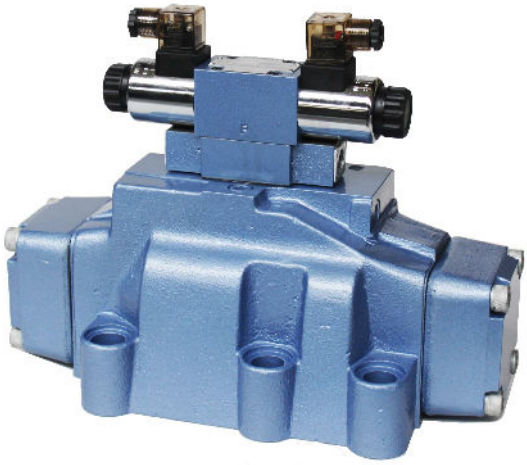
PONAR wadowice	Directional spool valve type WEH32 electro-hydraulically operated			WK 460 580
	NS32	up to 35 MPa	up to 1100 dm^3/min	02.2012

DATA SHEET - SERVICE MANUAL

APPLICATION



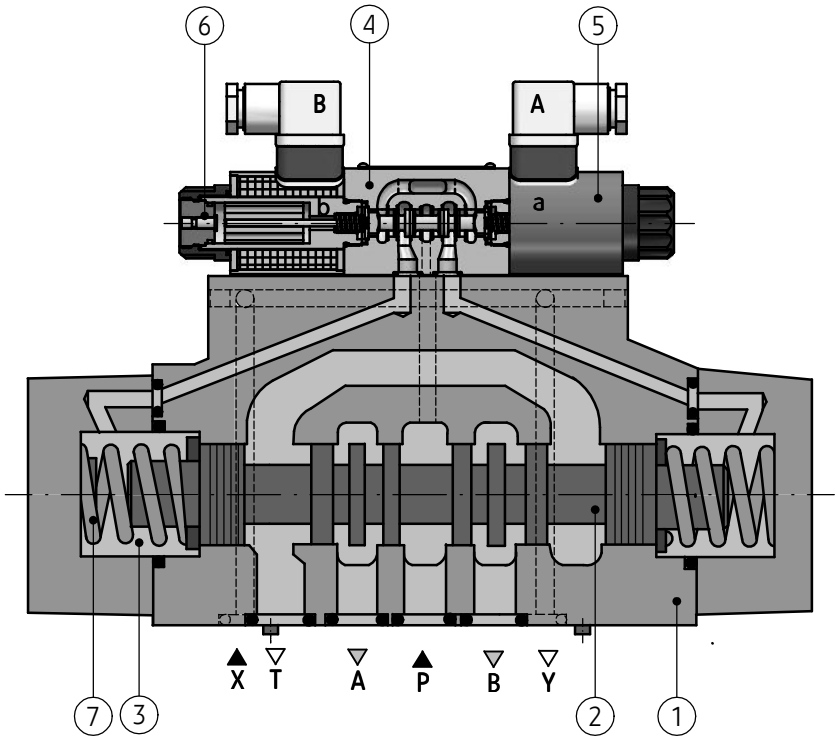
Directional spool valves type **WEH32...** electro-hydraulically operated are intended for change in direction of fluid flow in a system and thus it allows to change direction of movement of a receiver - mostly piston rod of a cylinder or hydraulic motor as well to use functions: *on* and *off*. These directional spool valves are used for subplate mounting in any position in a hydraulic system.

The directional spool valve type **WEH32...** 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

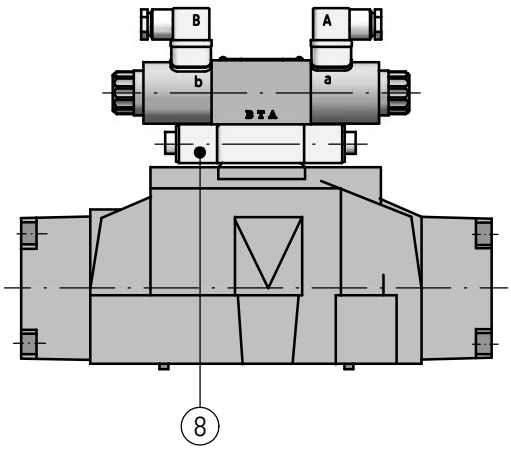
4WEH32E 52/G24NETZ4



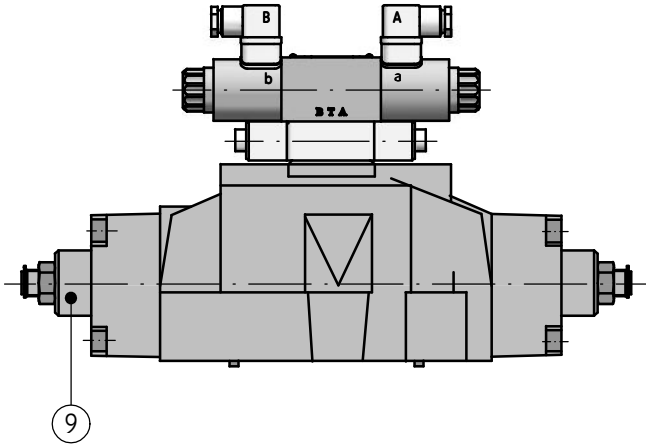
Main bore and annular ports **P**, **T**, **A**, **B** are made in the housing (1) and connected to its subplate connection. Directional valve is switched by shifting the spool (2) into one end position. Various control functions are dependent on the spool (2) which affects the change in configuration of connections among ports **P**, **T**, **A**, **B** in the housing (1). The spool (2) is shifted from its neutral position by affecting pressure of hydraulic fluid supplied via pilot valve (4) into one chamber of caps (3). The pilot valve (4) – type **WE6...** is operated by means of solenoids (5). In case of failure, the pilot valve (4) may be shifted manually by means of manual overrides (6) – version ...4WEH32.../...**N**. The spool (2) is centered in neutral position by means of springs (7).

DESCRIPTION OF OPERATION

4WEH32E 52/...**S**...



4WEH32E 52/...S...**10**...



Directional spool valves type **4WEH32...5X...** may be provided with the pilot choke adjustment (8) - valve type **Z2FS6...** to data sheet **WK 421 060** as well as spool stroke limiter (9).

Accessories may be mounted depending on version of directional valve like given on pages 9 – 12.

