

DATA SHEET - SERVICE MANUAL

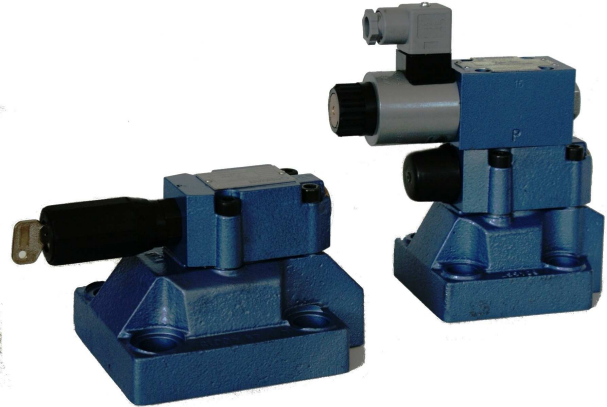
APPLICATION

Pressure relief valves type DB... serve to limit pressure in a hydraulic system or in its part, while in version DBW... with pilot valve it is also used to unload pressure in a system. Application example:

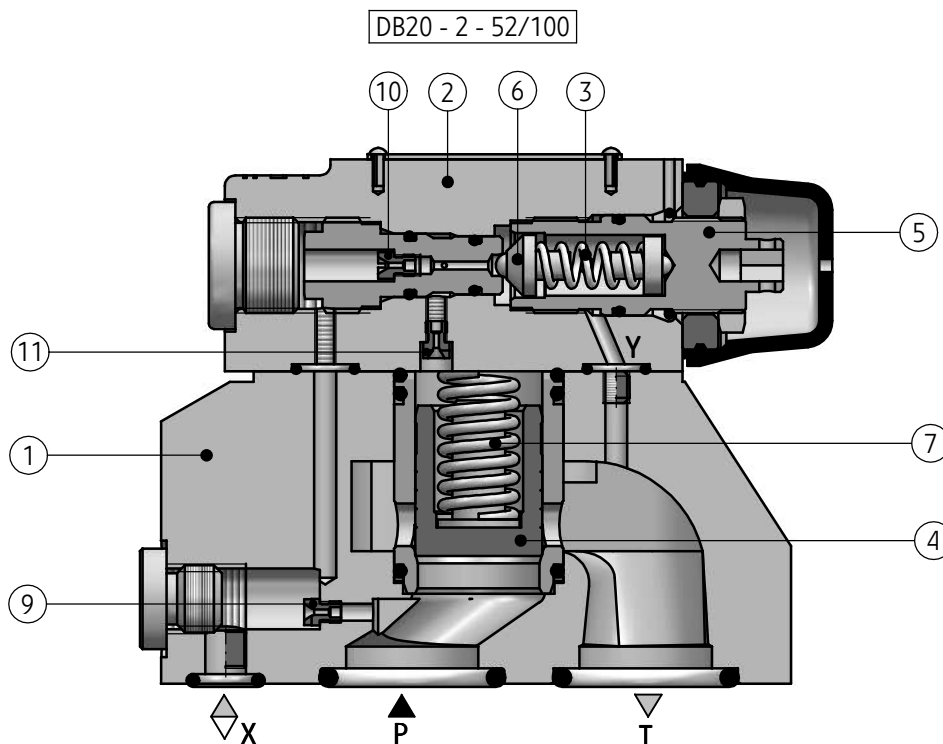
- DB... for setting up maximum pressure in a system
- DBW... for actuation of a pump without pressure

The valve is complied with the regulations of directive 2006/95/WE for the following voltages:

- 50 – 250 V for AC
- 75 – 250 V for DC



DESCRIPTION OF OPERATION

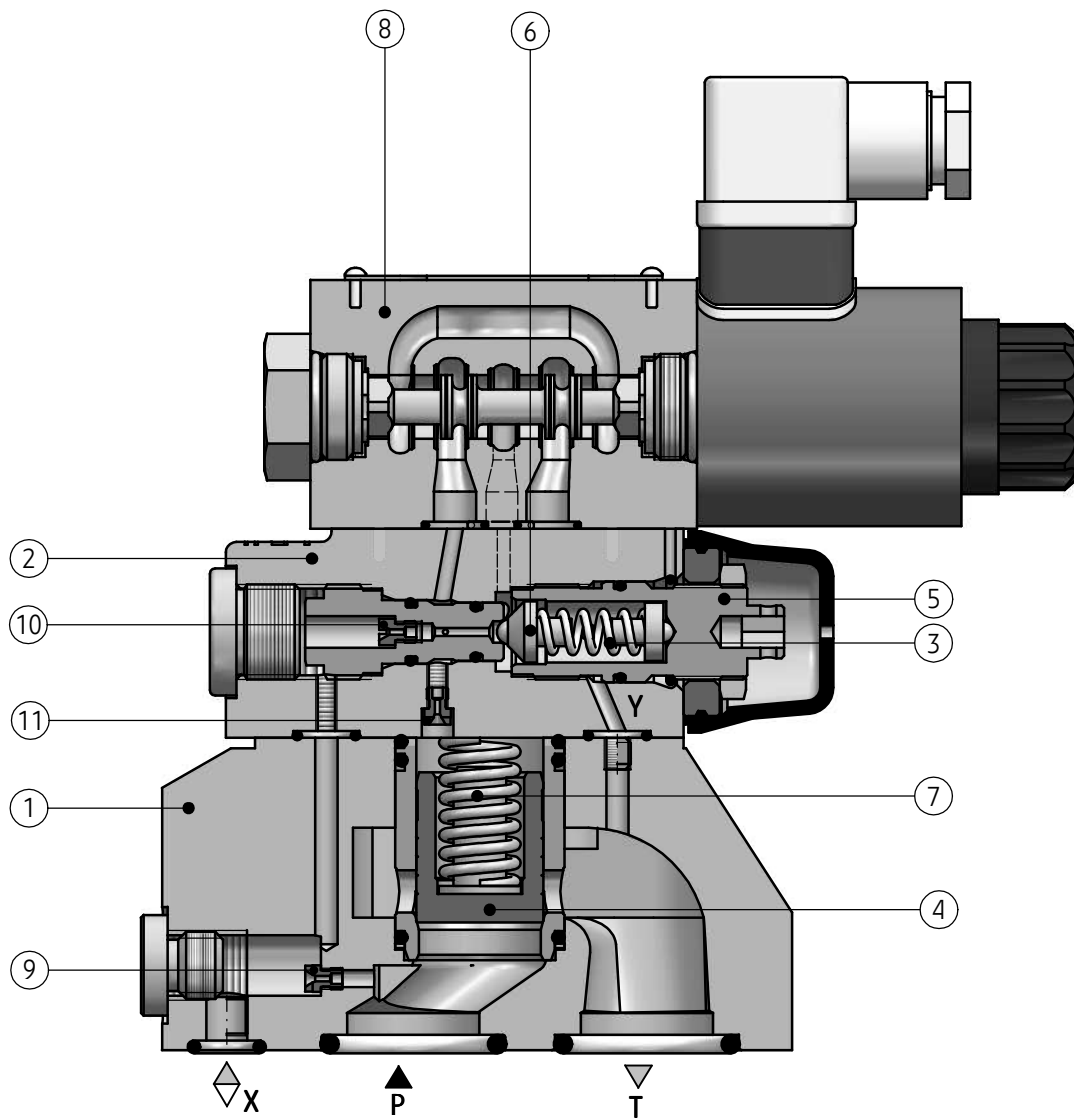


Pilot operated pressure relief valve type DB... consists of the pilot valve (2) and the main valve (1). Pressure in a system through line P affects the lower side of the spool (4) and via jets (9), (10), (11) also affects its upper side and the poppet (6) of the pilot valve. At standstill, the pressure is equal on both sides of the spool. A spring (7) holds the spool (4) in the starting position. Lines P and T are separated from each other. If pressure in a system reaches the value set by the position of the

adjustment element (5) and tension of the spring (3) of the pilot valve, the pilot poppet (6) opens and fluid flows via jets (9) and (10) and opened pilot valve (2) to a tank. The flow of control stream causes pressure drop at jets (9) and (10). In effect pressure acting on the lower side of the spool (4) is greater and the spool moves upwards, what allows excess fluid to be drained to a tank and pressure in a system to be limited to the set value.

