RE 24 751/02.03

Replaces: 08.02

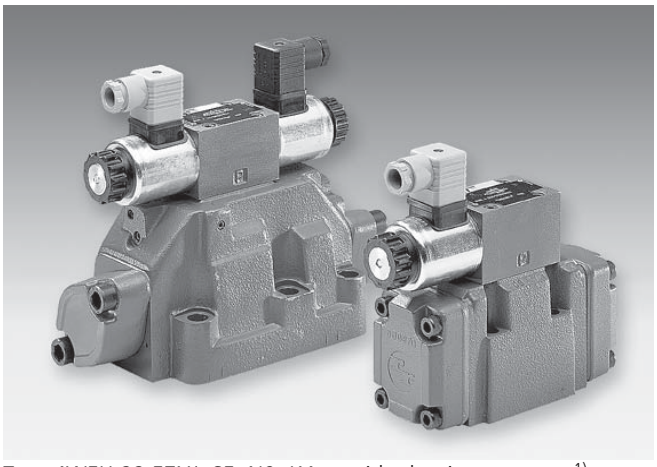
4/2- and 4/3-way directional valves pilot operated, Type 4WEH… externally pilot operated, Type 4 WH…

Nominal sizes 10 to 32

Series 4X; 6X; 7X

Maximum operating pressure 350 bar

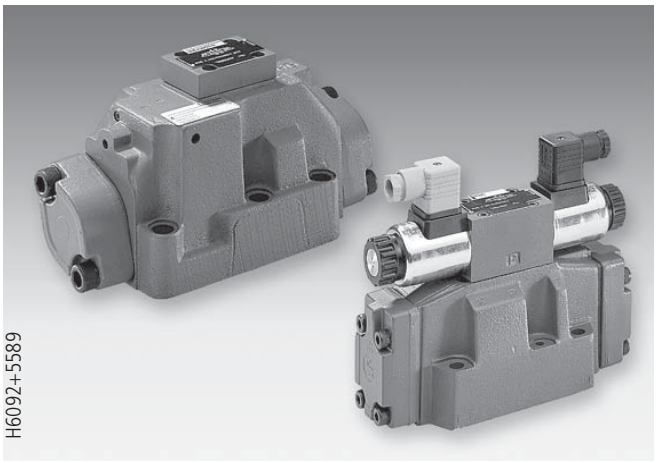
Maximum flow 1100 L/min



H6093

Type 4WEH 22 E7X/..6E..N9..K4… with plug-in connector [1)]

Type 4WEH 10 D4X/..6E..N9..K4… with plug-in connector [1)]



H6092+5589

Type 4WH 22 .7X/…

Type 4WEH 16 .7X/.6E..N9..K4… with plug-in connector [1)]

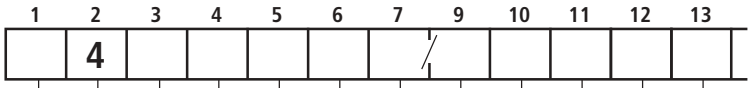
Overview of contents

Features

- Valves used to control the start, stop and direction of a fluid flow
- Electro-hydraulic operation (WEH), hydraulic operation (WH)
- For subplate mounting, Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H, Subplates to catalogue sheets RE 45 054 to RE 45 060 (separate order), see pages 18 to 22
- Spring or pressure centered, spring or hydraulic offset
- Wet pin DC or AC solenoids, optional
- Hand override, optional
- Electrical connections as an individual or central connection (see RE 23 178)
- Switching time adjustment, optional
- Back pressure valve in the P-channel of the main valve, optional
- Accessories to catalogue sheet RE 24 830:
  - Stroke adjustment at the main spool, optional
  - Stroke adjustment and/or end position monitoring, optional
  - Mechanical or inductive limit switch (proximity type) at main spool, optional

[1)] Separate order

Ordering details



Up to 280 bar (not for type 4W.H **25** …) **= No code**
Up to 350 bar **= H –**

4-way version **= 4**

Types of operation
Electro-hydraulic **= WEH**
Hydraulic **= WH**

Nominal sizes
NS 10 **= 10**
NS 16 **= 16**
NS 25 (type 4W.H **22** .7X/…) [1] **= 22**
NS 25 (type 4W.H **25** .6X/…) [2] **= 25**
NS 32 **= 32**