TECHNICAL DATA

Hydraulic fluid	
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	- 20 °C up to +50 °C
Max operating pressure	
Ports **A, B, P**	
• version **H-4 WEH 32.../...**	**35 MPa**
• version **4 WEH32.../...**	**28 MPa**
Port **T**	
• pilot fluid return **Y- external**	**25 MPa**
• pilot fluid return **Y- internal**	**21 MPa**
Max control pressure	**25 MPa**
Min control pressure	
Pilot fluid supply **X- external**	
• 3-position directional valve	0,8 MPa
• 2-position directional valve spring positioned	1,0 MPa
Pilot fluid supply **X- internal** (when pre-load valve applied or when flow rate is suitably high)	
• versions **4 WEH 32...** with spools **G,H,F,S,T**	0,45 MPa
• versions **H-4 WEH 32.../...D1...** with spools **G,H,F,S,T**	0,7 MPa

TECHNICAL DATA

Fluid volume required to operate the valve				
3-position spring centered directional valve	35,35 cm^3			
3-position hydraulically centered directional valve				
• from ***0*** (neutral) to operated position ***a***	17,25 cm^3			
• from ***0*** (neutral) to operated position ***b***	35,35 cm^3			
• from operated position ***a*** to ***0*** (neutral) position	18,1 cm^3			
• from operated position ***b*** to ***0*** (neutral) position	17,25 cm^3			
2-position directional spool valve	70,7 cm^3			
Total time of spool shifting from neutral to shifted position				
3-position (spring centered) directional valve				
at pilot pressure p st = 5 MPa	90 ms			
p st =15 MPa	75 ms			
p st =25 MPa	65 ms			
2-position (spring positioned) directional valve				
at pilot pressure p st = 5 MPa	135 ms			
p st = 15 MPa	115 ms			
p st = 25 MPa	105 ms			
Total time of spool shifting from shifted to neutral position				
3-position (spring centered) directional valve				
at pilot pressure p st = 5; 15; 25 MPa	95 ms			
2-position (spring positioned) directional valve				
at pilot pressure p st = 5 MPa	105ms			
p st = 15 MPa	85 ms			
p st = 25 MPa	75 ms			
Flow section in central position (schemes on page 5)	spool	**Q**	**V**	**W**
	flow section	16 % nominal flow	16 % nominal flow	3 % nominal flow
Pilot valve				
Type of pilot valve	4WE6 **J**...			
• for 3-position directional valve (spring centered)	with spools **C**, **D**, **K**, **Z**		with spool **Y**	
• for 2-position directional valve (spring positioned)	4WE6 **D**...		4WE6 **Y**...	
Nominal supply voltage for solenoids	**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			
Weight	max 51 kg			

ASSEMBLY AND APPLICATION REQUIREMENTS

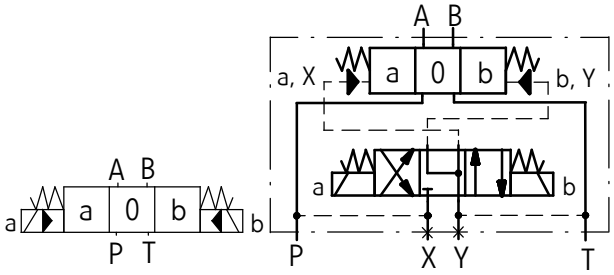
1. Only valve working properly and suitably installed may be connected to an electric system. Only skilled workers are allowed to connect and disconnect electric system.
2. Ground connection (⏚) must be connected with protective earth wire (PE ⏚) in supply system according to appropriate instructions.
3. It is forbidden to apply directional spool valve if the supply cable in the gland of plug-in-connector is not properly tightened.
4. It is forbidden to apply directional spool valve if the plug-in-connector is not properly tightened to the solenoid socket and is not secured by screwing bolt tightly.
5. Due to heating solenoid coils, directional spool 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).

SCHEMES

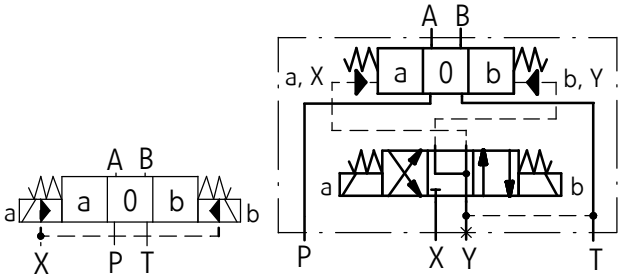
Simplified and detailed hydraulic schemes for 3-position directional valves with various pilot supply (X) and pilot drain (Y)

3-position directional valves with spring centered spool at ***0*** position in main valve and pilot valve

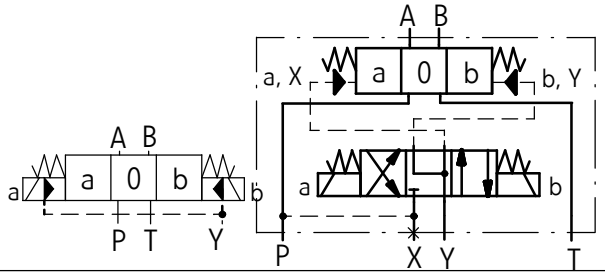
internal supply **X** ; **internal** drain **Y**
version ...4WEH32**...**/...**ET...**



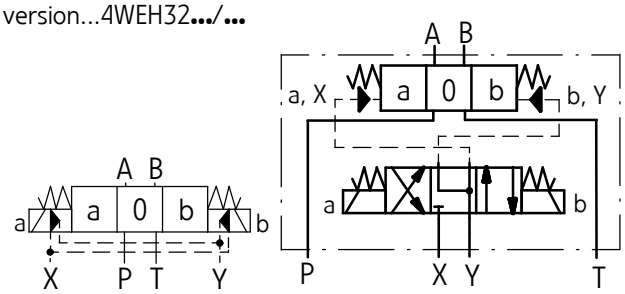
external supply **X** ; **internal** drain **Y**
version ....4WEH32**...**/...**T...**



internal supply **X** ; **external** drain **Y**
version ...4WEH32**...**/...**E...**

