool **2** proportionally to the electric input signal. The connection from P to A and from B to T takes place through extending cross sections with progressive flow characteristic. Feeding the control oil to the pilot valve **3** takes place internally by connection P or externally by connection X. The de-energizing of solenoid **6**, causes the move of the pilot spool **4** and the main spool **2** returns to the center position. The buttons of manual override **9** allow the move of the pilot spool **4** in case solenoids **5** and **6** power failure. The list of dedicated electronic controllers for the operation of proportional solenoids **5** and **6** can be found in the table on page no.2.



pilot valve type 3WZCDE6

Proportional pressure reducing valve type 3WZCDE6... is the 3-way direct operated valve. The main elements of the valve in the 3-position version are: housing **1**, proportional solenoids **2** and **3**, spool **4** with measuring pistons **5** and **6**, and centering springs **7**.

A valve in a not activated position (zero power of the solenoid coil) the spool **4** is kept in central position by centering springs **7**. Ports A and B are connected with the tank through T port, P port is shut off. In this position the reduced pressure in port A and B has a zero value. After the pilot current is turned on, for example solenoid **2**, the move of measuring piston **5** follows, including the spool **4** towards the solenoid **3**. As a result the flows between ports P to B and A to T open. Simultaneously, pressure created in port B, by the surface of measuring piston **6** acts on the spool **4** in the solenoid **2** power opposite direction.



DESCRIPTION OF OPERATION

pilot valve type 3WZCDE6... (cont. from page 1)

If the pressure created in port B exceeds the value of the current piloting the solenoid **2** the spool **4** moves and the flow from port B to T opens till the balance is reached again, equivalent to set value of the current piloting the solenoid **2**. As a result, for each value of solenoid coil current **3**, the balance state is created by other power value, which causes that the value of reduced pressure in port B is proportional to the value of pilot current. In case of power failure the move of the spool **4** can be performed manually by means of the buttons **8**.

TECHNICAL PARAMETERS

hydraulic fluid	mineral oil	
required oil cleanliness class	ISO 4406 class 20/18/15	
nominal fluid viscosity	37 mm ² /s at temperature 55°C	
viscosity range	2,8 ÷ 380 mm ² /s	
fluid temperature range (in a tank)	recommended max.	40 ÷ 55°C - 20 ÷ 70°C
ambient temperature range	- 20 ÷ 50°C	
max. operating pressure	ports: P, A, B:	USAP25...; ...T...; ...ED...; ...ETD... 35 MPa USAP25...E...; ...ET... 25 MPa
	port T:	USAP25...T...; ...ET... 1 MPa USAP25...; ...E... 25 MPa
pilot pressure in X port	min. 3 MPa max. 25 MPa	
max. flow	800 dm ³ /min	
fluid volume per 1 switch by step control signal 0 → 100%	4,6 cm ³	
hysteresis	< 6% Q _{max.}	
work repeatability	< 3% Q _{max.}	
work position	optional	
work cycle	100%	
max. power of solenoid coil	1,5 A	0,8 A
resistance of cold solenoid coil (20°C)	5,4 Ω	19,5 Ω
electronic regulator	acc. to table on page no. 2	
weight	version with two solenoids ~ 20 kg	

assembly and operation requirements at www.operating-conditions.ponar.pl

ELECTRONIC REGULATORS

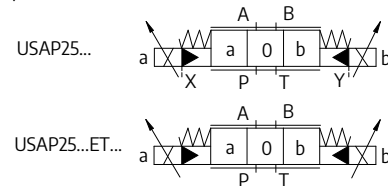
max. power of solenoid coil	1,5 A	0,8 A
electronic regulator	30RE20 - WK 495 773	-
	30RE20D - WK 420 830	-
	30RC20D* acc. to data sheet WK 430 340	
	MAP2* "electronic joystick" on www.ponar.pl	

(*) - by stabilized voltage supply 24V DC set the maximal power value I_{max.}

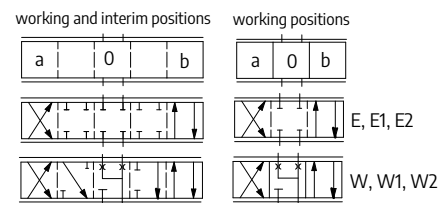
In 2-position versions (with 1 solenoid on a or b side) the valve works analogically, whereas the pressure is reduced only in one of A or B ports.