Spool return
By means of springs **= No code**
Hydraulic [3] **= H**

For symbols, see page 4

Series 40 to 49 – NS 10 **= 4X**
(40 to 49: unchanged installation and connection dimensions)

Series 60 to 69 – NS 25 (4W.H **25**.) and NS 32 **= 6X**
(60 to 69: unchanged installation and connection dimensions)

Series 70 to 79 – NS 16 and 25 (4W.H **22**.) **= 7X**
(70 to 79: unchanged installation and connection dimensions)

Spool return in the pilot valve for a 2-position valve and 2 solenoids
Only possible for spools C, D, K, Z and hydraulic spool return in the main valve:

Without spring return **= O**
Without spring return with detent [4] **= OF**

Pilot valve with wet pin solenoids [4]
High performance valve (RE 23 178) **= 6E**

24 V DC [4] **= G24**
230 V AC 50/60 Hz [4] **= W230**
For further voltages, frequencies and electrical data see catalogue sheet RE 23 178

Without hand override **= No code**
With hand override [4] **= N**
With protected hand override [4] **= N9**

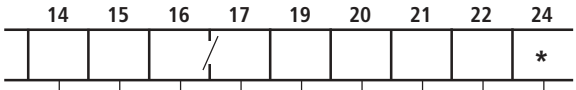
External pilot oil supply, external pilot oil drain [5] **= No code**
Internal pilot oil supply, external pilot oil drain [5; 6] **= E**
Internal pilot oil supply, internal pilot oil drain [6] **= ET**
External pilot oil supply, internal pilot oil drain [5] **= T**

For type 4WH… **only „No code"** possible!

Versions **„ET"** and **„T"** as a 3-position valve with pressure centering are **only** possible, if
$p_{St} \geq 2 \times p_{Tank} + p_{St\ min}$!

p_{St} = Pilot pressure
$p_{St\ min}$ = Pilot pressure, minimum
p_{Tank} = Tank pressure
$p_{ö}$ = Opening pressure

For foot notes see page 3!



Further details in clear text

No code = NBR seals
V = FKM seals
(other seals on request)

⚠ Attention!
The compatibility of the seals and pressure fluid has to be taken into account!

No code = **Without** pressure reducing valve
D3 [7] **=** **With** pressure reducing valve

Back pressure valve (not for NS 10) [4; 7]

No code = **Without** back pressure valve
P4,5 = **With** back pressure valve (p_0 = 4.5 bar)

Throttle insert [4]

No code = **Without** throttle insert
B08 = Throttle Ø 0.8 mm
B10 = Throttle Ø 1.0 mm
B12 = Throttle Ø 1.2 mm
B15 = Throttle Ø 1.5 mm

Accessories
Stroke adjustment, for ordering details see RE 24 830

Accessories
Inductive limit switch, for ordering details see RE 24 830

Electrical connections [4]

K4 [8] **=** Individual connection; with component plug DIN to EN 175301-803, without plug-in connector

No code = **Without** switching time adjustment
S = Switching time adjustment as meter-in control
S2 = Switching time adjustment as meter-out control

1) Standard version

2) High performance version

3)
- 2 switched positions (hydraulic end position): for spools C, D, K, Z, Y
- 3 switched positions (hydraulically centered): only for NS16, NS25 (type H-4W.H **25** …) and NS32

4) This ordering detail only applies to electro-hydraulic operation.

5) When using NS10 valves, with an external pilot oil supply X or an external pilot oil drain, the SO30 version of the sandwich plate must be used. The designation SO30 must be entered at the end of the type designation (sandwich plate).

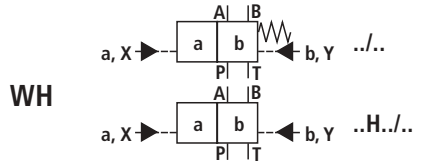
6) With an internal pilot oil supply:
- **Minimum control pressure**: Page 10 must be taken into account!
- In order to avoid excessive pressure peaks, a **throttle insert (B10)** should be provided in the P port of the pilot valve (see page 9).