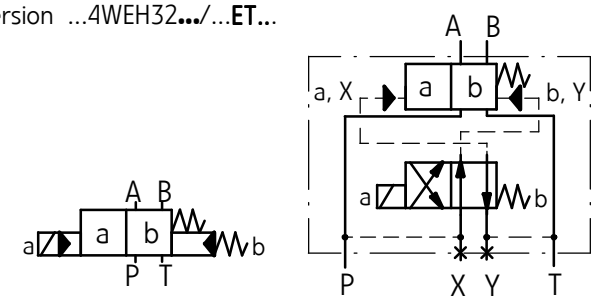
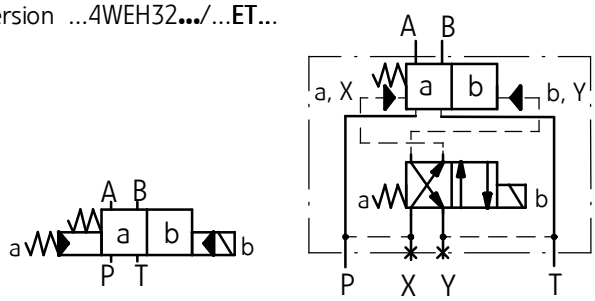
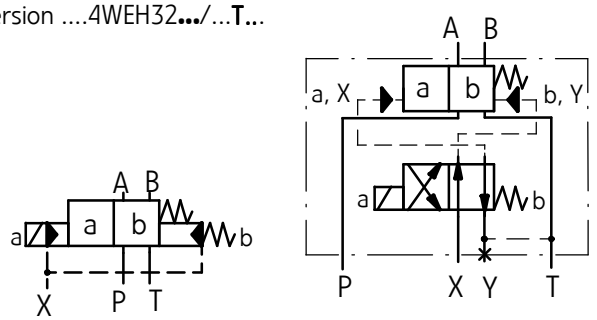
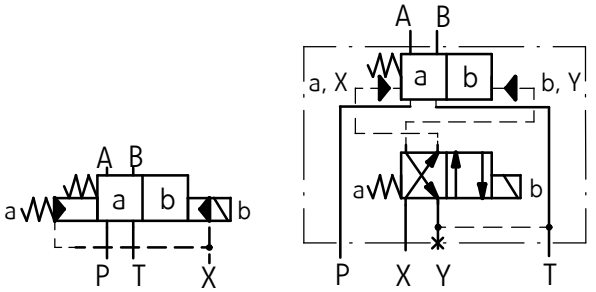
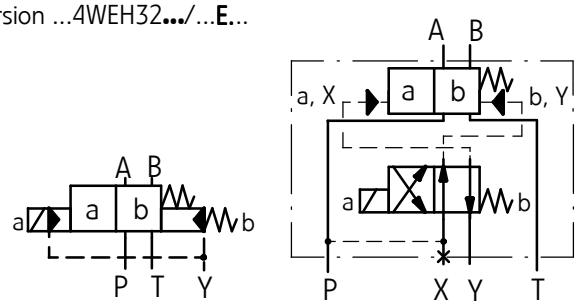
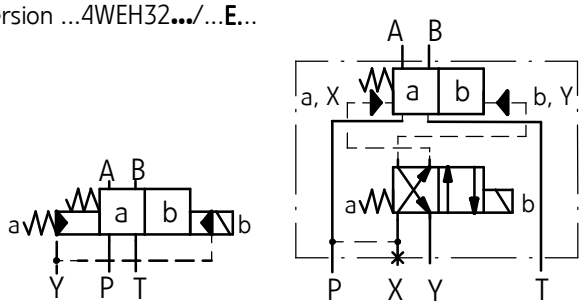
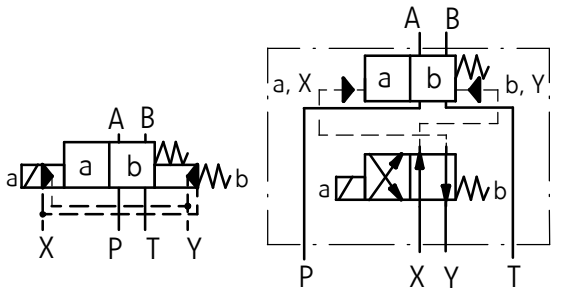
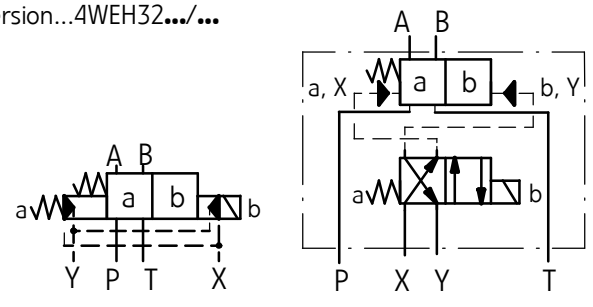


external supply **X** ; **external** drain **Y**
version...4WEH32**.../...**



SCHEMES

Simplified and detailed hydraulic schemes for 2-position directional valves with various pilot supply (X) and pilot drain (Y)

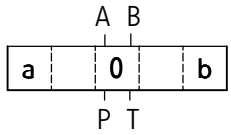
2-position main directional valves with spools **C**, **D**, **K**, **Z**; spool in main valve and pilot valve spring positioned	2-position main directional valves with spool **Y** spool in main valve and pilot valve spring positioned
internal supply **X** ; **internal** drain **Y** version ...4WEH32**...**/...**ET...** 	**internal** supply **X** ; **internal** drain **Y** version ...4WEH32**...**/...**ET...** 
external supply **X** ; **internal** drain **Y** version ....4WEH32**...**/...**T...** 	**external** supply **X** ; **internal** drain **Y** version ....4WEH32**...**/...**T...** 
internal supply **X** ; **external** drain **Y** version ...4WEH32**...**/...**E...** 	**internal** supply **X** ; **external** drain **Y** version ...4WEH32**...**/...**E...** 
external supply **X** ; **external** drain **Y** version...4WEH32**.../...** 	**external** supply **X** ; **external** drain **Y** version...4WEH32**.../...** 