DIAGRAMS

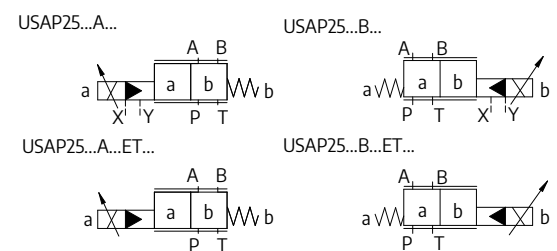
3-position valves



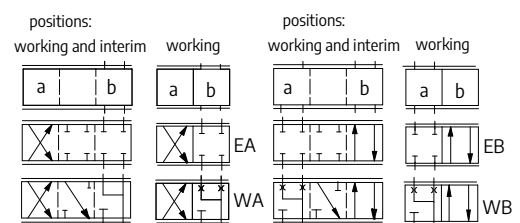
Graphic symbols of spools



2-position valves



Graphic symbols of spools



FLOW VALUES

spool type	flow value			
	P → A	P → B	A → T	B → T
E1, W1	Q _{max.}	Q/2	Q _{max.}	Q/2
E2, W2	Q/2	Q _{max.}	Q/2	Q _{max.}
E3, W3	Q _{max.}	Q _{max.}	Q _{max.}	de-energized

PILOT OIL SUPPLY AND PILOT OIL DRAIN

pilot oil supply (X) – external
pilot oil drain (Y) – external
version USAP25.../...

In version USAP25.../... the pilot oil is supplied from the external system through X port. Pilot oil is drained through independent Y port to the tank. Both hole screw plugs 4 and 5 in ports X,Y are mounted as presented in the drawing.

pilot oil supply (X) – internal
pilot oil drain (Y) – internal
version USAP25.../...ET...

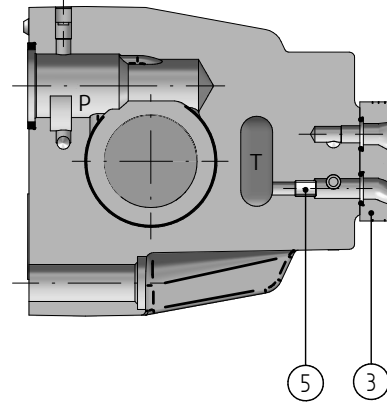
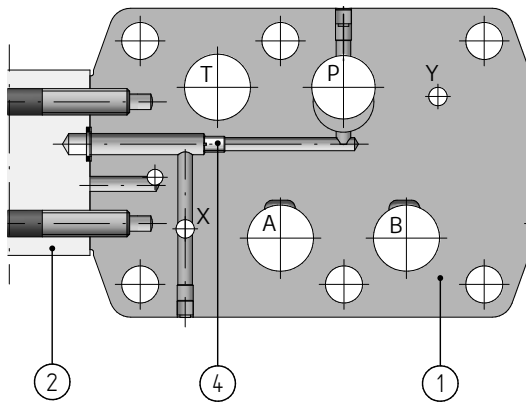
In version USAP25.../...ET... the pilot oil is supplied internally from P port of directional control valve. Pilot oil is drained internally through T port to the tank. Hole screw plugs 4 and 5 are dismounted. Ports X and Y in the subplate must be plugged.

pilot oil supply (X) – internal
pilot oil drain (Y) – external
version USAP25.../...E...

In version USAP25.../...E... the pilot oil is supplied internally from P port of directional control valve. Pilot oil is drained through independent Y port to the tank. Hole screw plug 4 is dismounted, and hole screw plug 5 is mounted. Port X in the subplate must be plugged.

pilot oil supply (X) – external
pilot oil drain (Y) – internal
version USAP25.../...T...