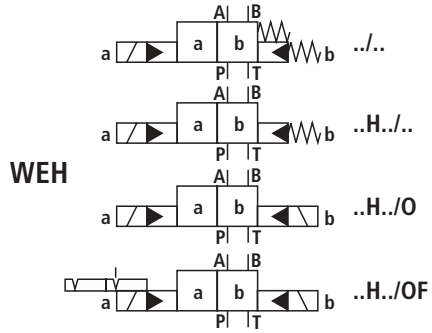
7) Only in conjunction with throttle insert „B10“

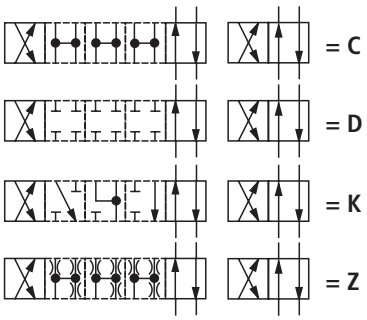
8) Plug-in connectors must be ordered separately (RE 23 178)

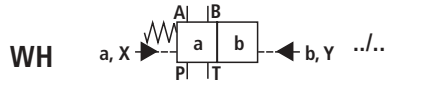
Preferred types, at page 7 and 8, are readily available.

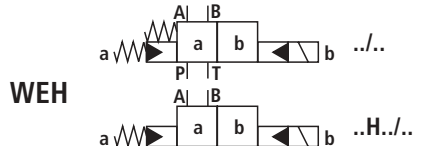
Symbols

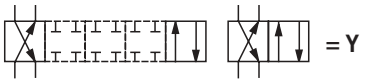


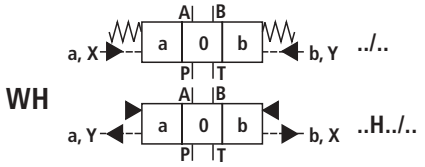


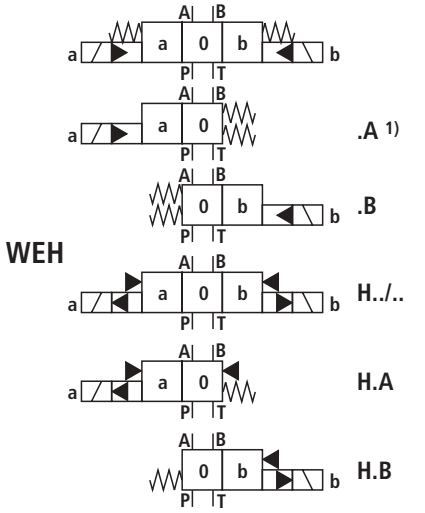


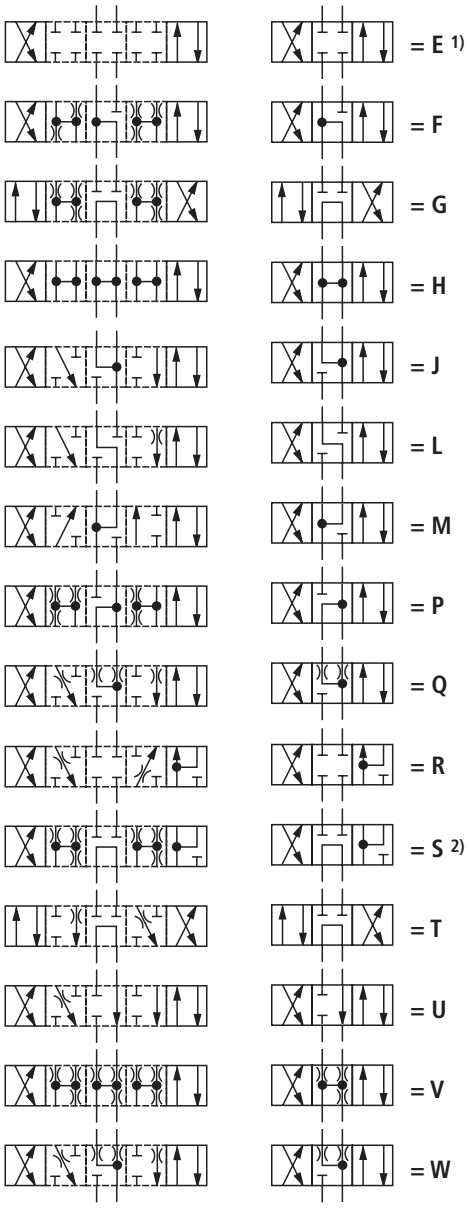








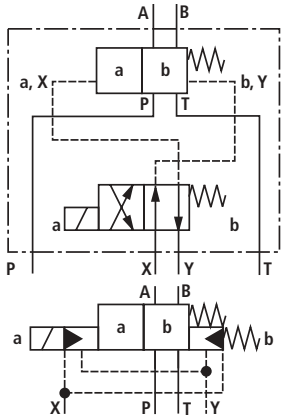
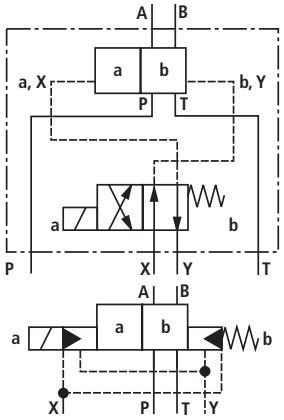