SCHEMES

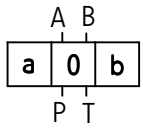
Graphic symbols for spools

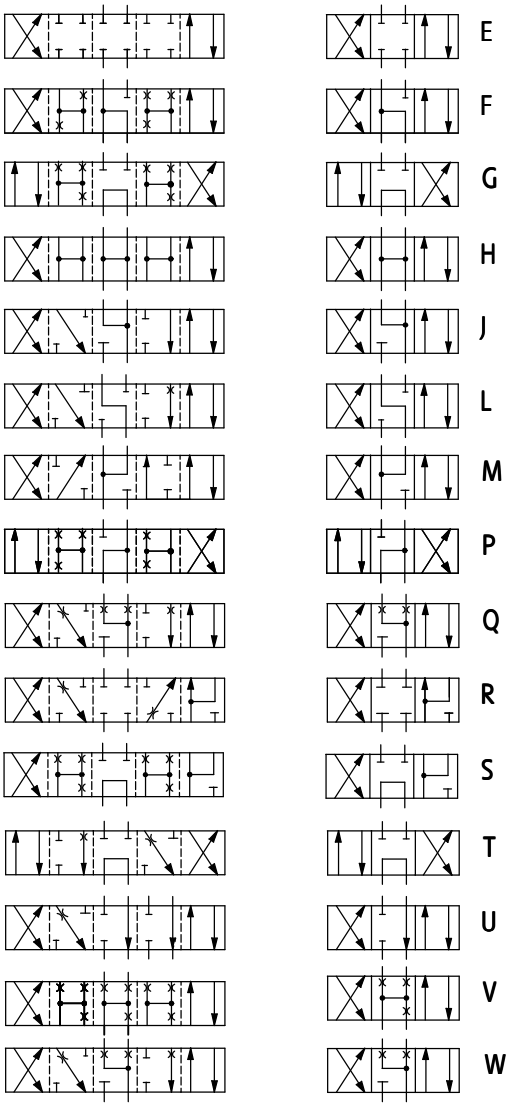
3-position

working and indirect positions



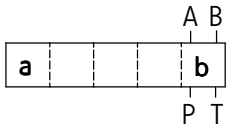
working positions



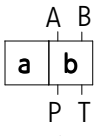


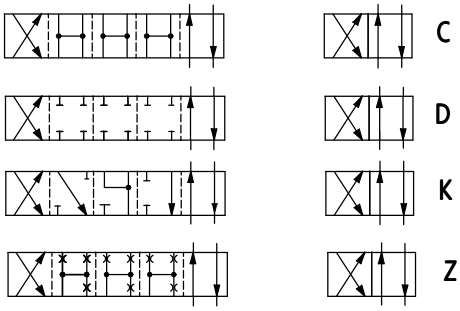
2-position

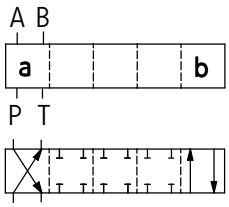
working and indirect positions

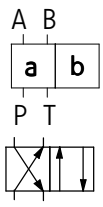


working positions



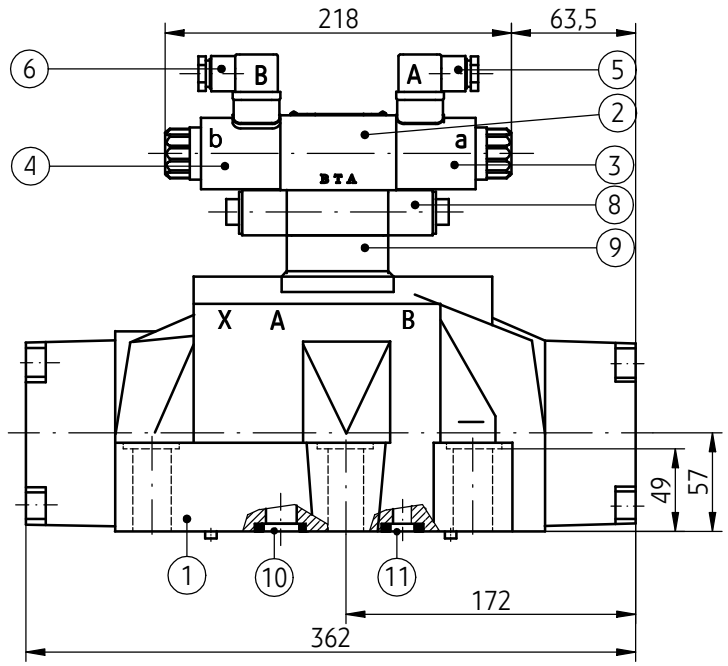


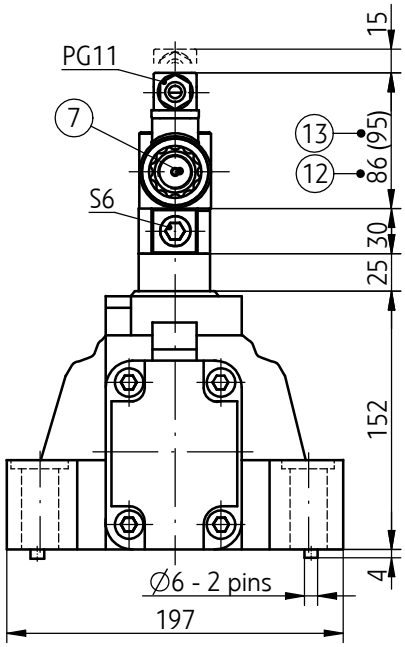


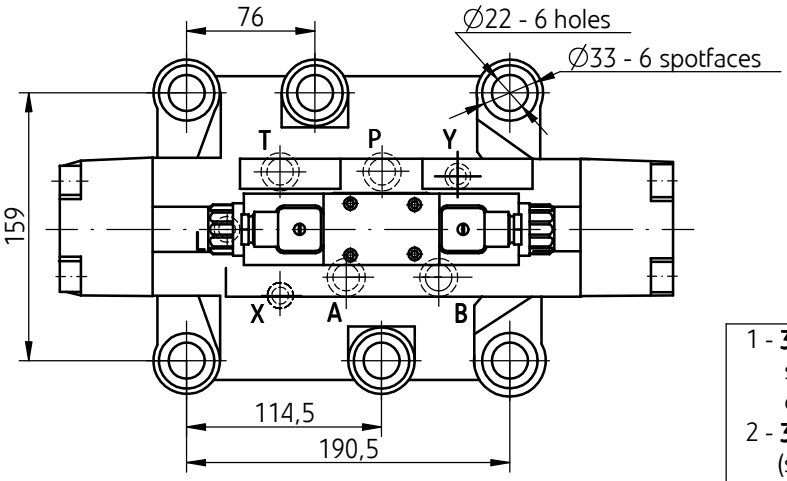


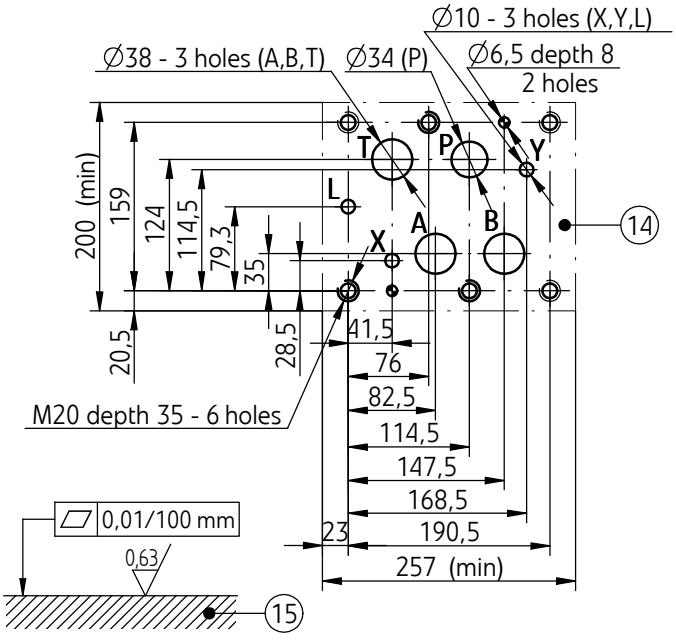
OVERALL AND CONNECTION DIMENSIONS

3-position versions, spring centered ...4WEH32...5X/...S...D1...