DESCRIPTION OF OPERATION

DBW20...A - 2 - 52/100



Pressure relief valve is also available in version with forced (electrically) pressure unloading. Pilot valve (8) in form of a directional valve shuts off drain line before the pilot poppet in its starting position. The valve functions as described before. After switching directional valve (9) the chamber before the pilot

poppet is connected to drain line (connected to a tank). The unloaded spool (4) moves upwards opening connection between **P** and **T**. The valve is available in two versions depending on the pilot valve (8): closed in de-energized position – version DBW...**A**... or opened in de-energized position – version DBW...**B**...

TECHNICAL DATA

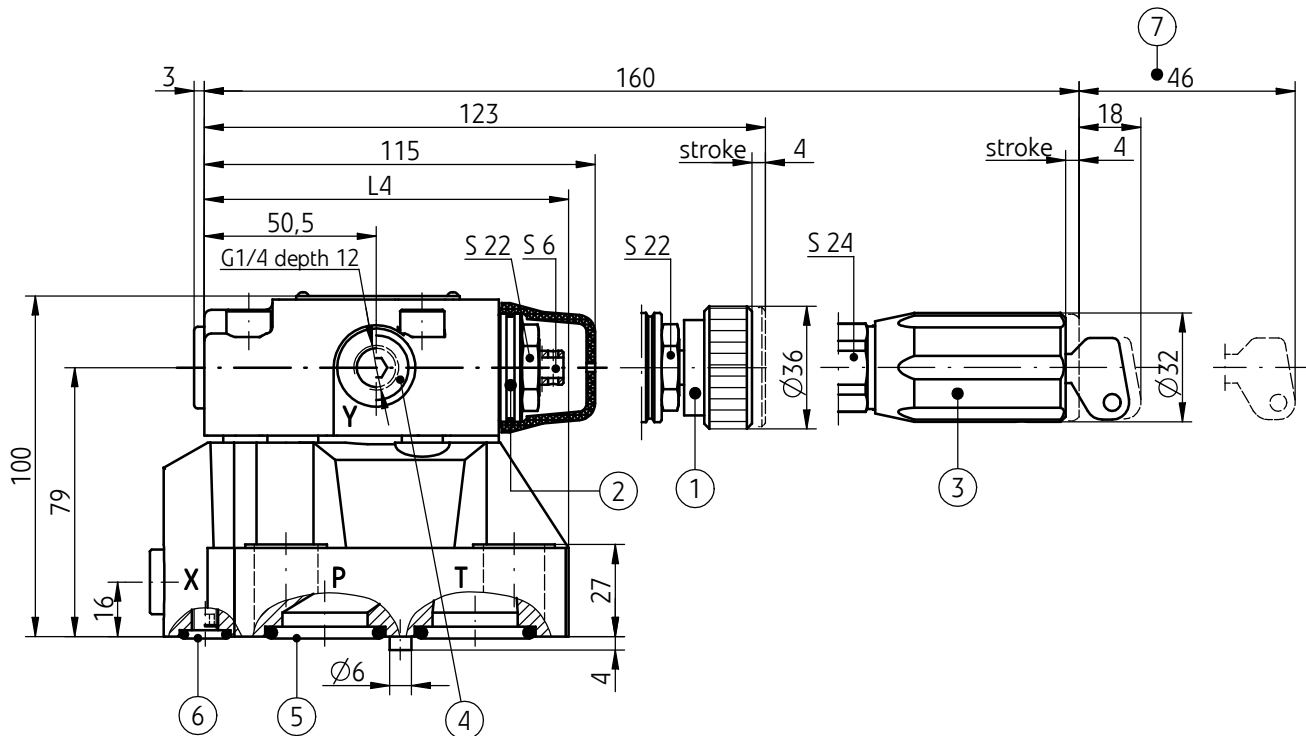
Hydraulic fluid	mineral oil						
Required filtration	up to 16 µm						
Recommended filtration	up to 10 µm						
Nominal fluid viscosity	37 mm ² /s at temperature 55 °C						
Viscosity range	2,8 up to 380 mm ² /s						
Fluid temperature range (in a tank)	recommended	40°C up to 55°C					
	max	-20°C up to +70°C					
Ambient temperature range	version DB...	-20°C up to +70°C					
	version DBW...	-20°C up to +50°C					
Maximum operating pressure	35 MPa						
Maximum pressure in lines Y, T	version DB...	31,5 MPa					
	version DBW...	21 MPa					
Minimum setting pressure	0,5 MPa						
Maximum setting pressure	35 MPa						
Maximum flow rate	nominal size	NS10	250 dm ³ / min				
		NS20	500 dm ³ / min				
		NS30	650 dm ³ / min				
Weight	nominal size	version					
		DB...	DBG...	DBW...	DBWG...	DBC...	DBWC...
	NS10	3,1 kg	4,9 kg	4,7 kg	6,5 kg	1,5 kg	3,1 kg
	NS20	4,0 kg	4,7 kg	5,6 kg	6,3 kg	1,5 kg	3,1 kg
	NS30	4,9 kg	5,4 kg	6,5 kg	7,0 kg	1,5 kg	3,1 kg
Type of a directional valve (only for versions DBW... ; DBW...G; DBWC...)	WE6... according to data sheet WK 499 502						
Nominal supply voltage for solenoid	DC			AC (plug-in connector with rectifier)			
	12V	24V	110V	230V - 50Hz	110V - 50Hz		
Supply voltage tolerance	±10%						
Power requirement (DC)	30 W						
Insulation	IP 65						
Temperature of solenoid coil	max 150 °C						

ASSEMBLY AND APPLICATION REQUIREMENTS

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Only valve working properly and suitably installed may be connected to an electric system. Only skilled workers are allowed to connect and disconnect electric system.</p> <p>2. Ground connection (⏏) must be connected with protective earth wire (⏏ PE) in supply system according to appropriate instructions.</p> <p>3. It is forbidden to apply the valve if the supply cable in the gland of plug-in connector is not properly tightened.</p> | <p>4. It is forbidden to apply the valve if the plug-in connector is not properly tightened to the solenoid socket and is not secured by screwing bolt tightly.</p> <p>5. Due to heating solenoid coil, the valves should be placed in order to eliminate the possibility of incidental touch while using, or, they should be equipped with the coil covers (in accordance with the European standards PN - EN ISO 13732-1 and PN - EN 982).</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

OVERALL AND CONNECTION DIMENSIONS

versions for subplate mounting: DB10...; 20...; 30...