In version USAP25.../...T... the pilot oil is supplied from the external system through X port. Pilot oil is drained internally by T port to the tank. Hole screw plug 4 is mounted, and hole screw plug 5 is dismounted. Port Y in the subplate must be plugged.



NOTE

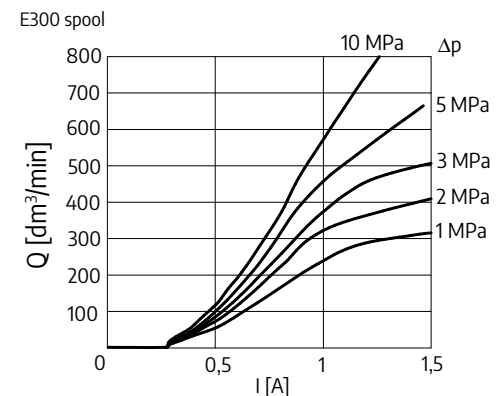
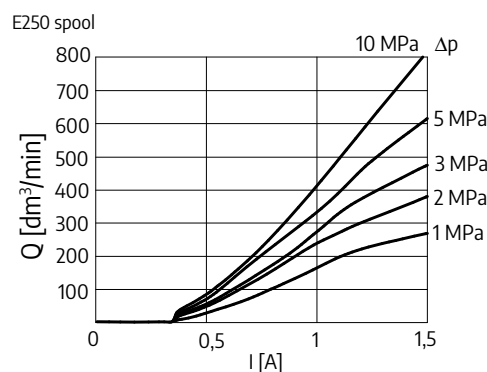
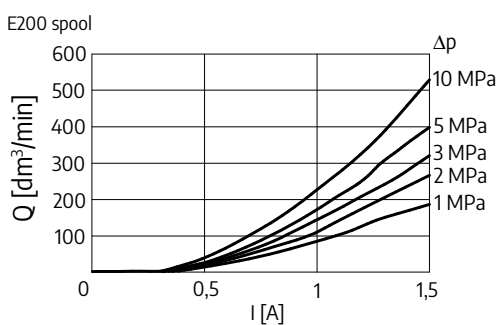
Screw plug 4 can be accessed after dismounting of 4 screws M10 x 100 (with hexagon socket S8), mounting the side cover 2. Screw plug 5 can be accessed after dismounting of 4 screws M5 x 50 (with hexagon socket S4), mounting the pilot directional valve 3 (for version USAP25...D... 4 screws M5 x 100 mounting the pilot directional valve 3 and reducing valve).

1. main directional valve housing
2. side cover
3. pilot directional valve / reducing valve housing
4. hole screw plug M6 - 8.8 with pilot oil supply (X)
5. hole screw plug M6 - 8.8 with pilot oil drain (Y)