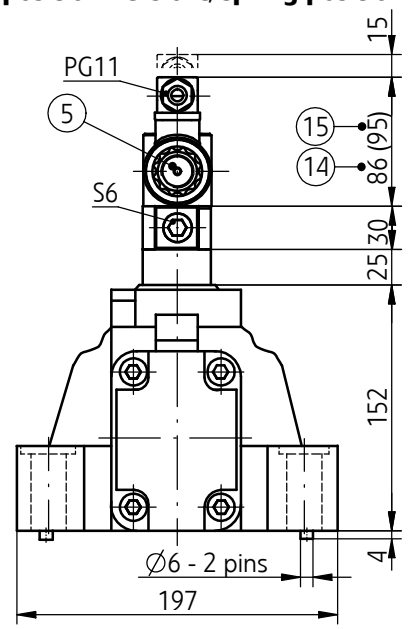


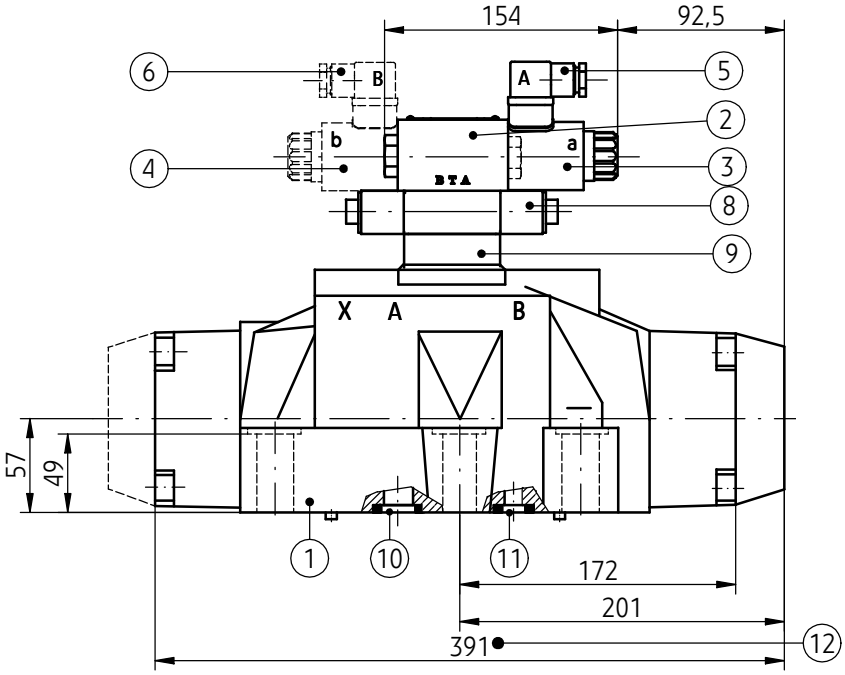
1 - **3-position main directional valve** (spring centered - spool schemes: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **Q**, **R**, **U**, **V**, **W** - on page 5)
2 - **3-position directional valve** (pilot valve) type **WE6...** (spool types according to technical data on page 3)
3 - Solenoid **a**
4 - Solenoid **b**
5 - Plug-in-connector **A** - **ISO 4400** (DIN 43650 - A)
6 - Plug-in-connector **B** - **ISO 4400** (DIN 43650 - A)
7 - Manual override
8 - Pilot choke adjustment (optional)
9 - Pressure ratio valve (optional)
10 - Sealing ring **o-ring 42 x 2** - 4 pcs/kit (**P**, **T**, **A**, **B**)
11 - Sealing ring **o-ring 12 x 2** - 3 pcs/kit (**X**, **Y**, **L**)
12 - Dimension for electrical connection for **DC**
13 - Dimension for electrical connection for **AC** (plug-in-connector with rectifier)
14 - Porting pattern - configuration of surface holes in subplate in accordance with the following standards:
- **CETOP RP 121H**
- **ISO 4401** - identified by **ISO 4401-10**-08-0-94 fixing screws in accordance with **PN-EN ISO 4762** **M20 x 80 - 10.9** - 6 pcs/kit tightening torque **Md = 580 Nm**

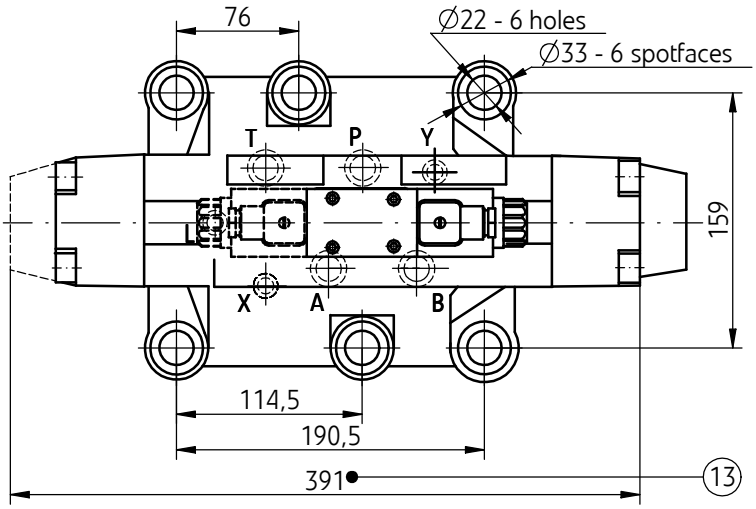
15 - Subplate surface required

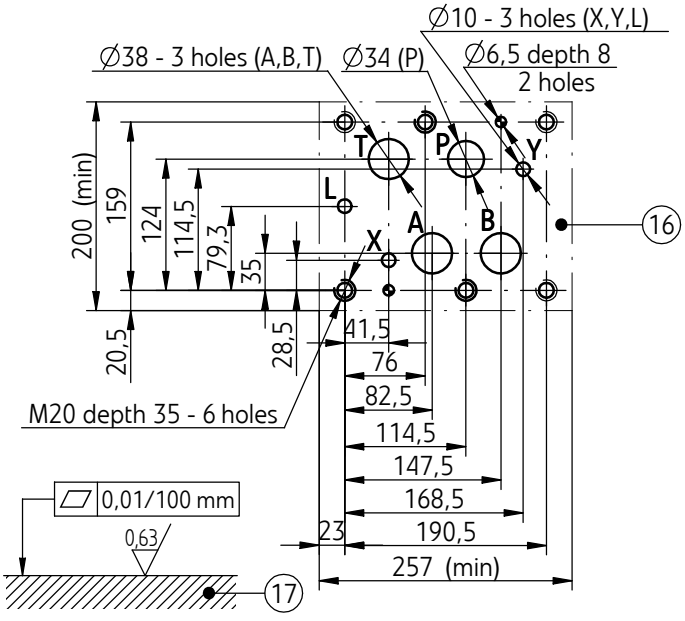
OVERALL AND CONNECTION DIMENSIONS

2-position versions, spring positioned ...4WEH32...5X/...S...D1...









1 - **2-position main directional valve** (spring positioned - spool schemes: **C, D**, **K**, **Z**, **Y** - on page 5)
2 - **2-position directional valve** (pilot valve) type **WE6...** (spool types according to technical data on page 3)
3 - Solenoid **a**
4 - Solenoid **b** - only for directional valve with spool **Y** (version 4WEH32**Y**...)
5 - Plug-in-connector **A** - **ISO 4400** (DIN 43650 - A)
6 - Plug-in-connector **B** - **ISO 4400** (DIN 43650 - A) only for version like item 4
7 - Manual override
8 - Pilot choke adjustment (optional)
9 - Pressure ratio valve (optional)
10 - Sealing ring o-ring **42 x 2** - 4 pcs/kit (**P**, **T**, **A**, **B**)
11 - Sealing ring o-ring **12 x 2** - 3 pcs/kit (**X**, **Y**, **L**)
12 - Dimension for directional valve with spools: **C**, **D**, **K**, **Z**
13 - Dimension for directional valve with spool **Y**
14 - Dimension for electrical connection for **DC**
15 - Dimension for electrical connection for **AC** (plug-in-connector with rectifier)
16 - Porting pattern - configuration of surface holes in subplate in accordance with the following standards:
- **CETOP RP 121H**
- **ISO 4401** - identified by **ISO 4401-10**-08-0-94 fixing screws in accordance with **PN-EN ISO 4762** **M20 x 80 - 10.9** - 6 pcs/kit tightening torque **Md = 580 Nm**

17 - Subplate surface required

ACCESSORIES FOR STANDARD VERSIONS

Pilot choke adjustment

versions: ...4WEH32...5X/...**S**...
...4WEH32...5X/...**S2**...

Directional spool valves type …**4WEH32…** may be optionally provided with pilot choke adjustment (throttle check valve type **Z2FS6…** according to data sheet **WK 450 232**) which allows to adjust switching time of directional spool valve.

The change of adjustment method of switching time (flow throttling):

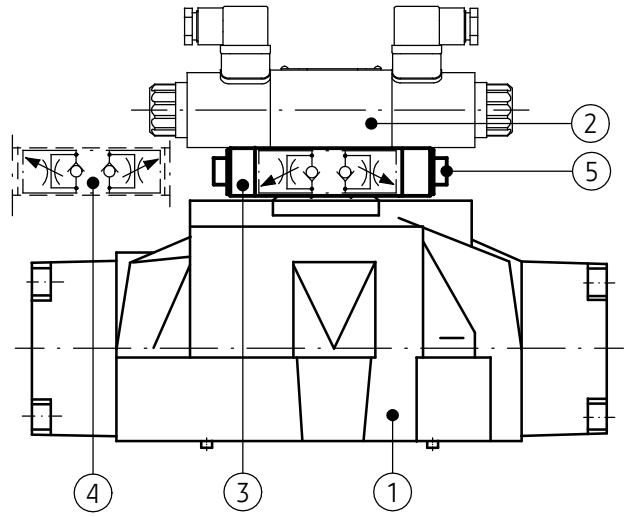
- on inlet - version ...4WEH32…5X/…**S**...
- on outlet - version ...4WEH32...5X/…**S2**...

is made while mounting by rotating the pilot choke adjustment (3) by 180 degrees around its longitudinal axis.