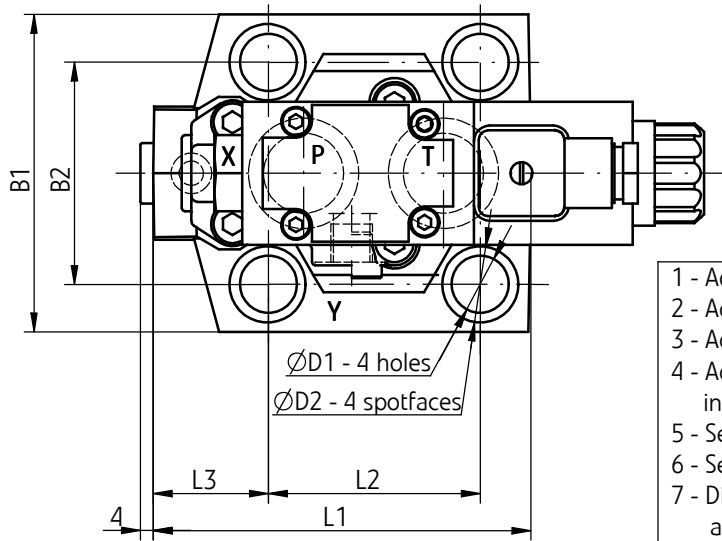
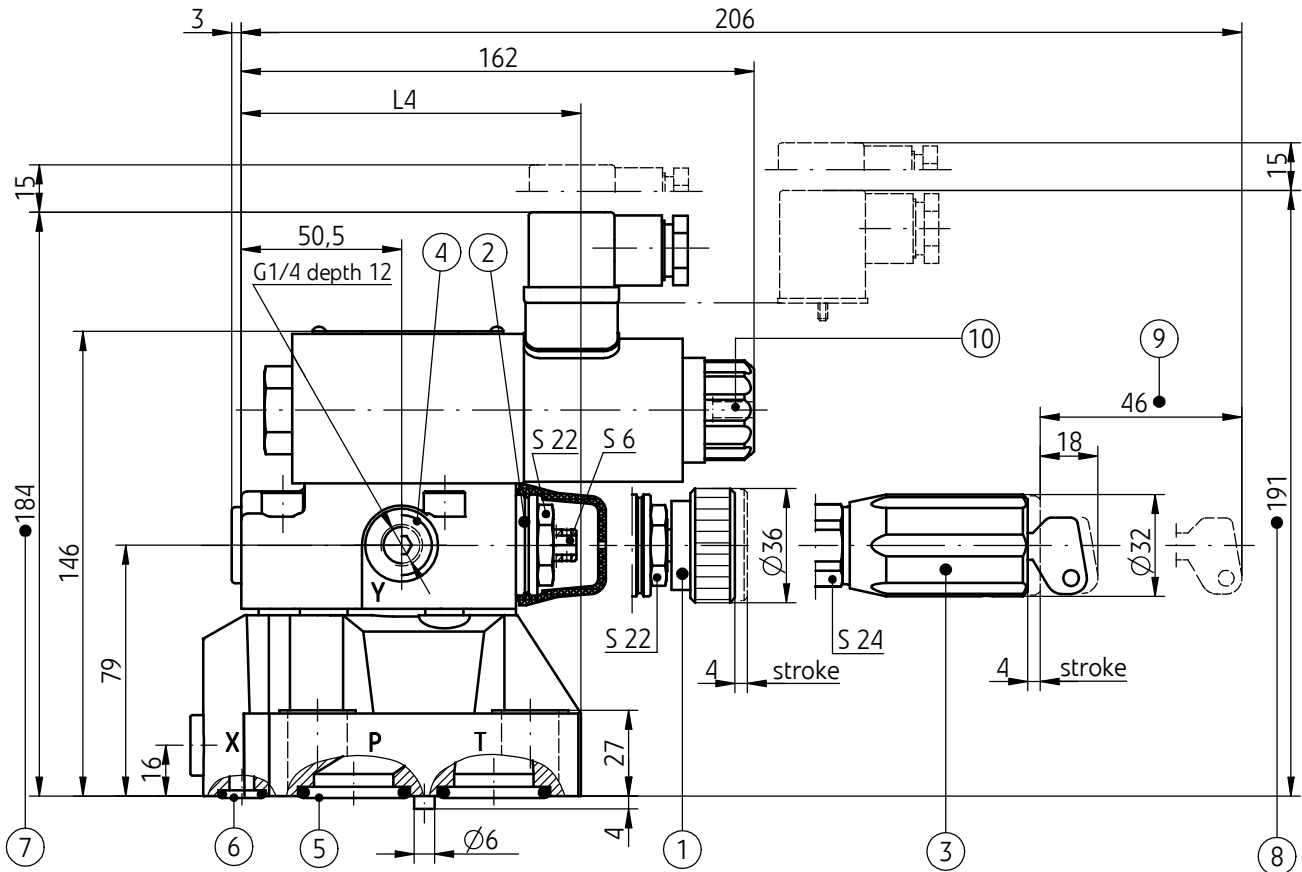


- 1 - Adjustment 1 (handknob)
- 2 - Adjustment 2 (set screw with hexagon socket)
- 3 - Adjustment 3 (lockable handknob)
- 4 - Additional external port Y (plug G1/4 does not occur in versions: DB.../...Y... ; DB.../...XY...)
- 5 - Sealing ring o-ring - 2 pcs/kit (P, T) - according to table
- 6 - Sealing ring o-ring - 1 pcs/kit (X) - according to table
- 7 - Space required to remove the key from the lock of the adjustment item 3

version	o-ring item 5	o-ring item 6	B1	B2	φ D1	φ D2	L1	L2	L3	L4
DB10...	17,1 x 2,6	8,3 x 2,4	78	54	20	14	90	54	23,5	93,5
DB20...	28,2 x 3,5		100	70	26	18	117	67	34	107
DB30...	34,5 x 3,5		115	82,5	29	20	148	89	41,5	128

OVERALL AND CONNECTION DIMENSIONS

versions for subplate mounting: DBW10...; 20...; 30...



- 1 - Adjustment **1** (handknob)
- 2 - Adjustment **2** (set screw with hexagon socket)
- 3 - Adjustment **3** (lockable handknob)
- 4 - Additional external port **Y** (plug G1/4 does not occur in versions: DBW.../...Y... DBW.../...XY...)
- 5 - Sealing ring **o-ring** - 2 pcs/kit (P, T) - according to table
- 6 - Sealing ring **o-ring** - 1 pcs/kit (X) - according to table
- 7 - Dimension for the valve with electrical connection of a directional valve **12V, 24V, 110V DC** (plug-in connector type **DIN 43650/ISO 4400**)
- 8 - Dimension for the valve with electrical connection of a directional valve **110V, 230V AC** (plug-in connector type **DIN 43650/ISO 4400** with rectifier)
- 9 - Space required to remove the key from the lock of the adjustment item 3
- 10 - Manual override

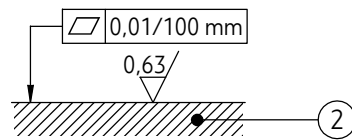
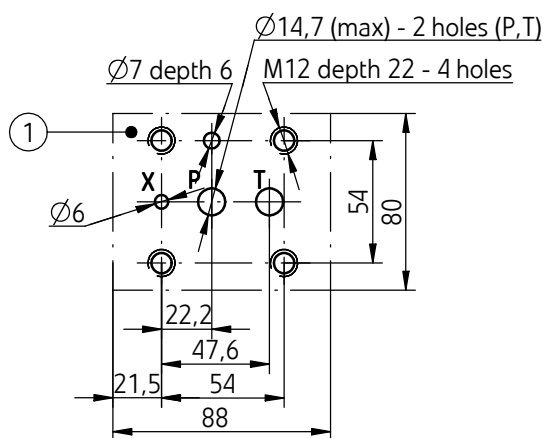
version	o-ring item 5	o-ring item 6	B1	B2	φ D1	φ D2	L1	L2	L3	L4
DBW10...	17,1 x 2,6	8,3 x 2,4	78	54	20	14	90	54	23,5	93,5
DBW20...	28,2 x 3,5		100	70	26	18	117	67	34	107
DBW30...	34,5 x 3,5		115	82,5	29	20	148	89	41,5	128

OVERALL AND CONNECTION DIMENSIONS

versions for subplate mounting: DB, DBW10...; 20...; 30...

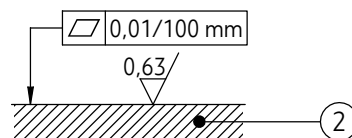
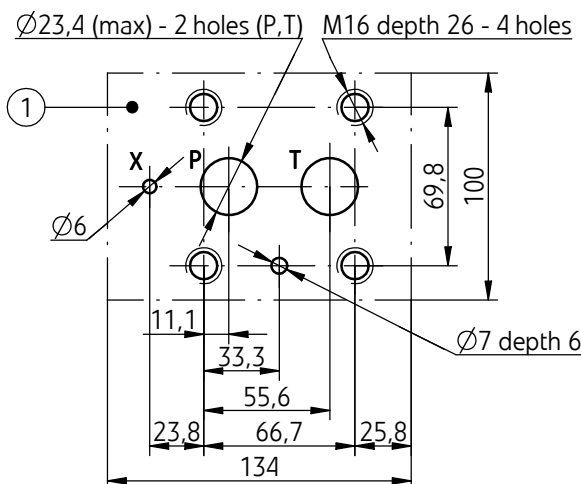
porting pattern on subplate

versions: DB10...; **DBW10...**



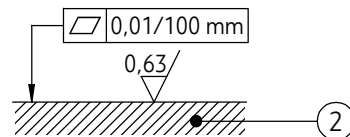
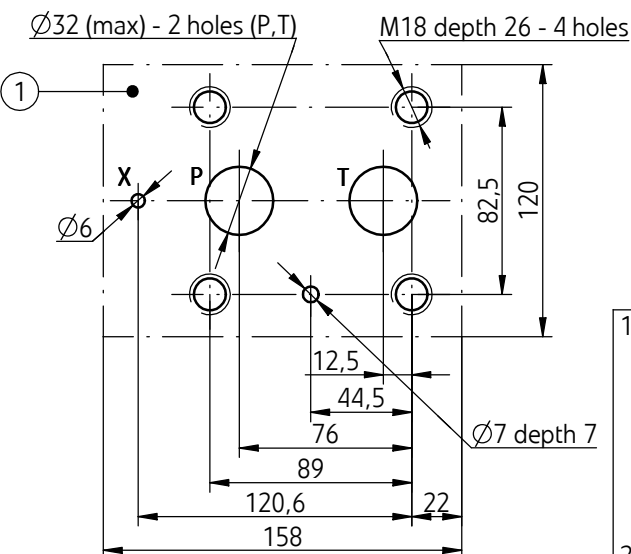
- 1 - Porting pattern on subplate according to:
 - CETOP- RP 121H - identified by CETOP 4.4.2-2- R06 nominal size CETOP R06
 - PN - ISO 6264 - identified by PN - ISO 6264 -06-09-1-97 mounting bolts M12 x 50 - 10.9 - 4 pcs/kit in accordance with PN - EN ISO 4762 tightening torque $Md = 120 \text{ Nm}$
- 2 - Subplate surface required

versions: DB20...; DBW20...