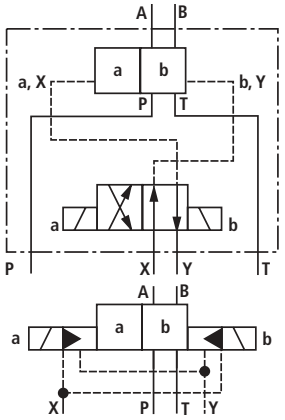
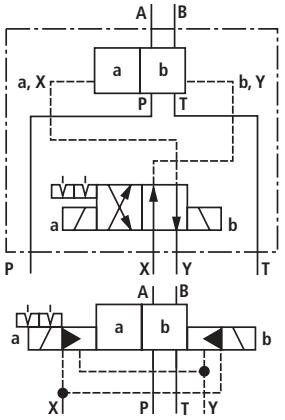
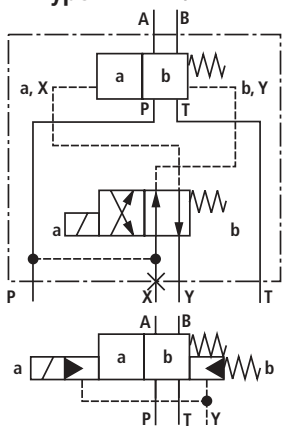
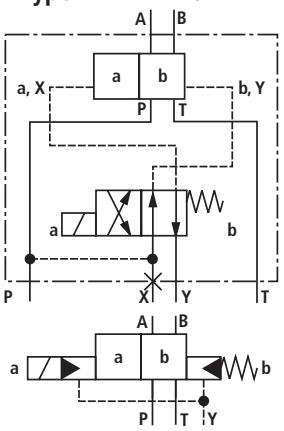
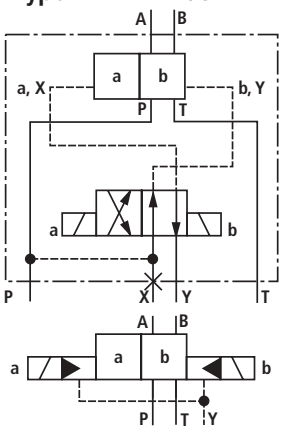
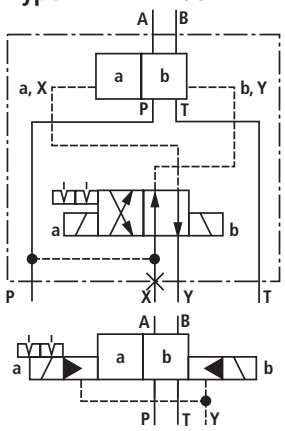
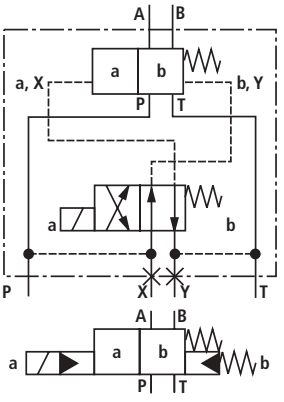
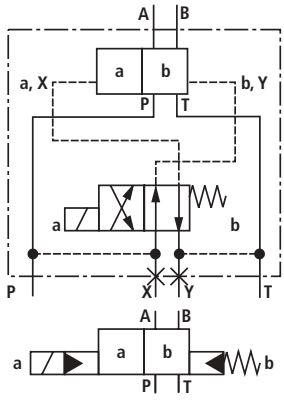
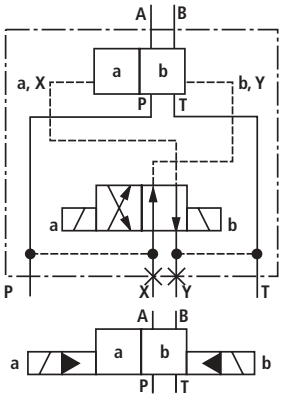
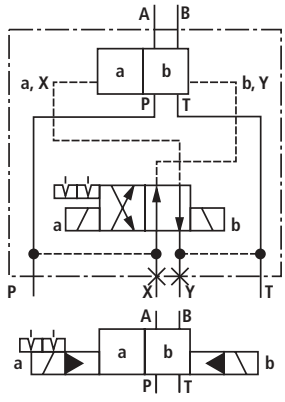
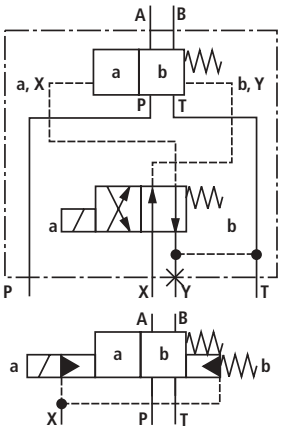
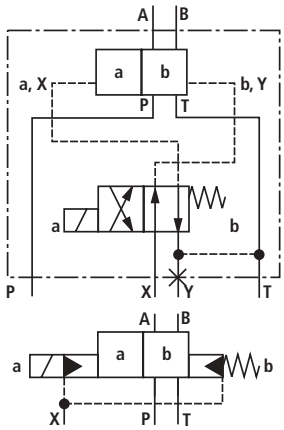
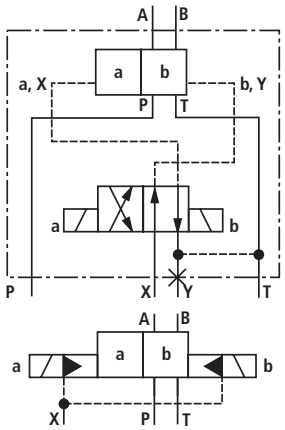
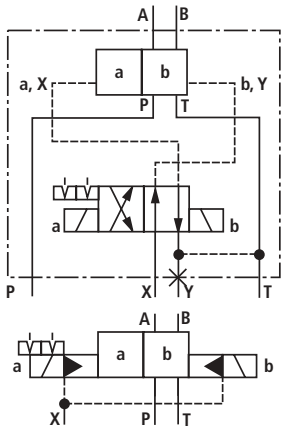