Rotation of the adjusting screw (5) clockwise increases and counterclockwise decreases switching time of the valve.

The pilot choke adjustment (3) and the pilot valve (2) must be fixed by means of screws **M5 x 80 - 10.9** - 4 pcs/kit in accordance with **PN - EN ISO 4762** with tightening torque of **Md** = **5 Nm**.

...4WEH32. ...5X/...**S2**... | ...4WEH32...5X/...**S**...



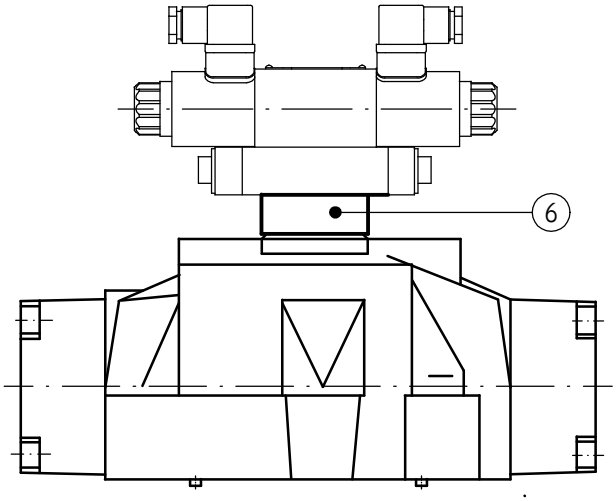
1 - Main valve
2 - Pilot valve
3 - Pilot choke adjustment with adjustment of switching time on outlet
4 - Assembly method of pilot choke adjustment with adjustment of switching time on intlet
5 - Adjusting screw
6 - Pressure ratio valve

Pressure ratio valve

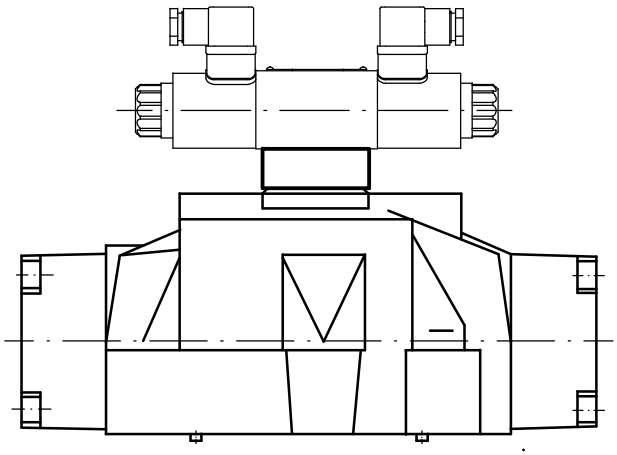
versions: H- 4WEH32...5X/...**ET**...**D1**...
H- 4WEH32...5X/...**E**...**D1**...

When pilot pressure exceeds 25 MPa, the directional valves type …**WEH32…** must be equipped with pressure ratio valve (6). It causes the pilot pressure is reduced in the ratio 1: 0,66 = 1,515. Directional valves in the following versions: **H** - 4WEH32.../...**ET**...; **H** - 4WEH32.../...**E**... are provided with the pressure ratio valve (6). The pressure ratio valve (6), pilot choke adjustment (3) and pilot valve (2) must be fixed by means of screws **M5 x 105 - 10.9** - 4 pcs/kit in accordance with **PN - EN ISO 4762** with tightening torque of **Md = 5 Nm**.

H-4WEH32...5X/...**ET** S...**D1**...
H-4WEH32...5X/...**E** S...**D1**...



H - 4WEH32...5X/...**ET**...**D1**...
H - 4WEH32...5X/...**E**...**D1**...



ACCESSORIES FOR STANDARD VERSIONS

Pilot oil supply and pilot oil drain

Pilot oil supply **X** – **external**
pilot oil drain **Y** – **external**
version …4WEH32…5X/**…**

The pilot oil supply is sourced externally via channel **X** from a separate circuit. The pilot oil drain is led externally via channel **Y** to tank.

Pilot oil supply **X** – **internal**
pilot oil drain **Y** – **external**
version …4WEH32…5X/…**E**…

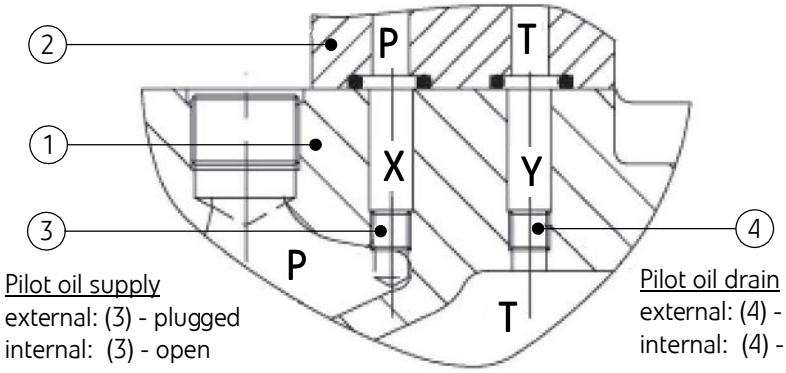
The pilot oil supply is sourced internally from channel **P** of the main valve. The pilot oil drain is led externally via channel **Y** to tank. Port **X** in the subplate is plugged.

Pilot oil supply **X** – **internal**
pilot oil drain **Y** – **internal**
version …4WEH32…5X/…**ET**…

The pilot oil supply is sourced internally from channel **P** of the main valve. The pilot oil drain is led internally via channel **T** to tank. Ports **X** and **Y** in the supblate are plugged.

Pilot oil supply **X** – **external**
pilot oil drain **Y** – **internal**
version …4WEH32…5X/…**T**…

The pilot oil supply is sourced internally from channel **P** of the main valve. The pilot oil drain is led internally via channel **T** to tank. Ports **X** and **Y** in the supblate are plugged.



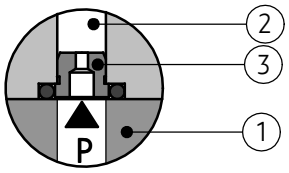
Pilot oil supply
external: (3) - plugged
internal: (3) - open

Pilot oil drain
external: (4) - plugged
internal: (4) - open

1 - Main valve
2 - Pilot valve
3 - Plug **M6** - **8,8** (S3) - pilot oil supply (**X**)
4 - Plug **M6** - **8,8** (S3) - pilot oil drain (**Y**)

Throttle insert
versions: …4WEH32…5X/…**B**…

Directional valves type **…WEH32…5X…** may be equipped with throttle insert (3) in port **P** in pilot valve (2) which allows to **delay switching time** of the main valve.