- 1 - Porting pattern on subplate according to:
 - CETOP- RP 121H - identified by CETOP 4.4.2-2- R08 nominal size CETOP R08
 - PN - ISO 6264 - identified by PN - ISO 6264 -08-13-1-97 mounting bolts M16 x 50 - 10.9 - 4 pcs/kit in accordance with PN - EN ISO 4762 tightening torque $Md = 310 \text{ Nm}$
- 2 - Subplate surface required

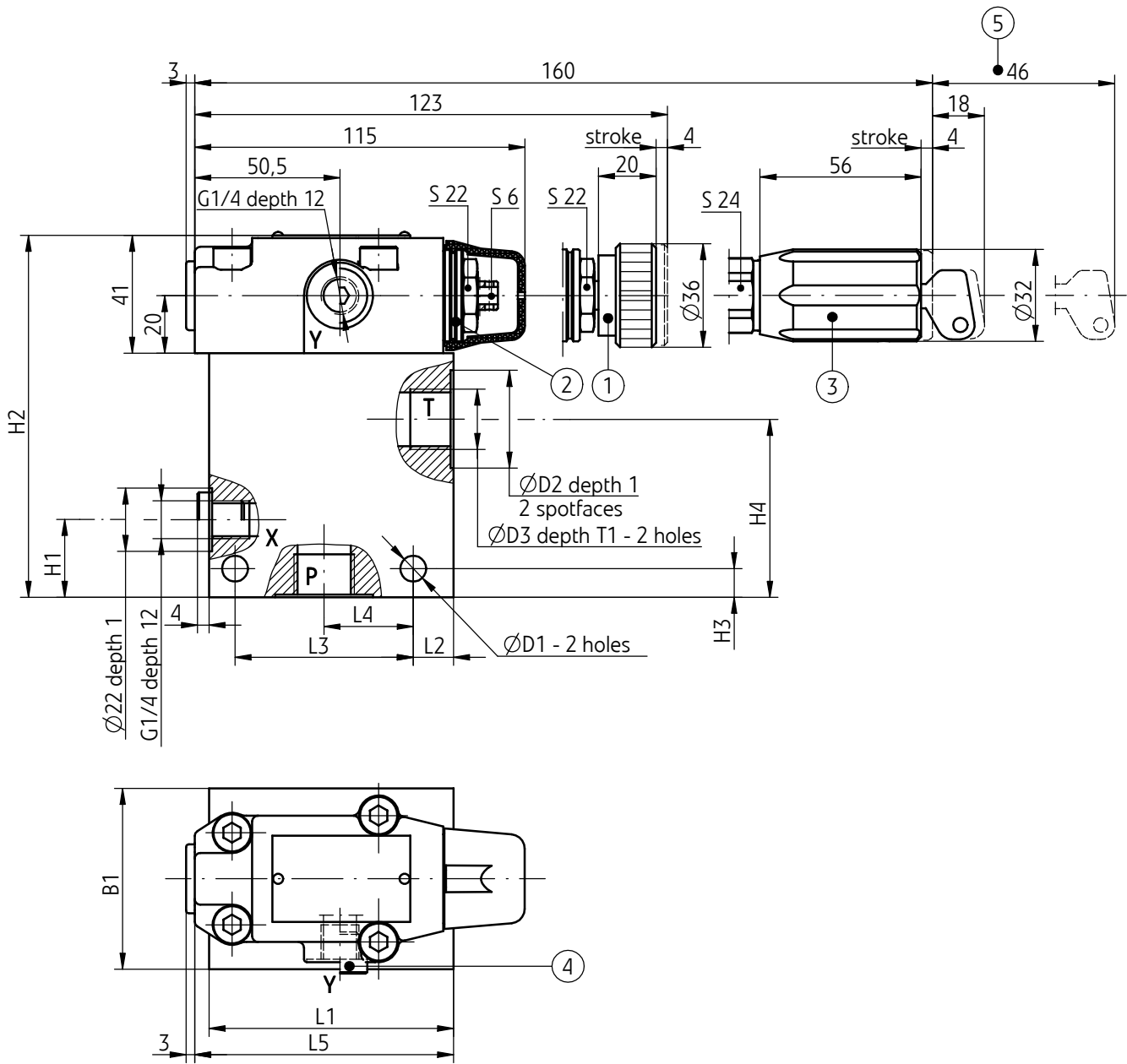
versions: DB30...; DBW30...



- 1 - Porting pattern on subplate according to:
 - CETOP- RP 121H - identified by CETOP 4.4.2-2- R10 nominal size CETOP R10
 - PN - ISO 6264 - identified by PN - ISO 6264 -10-17-1-97 mounting bolts M18 x 50 - 10.9 - 4 pcs/kit in accordance with PN - EN ISO 4762 tightening torque $Md = 430 \text{ Nm}$
- 2 - Subplate surface required

OVERALL AND CONNECTION DIMENSIONS

versions for threaded connection: DB10...G...; 20...G...; 30...G...

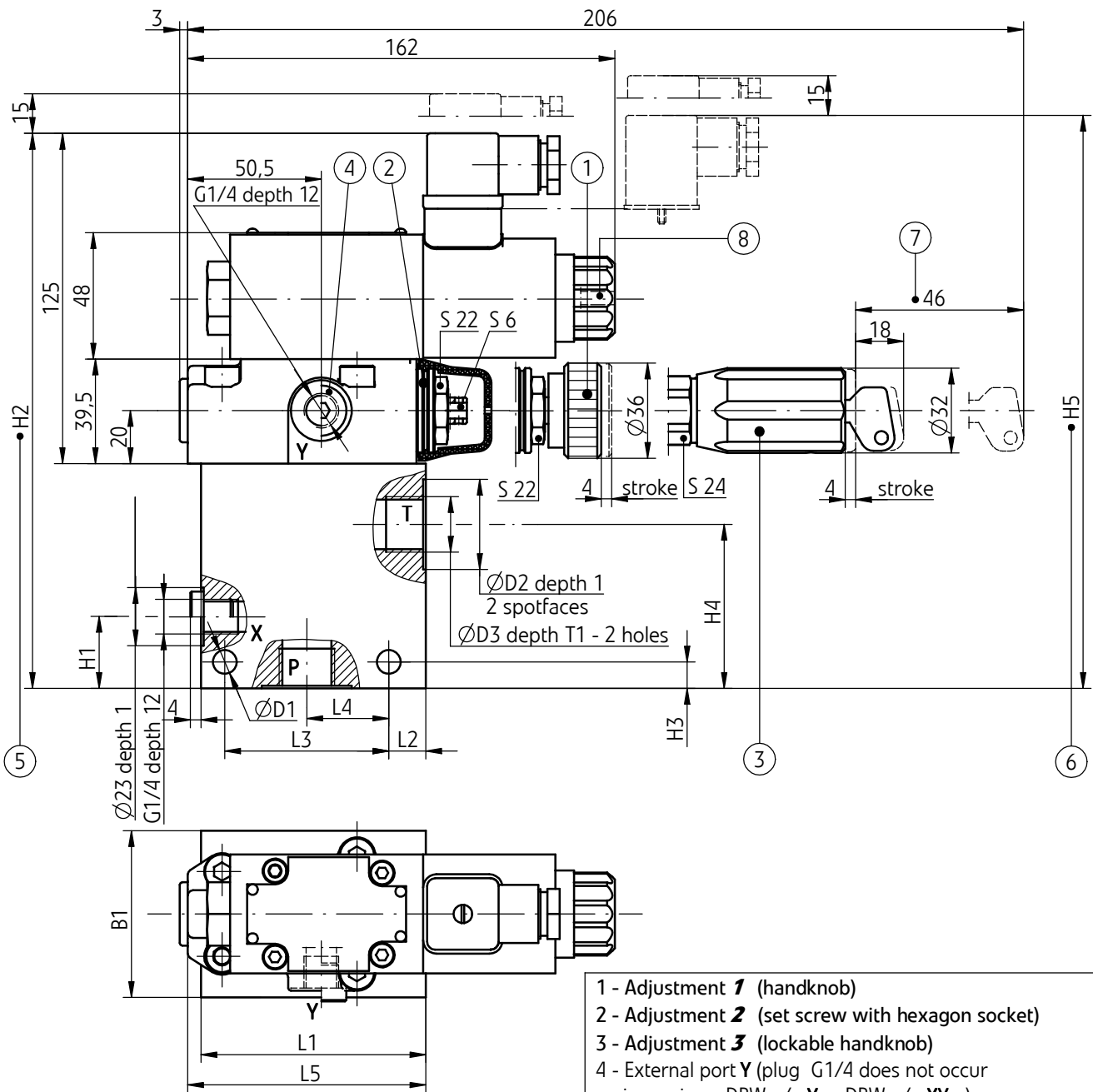


- 1 - Adjustment 1 (handknob)
- 2 - Adjustment 2 (set screw with hexagon socket)
- 3 - Adjustment 3 (lockable handknob)
- 4 - External port Y (plug G1/4 does not occur in versions: DB...G.../...Y... DB...G.../...XY...)
- 5 - Space required to remove the key from the lock of the adjustment item 3