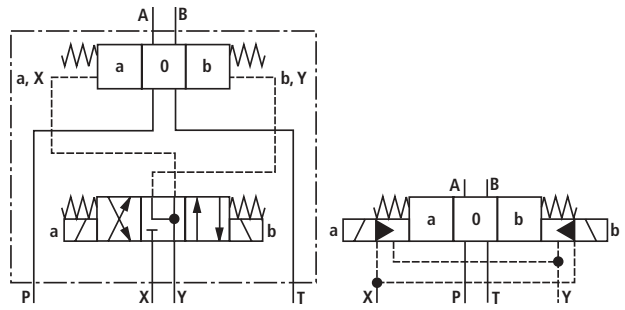
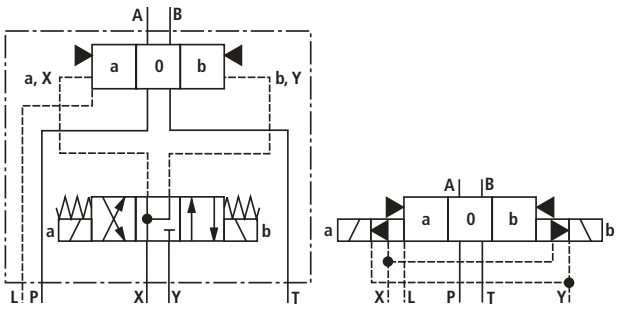
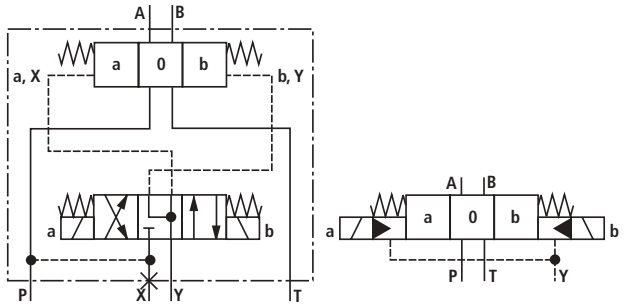
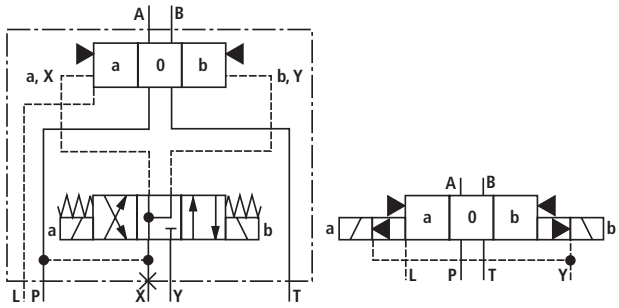
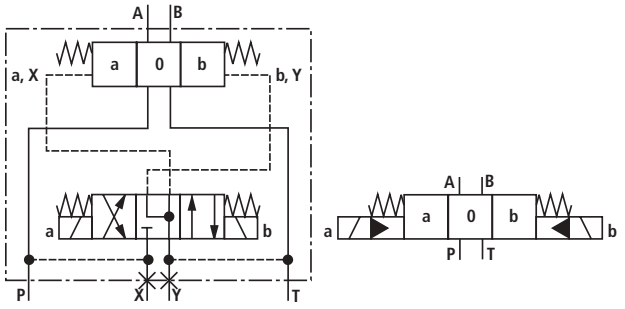
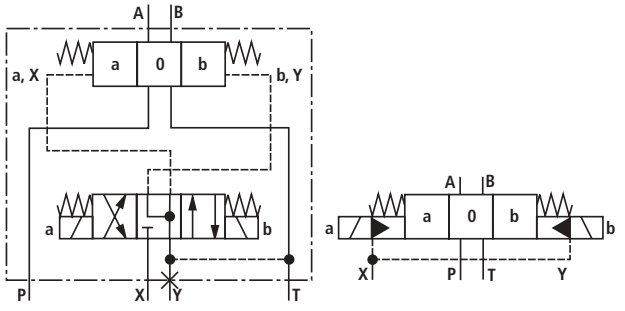
1) Example: Spool E with switched position „a“
Ordering example:
H-4WEH 16 **EA**7X/6EG24N9ETSK4..B10..V..