1 - Main valve body
2 - **P** port of the pilot valve
3 - Throttle insert

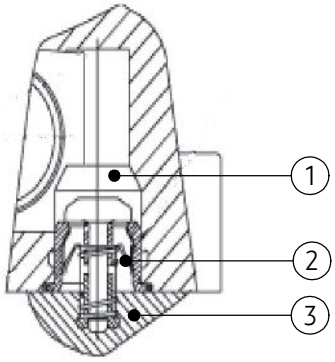
ACCESSORIES FOR STANDARD VERSIONS

Pre-load valve

versions: ...4WEH32...5X/...**P4,5...**
..4WEH32...5X/...**P7...**

In valves with positions of spool with **pressureless by-pass and internal pilot oil supply**, **a pre-load valve** (2) **must be installed in the P channel of the main valve** (1) to build up the minimum pilot pressure. The pressure difference of the pre-load valve (2) must be added to the pressure difference of the main valve (1) - see characteristic curves in order to determine the actual value.

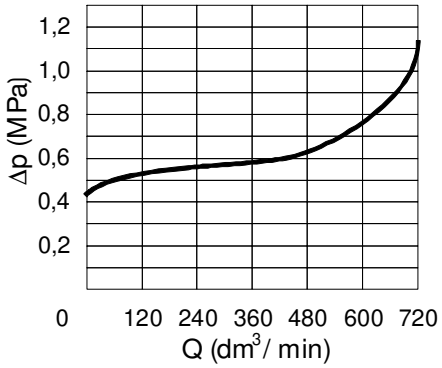
Cracking pressure for pre-load valves:
valve type **P 4,5 - 0,45 MPa**
valve type **P 7 - 0,7 MPa**
For directional valves with fixed pressure ratio valve – versions:...4WEH16...72/...**D**...the pre-load valve **P7** must be applied.



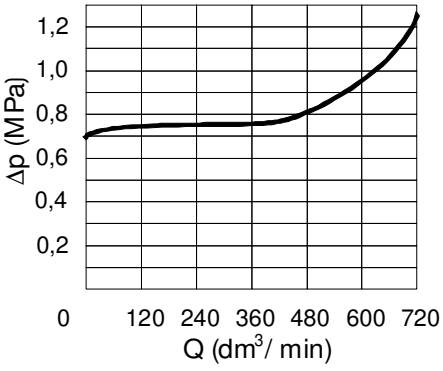
1 - **P** channel of the main valve
2 - Pre-load valve
3 - Subplate

Performance curves for pre-load valves
measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

pre-load valve type **P4,5**



pre-load valve type **P7**



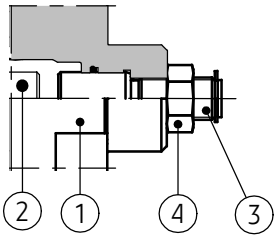
OPTIONAL ACCESSORIES

Stroke limiter

Stroke limiter of the spool may be mounted:

- stroke limiter on valve sides **A** and **B** (3-position valve, spring centered) version ...4WEH32...5X/...**10**...
- stroke limiter on valve side **A** (2-position valve - spools: **C**, **D**, **K**, **Z**) version ...4WEH32...5X/...**11**...
- stroke limiter on valve side **B** (2-position valve - spool: **Y**) version ...4WEH32...5X/...**12**...

...4WEH32...5X/...**12**...



Adjustment of the stroke of the main spool is by rotating the pin (3) and securing with locknut (4). Rotating the pin (3) clockwise reduces the stroke of the main spool (2). While adjusting the stroke the control chamber must be at zero pressure.

1 - Stroke limiter body (on valve side **B**)
2 - Spool of the main valve
3 - Pin
4 - Locknut

OVERALL DIMENSIONS OF DIRECTIONAL VALVE WITH OPTIONAL ACCESSORIES

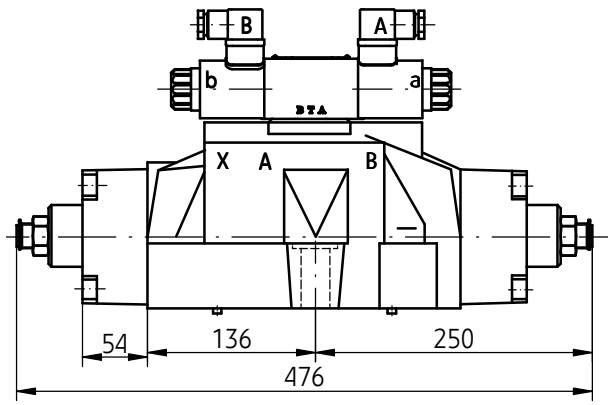
Versions with stroke limiter

3-position directional valves with the main spool spring centered

Stroke limiter may be mounted:

- on valve sides **A** and **B** - version ...4WEH32...**10**...
- on valve side **A** - version ...4WEH32...**11**...
- on valve side **B** - version ...4WEH32...**12**...

...4WEH32...**10**...

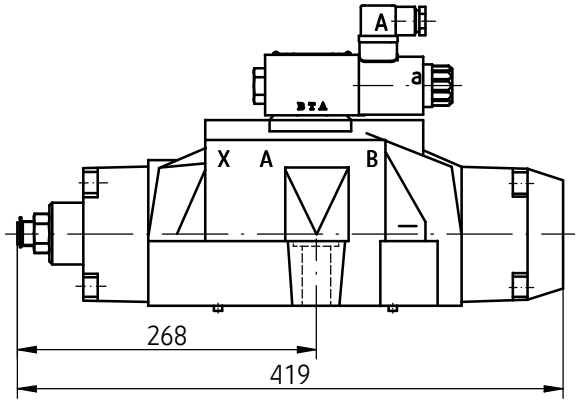


2-position directional valves with the main spool spring positioned - spools: **C**, **D**, **K**, **Z**

Stroke limiter may be mounted:

- on valve side **A** - version ...4WEH32...**11**...

...4WEH32...**11**...

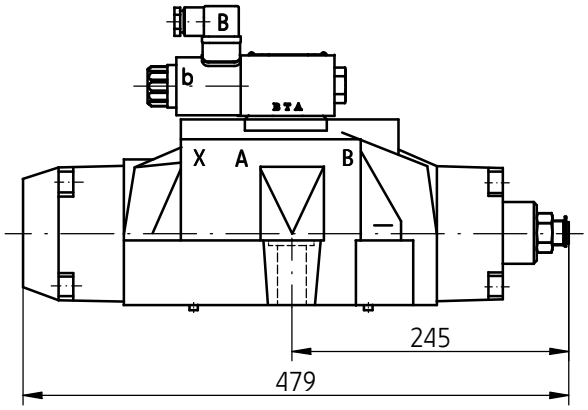


2-position directional valves with the main spool spring positioned - spool **Y**

Stroke limiter may be mounted:

- on valve side **B** - version ...4WEH32...**12**...

...4WEH32...**12**...