version	B1	φ D1	φ D2	φ D3	H1	H2	H3	H4	L1	L2	L3	L4	L5	T1
DB10...G...	63	9	34	G 1/2	27	126	10	62	85	14	62	31	90	14
DB20...G...	63	9	47	G 1	27	126	10	62	85	14	62	31	90	18
DB30...G...	70	11	61	G 1 1/2	42	139	13	64	100	18	72	36	99	22

OVERALL AND CONNECTION DIMENSIONS

versions for threaded connection: DBW10...G...; 20...G...; 30...G...



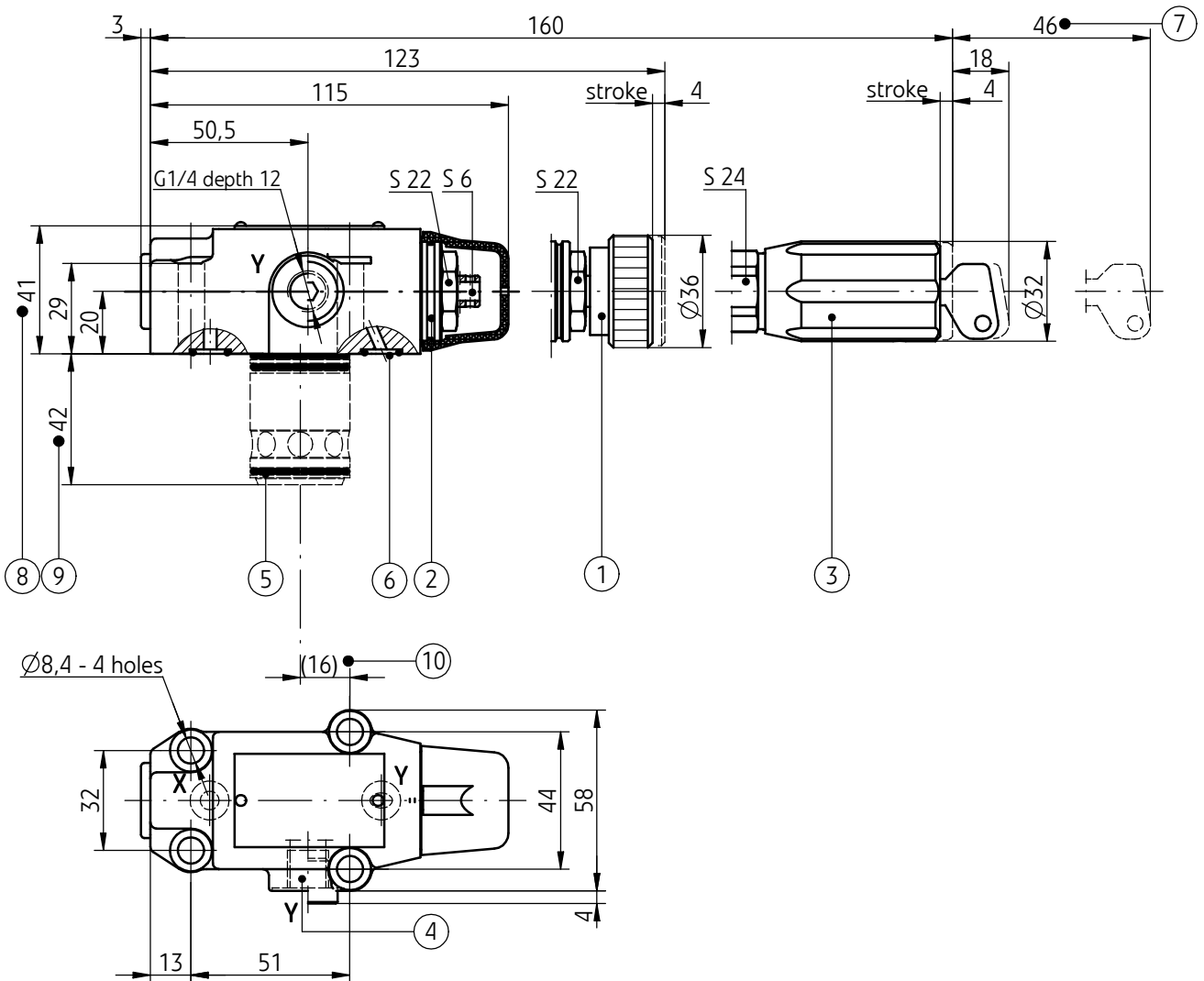
- 1 - Adjustment **1** (handknob)
- 2 - Adjustment **2** (set screw with hexagon socket)
- 3 - Adjustment **3** (lockable handknob)
- 4 - External port **Y** (plug G1/4 does not occur in versions: DBW.../...Y... DBW.../...XY...)
- 5 - Dimension for the valve with electrical connection of a directional valve **12V, 24V, 110V DC** (plug-in connector type **DIN 43650/ISO 4400**)
- 6 - Dimension for the valve with electrical connection of a directional valve **110V, 230V AC** (plug-in connector type **DIN 43650/ISO 4400** with rectifier)
- 7 - Space required to remove the key from the lock of the adjustment item 3
- 8 - Manual override

version	B1	φ D1	φ D2	φ D3	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	T1
DBW10...G...	63	9	34	G 1/2	27	210	10	62	217	85	14	62	31	90	14
DBW20...G...	63	9	47	G 1	27	210	10	62	217	85	14	62	31	90	18
DBW30...G...	70	11	61	G 1 1/2	42	225	13	64	232	100	18	72	36	99	22

OVERALL AND CONNECTION DIMENSIONS

pilot valve without the main spool - version DBC...

pilot valve with the main spool - versions: DBC10...; 30...