PERFORMANCE CURVES

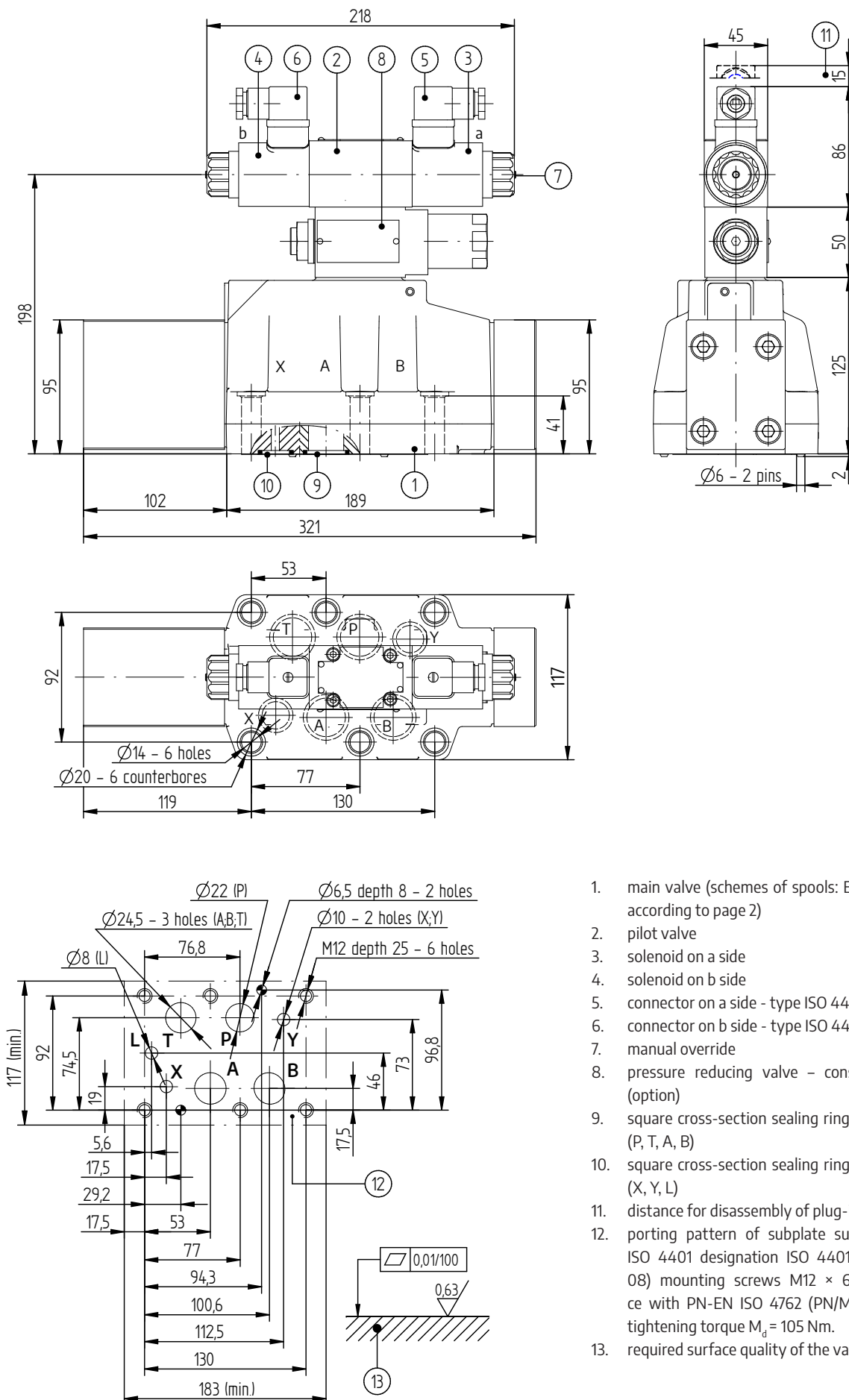
measured at viscosity $\nu = 41 \text{ mm}^2/\text{s}$ and temp. $t = 50^\circ\text{C}$