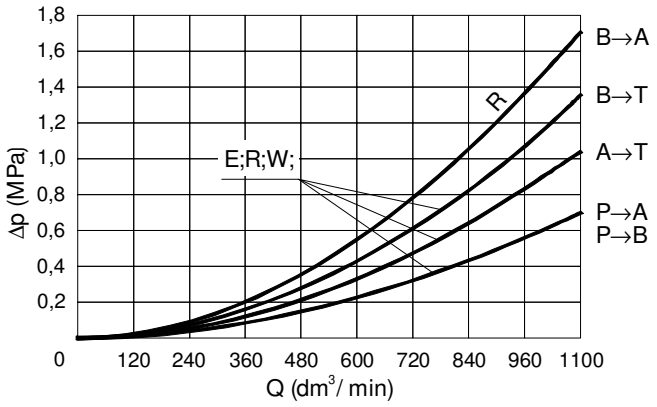


PERFORMANCE CURVES

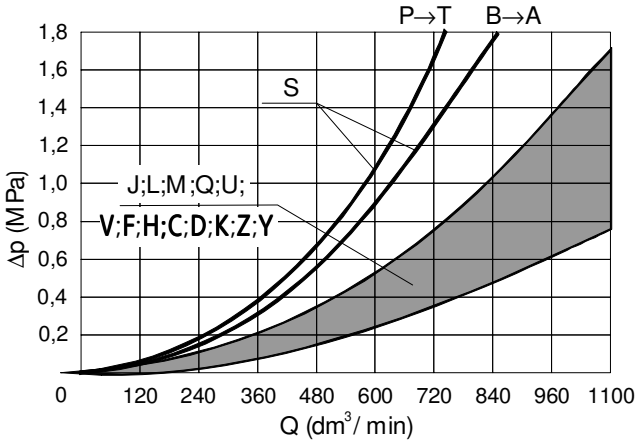
measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

Pressure resistance curves

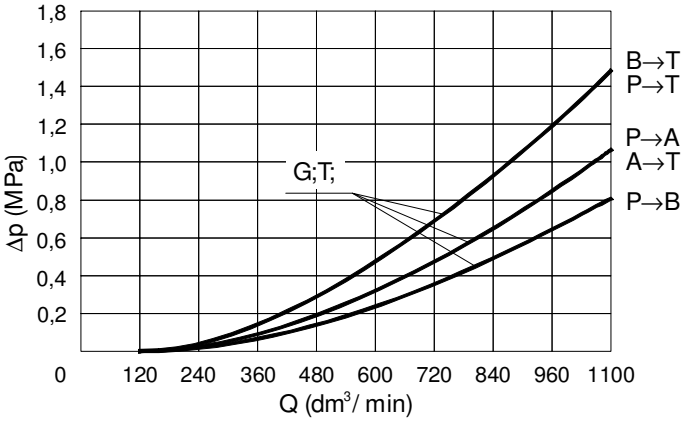
Performance curves **Δp (Q)** for directional valves type **4WEH32...** with spools **E** and **R**



Performance curves **Δp (Q)** for directional valves type **4WEH32...** with spools: **F,H,J,L,M,Q,S,U,V,W,C,D,K,Z,Y**



Performance curves **Δp (Q)** for directional valves type **4WEH32...** with spools **G** and **T**



Flow limits

spool type	pressure **p** [MPa]				
	7	14	21	28	35
	flow rate **Q** [dm³/ min]				
E, J, L, M, Q, R, U, V, W, C, D, K, Z, Y	1100	1050	860	750	680
F, G, H, S, T	820	630	510	450	400

NOTE:

Above flow limits are related to standard application of 4-way directional control valve using two flow directions, e.g. **P** to **A** and simultaneously **B** to **T**. When 4-way directional control valve with only one flow direction is used, e.g. **P** to **A** (**B** plugged) or **A** to **T** (**B** plugged), then the actual flow limits are considerably lower.

HOW TO ORDER

	+ 4	WEH				/				

Version
working pressure
up to 28 MPa = **no designation**
working pressure
up to 35 MPa = **H**

Number of service ports
4-way = **4**

Nominal size (NS)
NS32 = **32**

Type of the main spool
spool schemes - according to **page 6**

Series number
(50-59) - installation and connection dimensions unchanged = 5X
series 52 = **52**

Supply voltage for solenoids at pilot valve
12 V DC = G 12
24 V DC = **G 24**
110 V DC = G 110
110 V AC 50 Hz (plug-in-connector with rectifier) = W 110 R
230 V AC 50 Hz (plug-in-connector with rectifier) = **W 230 R**

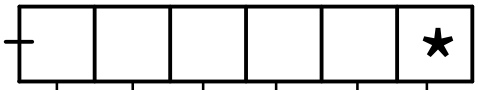
Manual override
solenoids without manual override = no designation
solenoids with manual override = **N**

Pilot oil supply and pilot oil drain
external pilot oil supply, **external pilot oil drain** = **no designation**
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

Switching time adjustment
without switching time adjustment = **no designation**
switching time adjustment as meter-in control = S
switching time adjustment as meter-out control = S2

Electrical connection
plug-in-connector ISO 4400 type without LED = **Z4**
plug-in-connector ISO 4400 type with LED = Z4L

HOW TO ORDER



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

Pressure ratio valve

without pressure ratio valve	= **no designation**
with pressure ratio valve	= D1

Pre-load valve

without pre-load valve	= **no designation**
pre-load valve with cracking pressure 0,45 MPa	= P 4,5
pre-load valve with cracking pressure 0,7 MPa	= P 7

Throttle insert in port P of the pilot valve

without throttle insert	= **no designation**
throttle insert ϕ 0,8	= B 08
throttle insert ϕ 1,0	= B 10
throttle insert ϕ 1,2	= B 12

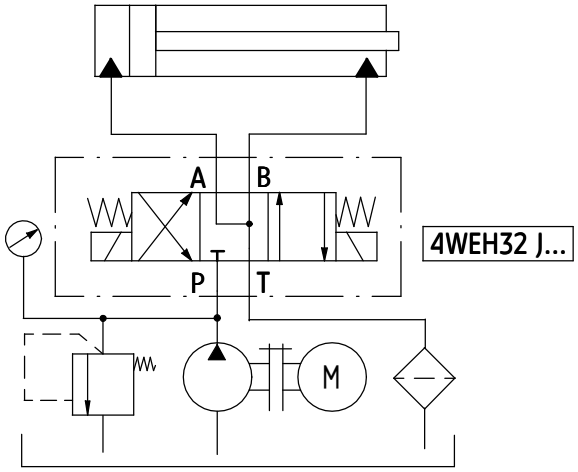
Accessories

without accessories	= **no designation**
stroke limiter on valve sides **A** and **B**	= 10
stroke limiter on valve side **A**	= 11
stroke limiter on valve side **B**	= 12

NOTES:

The directional spool valve should be ordered according to the above coding.
The symbols in bold are preferred versions in short delivery time.
Coding example: H- 4 WEH32 E 52/G24 N ET Z4 D1

EXAMPLE OF APPLICATION IN HYDRAULIC SYSTEM



SUBPLATES AND FIXING SCREWS

Subplates should be ordered according to subplate symbols, given below, taking into account the size of threaded connections. Subplate symbols:

G157/1 - threaded connections P, T, A, B - **G 1 1/2**
X, Y ,L - **G3/8**

G157/2 - threaded connections P, T, A, B - M48 x 2
X, Y ,L - M18 x 1,5

Subplates and fixing screws in accordance with **PN - EN ISO 4762 - M20 x 80 -10,9** - 6 pcs/kit must be ordered separately.
Tightening torque for screws **Md = 580 Nm**

NOTE:
Subplate symbol in bold is the preferred version available in short delivery time.

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