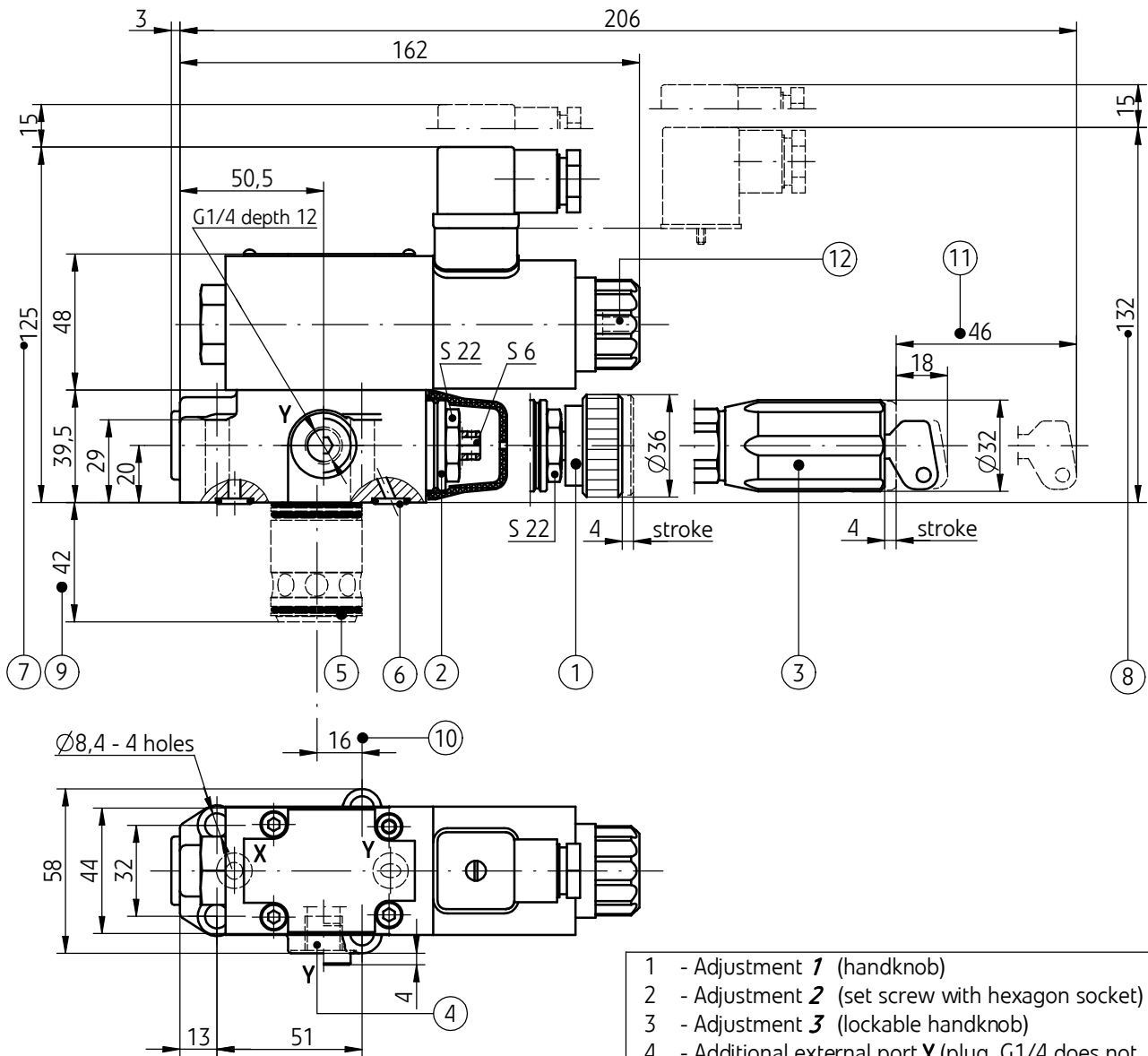


- | | |
|------|---------------------------------------------------------------------------------------------------|
| 1 | - Adjustment 1 (handknob) |
| 2 | - Adjustment 2 (set screw with hexagon socket) |
| 3 | - Adjustment 3 (lockable handknob) |
| 4 | - External port Y (plug G1/4 does not occur in versions: DBC.../...Y... ; DBC.../...XY...) |
| 5 | - Sealing ring o-ring 27,3 x 2,4 |
| 6 | - Sealing ring o-ring 9,2 x 1,8 - szt. 2/komplet (X, Y) |
| 7 | - Space required to remove the key from the lock of the adjustment item 3 |
| 8 | - Dimension for version DBC...
(pilot valve without the main spool) |
| 9,10 | - Dimensions only for versions DBC10...; DBC30...
(pilot valve with the main spool) |

OVERALL AND CONNECTION DIMENSIONS

pilot valve without the main spool - version DBWC...

pilot valve with the main spool - versions: DBWC10...; 30...



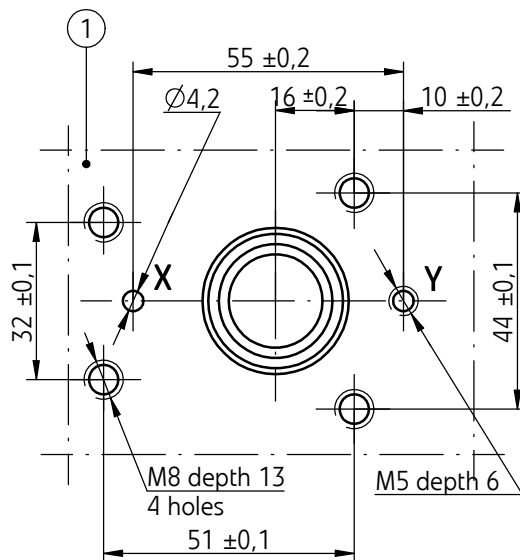
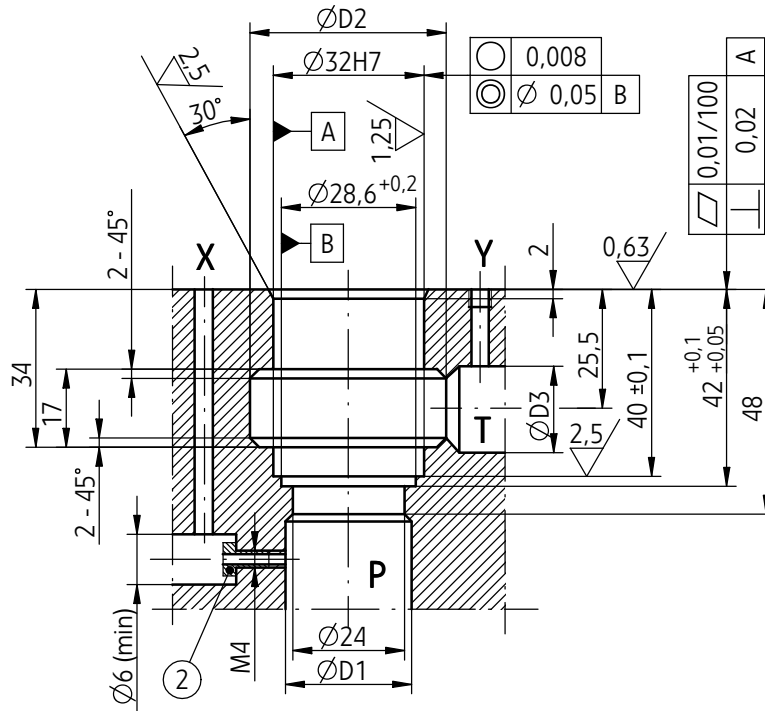
- 1 - Adjustment **1** (handknob)
- 2 - Adjustment **2** (set screw with hexagon socket)
- 3 - Adjustment **3** (lockable handknob)
- 4 - Additional external port **Y** (plug G1/4 does not occur in versions: DBWC.../...Y...; DBWC.../...XY...)
- 5 - Sealing ring **o-ring 27,3 x 2,4**
- 6 - Sealing ring **o-ring 9,2 x 1,8** - 2 pcs/kit (X, Y)
- 7 - Dimension for the valve in version DBWC... (pilot valve without the main spool) with electrical connection of a directional valve **12V, 24V, 110V DC** (plug-in connector type **DIN 43650/ISO 4400**)
- 8 - Dimension for the valve in version DBWC... (pilot valve without the main spool) with electrical connection of a directional valve **110V, 230V AC** (plug-in connector type **DIN 43650/ISO 4400** with rectifier)
- 9,10 - Dimension for the valve in version DBWC10...; DBWC30... (pilot valve with the main spool)
- 11 - Space required to remove the key from the lock of the adjustment item 3
- 12 - Manual override

OVERALL AND CONNECTION DIMENSIONS

pilot valve with the main spool

versions: DBC10...; 30...; DBWC10...; 30...

dimensions of the valve cavity



version	φ D1	φ D2	φ D3
DBC10...; DBWC10...	10	40	10
DBC30...; DBWC30...	30 (nominal)	45	30 (nominal)

1 - Porting pattern on end face of the valve seat mounting bolts **M8 x 40 - 10.9** - 4 pcs/kit in accordance with **PN - EN ISO 4762** tightening torque **Md = 37 Nm**
 2 - Jet