flow rate curves in relation to control signal with constant values Δp



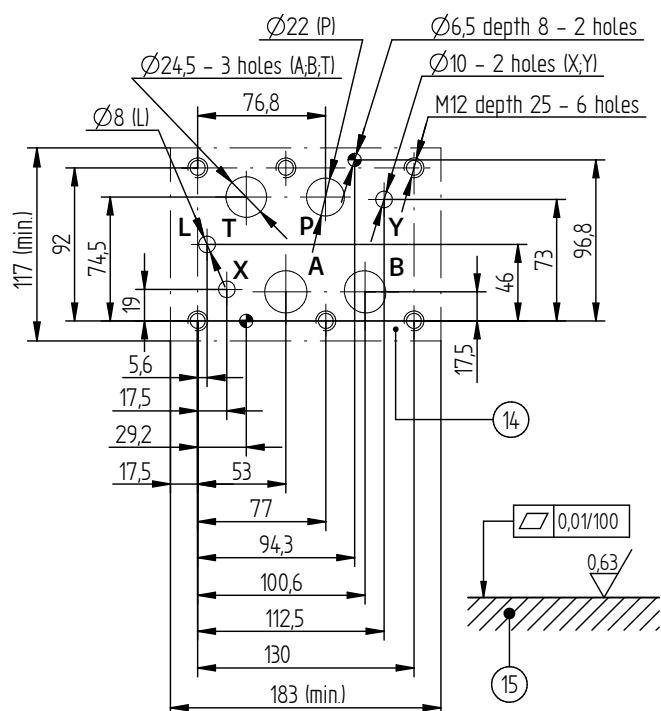
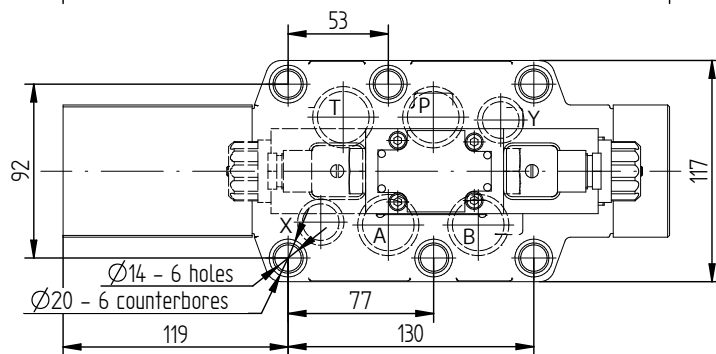
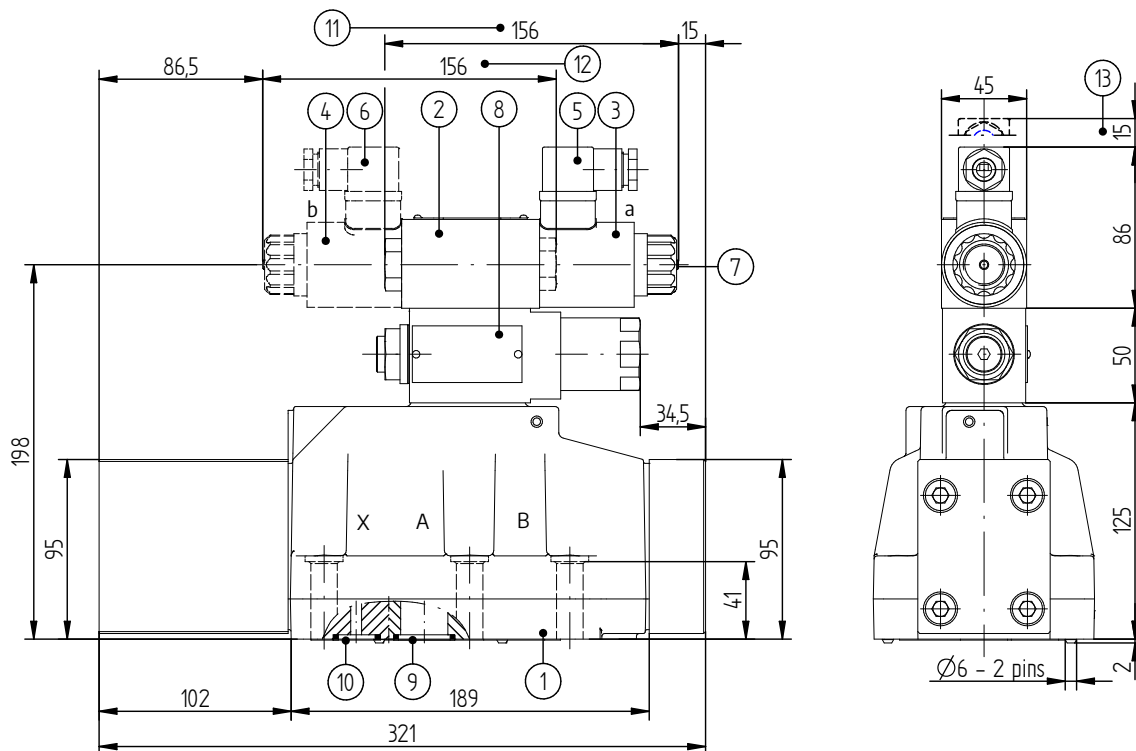
OVERALL AND CONNECTION DIMENSIONS

3-position versions with pressure reducing valve USAP25...D...



OVERALL AND CONNECTION DIMENSIONS

2-position versions with pressure reducing valve USAP25...A...D...; ...B...D...



1. main valve (versions USAP25...A... - symbols of spools: EA, WA; versions USAP25...B... - symbols of spools: EB, WB - according to page 2)
2. pilot valve
3. solenoid on a side (in versions USAP25...A...)
4. solenoid on b side (in versions USAP25...B...)
5. connector on a side - type ISO 4400 (DIN 43650 - A)
6. connector on b side - type ISO 4400 (DIN 43650 - A)
7. manual override
8. pressure reducing valve - constant setting 3 MPa (option)
9. square cross-section sealing ring 27,3 x 2,8 - 4pcs / kit (P, T, A, B)
10. square cross-section sealing ring 19,4 x 2,9 - 3pcs / kit (X, Y, L)
11. overall dimension in versions USAP25...A...
12. overall dimension in versions USAP25...B...
13. distance for disassembly of plug-in connector
14. porting pattern of subplate surface compliant with ISO 4401 designation ISO 4401-08-07-0-94 (CETOP 08) mounting screws M12 × 60 -10.9 in accordance with PN-EN ISO 4762 (PN/M-82302) - pcs. 6/set tightening torque $M_d = 105 \text{ Nm}$.
15. required surface quality of the valve contact surface

HOW TO ORDER

USAP 25 - / - - **N** **Z4**

1 2 3 4 5 6 7 8 9 10 11

1 nominal size (NS)

NS 25 = 25

2 series number

series 12 = 12
(12 ÷ 19) connection and installation dimensions unchanged

3 spool symbol

(spool symbols acc. to page 2)
3-position = E, E1, E2, W, W1, W2
2-position = EA, WA, EB, WB

4 nominal flow by $\Delta p = 1 \text{ MPa}$

200 dm³/min = 200
250 dm³/min = 250
300 dm³/min = 300

5 types of solenoids coils

coil max. current $I_{\text{max}} = 1,5 \text{ A} = 12$
coil max. current $I_{\text{max}} = 0,8 \text{ A} = 24$

6 manual override of solenoids

with manual override = N

7 pilot oil supply and pilot oil drain

external pilot oil supply, external pilot oil drain = \emptyset
internal pilot oil supply, external pilot oil drain = E
internal pilot oil supply, internal pilot oil drain = ET
external pilot oil supply, internal pilot oil drain = T

8 electrical connection type

connector ISO 4401
(DIN 43650-A) = Z4

9 pressure reducing valve

without pressure reducing valve = \emptyset
with pressure reducing valve = D

10 sealing

NBR (for fluids on mineral oil base) = \emptyset
FPM (for fluids on phosphate ester base) = V

11 further requirements = *

(to be agreed with the manufacturer)

\emptyset indicates that the box should be left blank.

The symbols in bold are the preferred versions available in short delivery time.

Coding example: **USAP25-12/E-200-12NETZ4**

SUBPLATES AND MOUNTING SCREWS

Subplates must be ordered according to the data sheet WK 491 800.

Subplates symbols:

G151/01 – threaded connections: P, T, A, B - G1; X, Y, L - G $\frac{1}{4}$

G154/01 – threaded connections: P, T, A, B - G1 $\frac{3}{4}$; X, Y, L - G $\frac{1}{4}$

G156/01 – threaded connections: P, T, A, B - G1 $\frac{1}{2}$; X, Y, L - G $\frac{1}{4}$

Subplates and mounting screws for the assembly of the valve: M12 × 60–10.9 in accordance with PN-EN ISO 4762 (PN/M-82302): 6 pcs/kit must be ordered separately. Tightening torque: $M_d = 105 \text{ Nm}$

NOTE:

The subplate **symbol in bold** is the preferred version available in short delivery time.

CONTACT

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