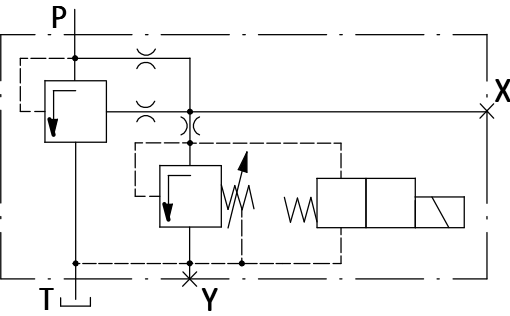
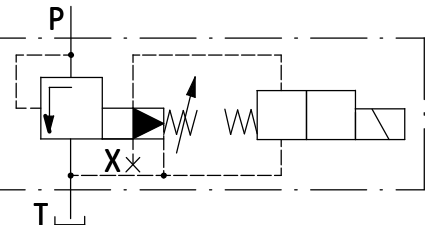
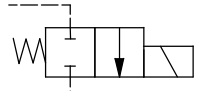
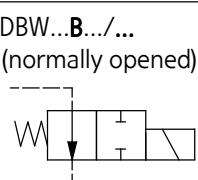
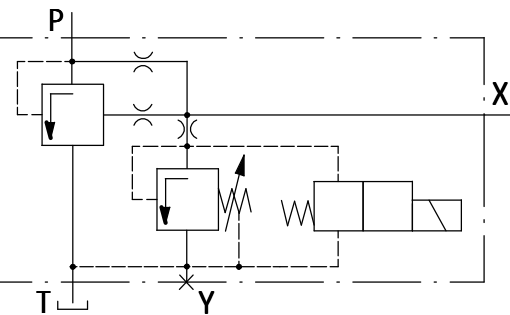
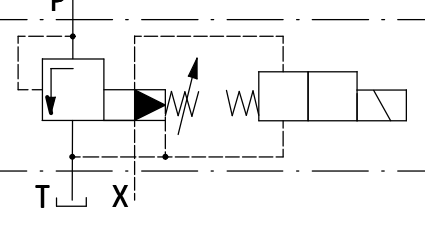
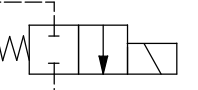
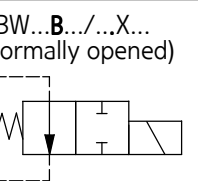
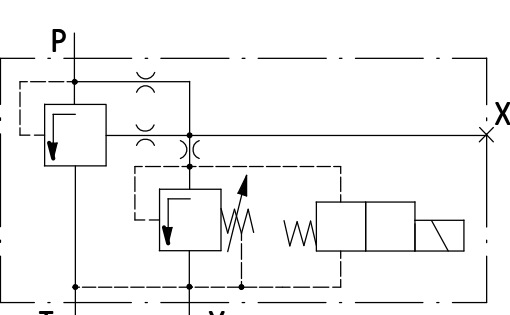
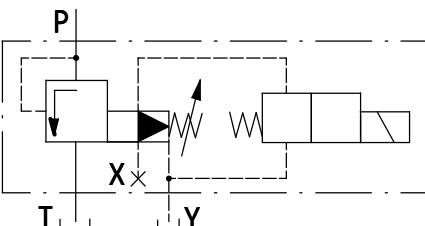
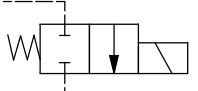
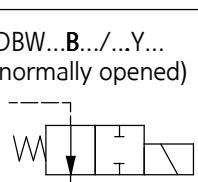
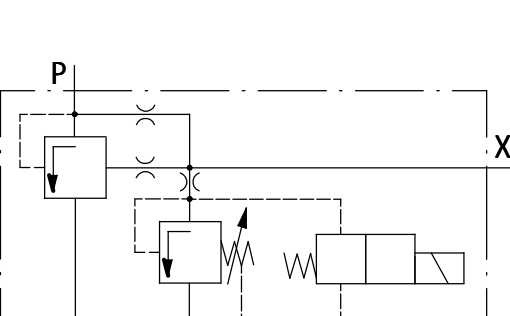
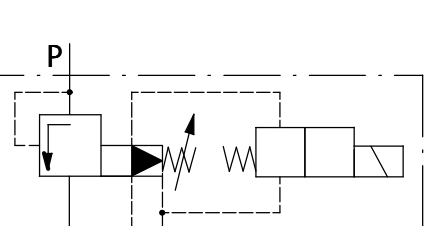
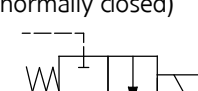
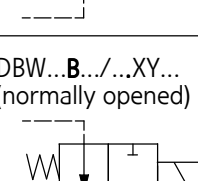
SCHEMES

Detailed and simplified symbols for complete valves - versions DB...

detailed symbol	simplified symbol
version DB.../...	
version DB.../...X...	
version DB.../...Y...	
version DB.../...XY...	

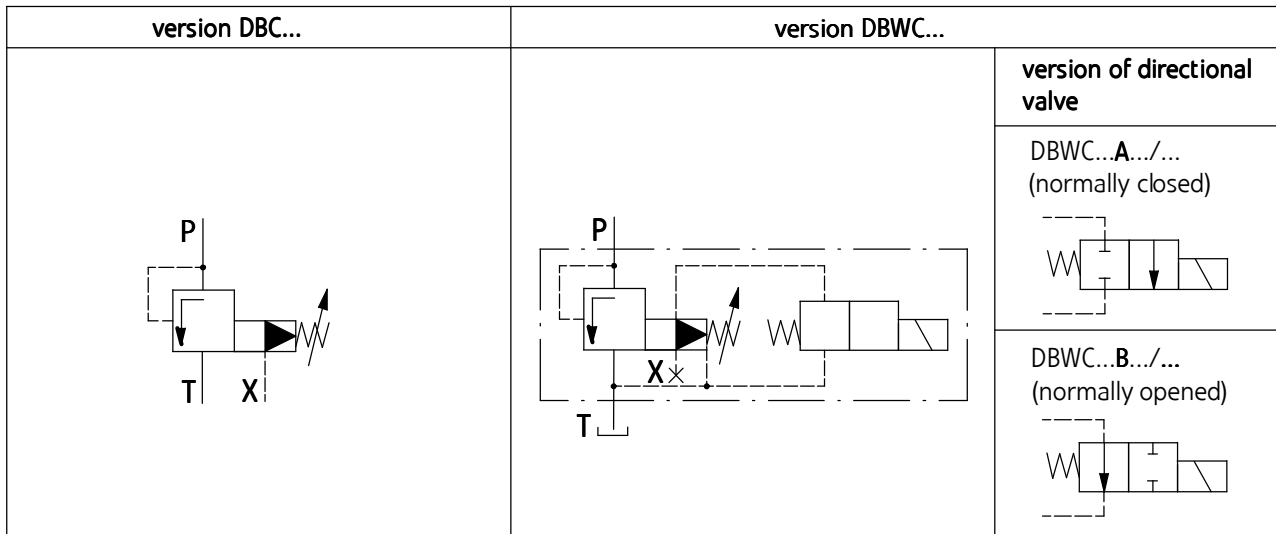
SCHEMES

Detailed and simplified symbols for complete valves - versions DBW...

detailed symbol	simplified symbol	version of directional valve
version DBW.../...		
		<p>DBW...A.../... (normally closed)</p>  <p>DBW...B.../... (normally opened)</p> 
version DBW.../...X...		
		<p>DBW...A.../...X... (normally closed)</p>  <p>DBW...B.../...X... (normally opened)</p> 
version DBW.../...Y...		
		<p>DBW...A.../...Y... (normally closed)</p>  <p>DBW...B.../...Y... (normally opened)</p> 
version DBW.../...XY...		
		<p>DBW...A.../...XY... (normally closed)</p>  <p>DBW...B.../...XY... (normally opened)</p> 

SCHEMES

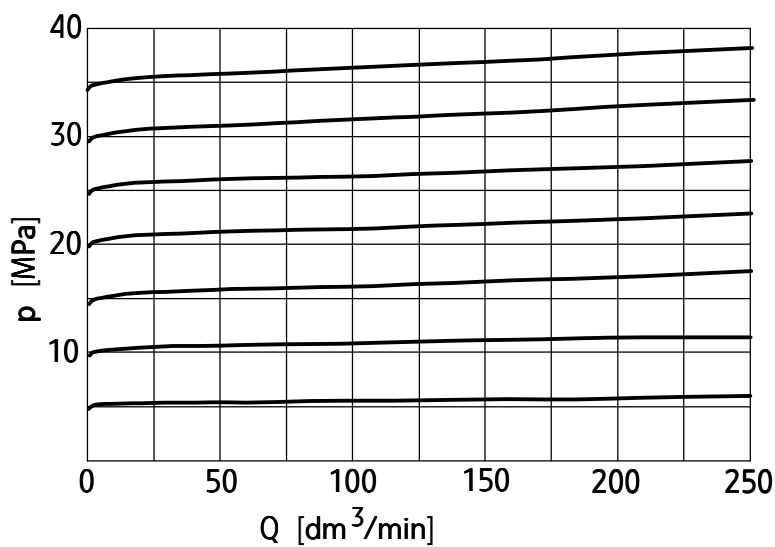
Graphic symbols for pilot valves
versions: DBC... ; DBWC



PERFORMANCE CURVES

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

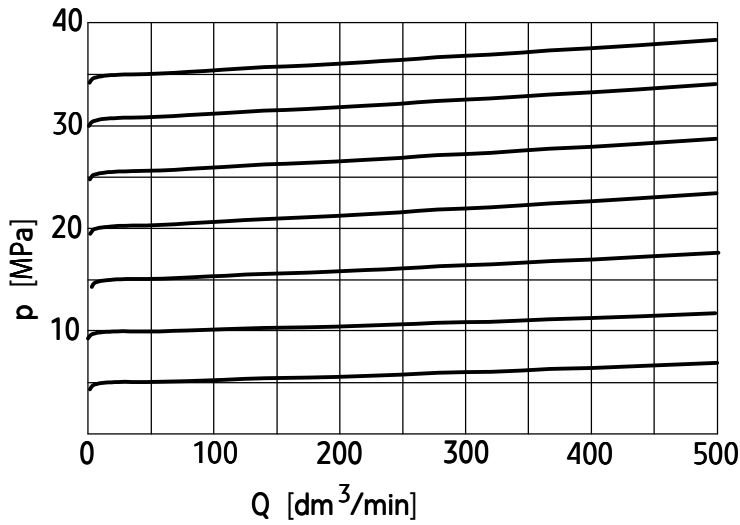
Operating pressure p in relation to the flow Q
for valves **NS10**



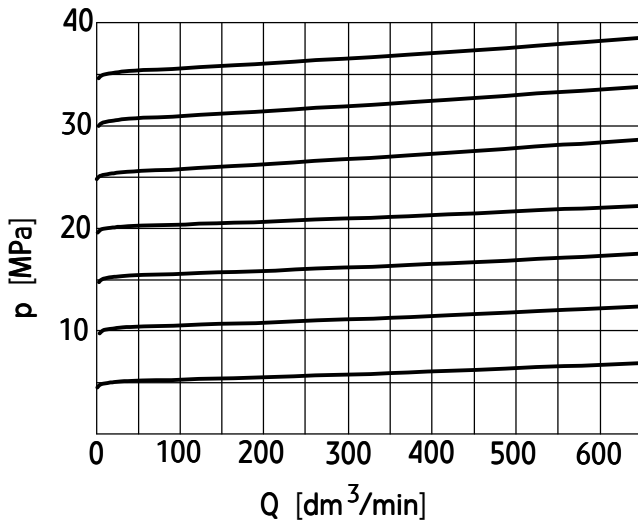
PERFORMANCE CURVES

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

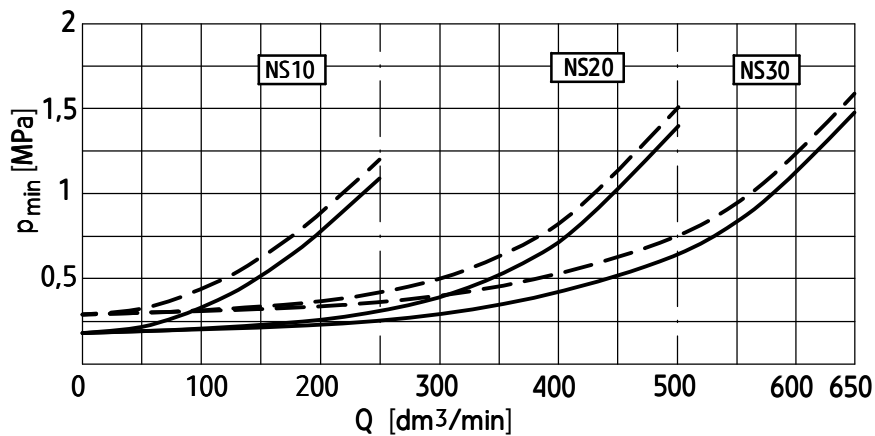
Operating pressure p in relation to the flow Q
for valves **NS20**



Operating pressure p in relation to the flow Q
for valves **NS30**



Minimum settable pressure p_{\min} in relation to the flow Q



Cracking pressure of the main valve:

— standard
— low (U)

HOW TO ORDER

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Further requirements in clear text
(to be agreed with the manufacturer)

Sealing

NBR (for fluids on mineral oil base) = **no designation**
FKM (for fluids on phosphate ester base) = V

Electrical connection (only for versions DBW... DBW...G... DBWC...)

Plug-in connector DIN 43650-A/ISO4400 without LED = **Z4**
Plug-in connector DIN 43650-A/ISO4400 with LED = Z4L

Manual override for solenoid (only for versions DBW... DBW...G... DBWC...)

solenoid without manual override = no designation
solenoid with manual override = **N**

Supply voltage for solenoid (only for versions DBW... DBW...G... DBWC...)

12V DC = G12
24V DC = **G24**
110V DC = G110
110V AC 50Hz (plug-in connector with rectifier) = W110R
230V AC 50Hz (plug-in connector with rectifier) = **W230R**

Pilot oil supply and pilot oil drain (only for versions DB...; DBW...)

internal pilot oil supply, internal pilot oil drain = **no designation**
external pilot oil supply, internal pilot oil drain = X
internal pilot oil supply, external pilot oil drain = Y
external pilot oil supply, external pilot oil drain = XY

Cracking pressure of the main valve (not applicable for versions DBC...; DBWC... without the main spool)

standard = no designation
low = **U**

NOTES:

The valve should be ordered according to the above coding.

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

Coding example: DB10 G2 - 52/100 U

SUBPLATES AND MOUNTING BOLTS

Subplates for particular versions of valve should be ordered according to subplate type, taking into the account the size of thread connections given in the table below.

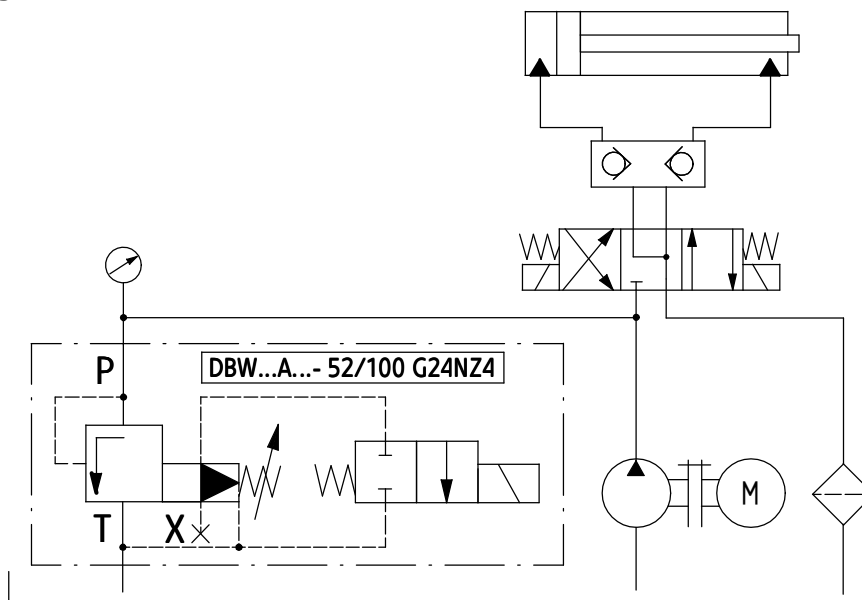
Subplates and mounting bolts must be ordered separately.

NOTE:

Subplate symbols in bold are preferred versions in short delivery time.

Valve type	Subplate type Data sheet	Thread connections of the subplate	Mounting bolts
DB10...; DBW10...	G406/01 WK 470 013	P, T - G 3/8 X - G 1/4	M12 x 50 - 10.9 - 4 pcs/kit in accordance with PN -EN ISO 4762 tightening torque Md = 120 Nm.
	G407/01 WK 470 013	P, T - G 1/2 X - G 1/4	
DB20...; DBW20...	G408/01 WK 450 797	P, T - G 3/4 X - G 1/4	M16 x 50 - 10.9 - 4 pcs/kit in accordance with PN -EN ISO 4762 tightening torque Md = 310 Nm.
	G409/01 WK 450 797	P, T - G 1 X - G 1/4	
DB30...; DBW30...	G410/01 WK 470 473	P, T - G 1 1/4 X - G 1/4	M18 x 50 - 10.9 - 4 pcs/kit in accordance with PN -EN ISO 4762 tightening torque Md = 430 Nm.
	G411/01 WK 470 473	P, T - G 1 1/2 X - G 1/4	

EXAMPLE OF APPLICATION IN HYDRAULIC SYSTEM



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