2) Spool S only for NS16

Symbols with 2 switched positions

	Valves with spring offset	Valves with hydraulic offset		
	Type 4WEH.../...	Type 4WEH..H.../...	Type 4WEH..H.../O...	Type 4WEH..H.../OF...
X = external; **Y** = external				
	Type 4WEH.../...E...	Type 4WEH..H.../...E...	Type 4WEH..H.../O...E...	Type 4WEH..H.../OF...E...
X = internal; **Y** = external				
	Type 4WEH.../...ET...	Type 4WEH..H.../...ET...	Type 4WEH..H.../O...ET...	Type 4WEH..H.../OF...ET...
X = internal; **Y** = internal				
	Type 4WEH.../...T...	Type 4WEH..H.../...T...	Type 4WEH..H.../O...T...	Type 4WEH..H.../OF...T...
X = external; **Y** = internal				

Symbols with 3 switched positions

	Valves with spring centered neutral position	Valves with pressure centered neutral position only NS16, 25 (type 4W.H **25** .6X/…) and 32
X = external; **Y** = external	**Type 4WEH.../...** 	**Type 4WEH..H.../...** 
X = internal; **Y** = external	**Type 4WEH.../...E...** 	**Type 4WEH..H.../...E...** 
X = internal; **Y** = internal	**Type 4WEH.../...ET...** 	3-position valves, pressure centered, preferrably with external pilot oil supply and/or drain (No code., E) For the pre-conditions for internal pilot oil supply and/or drain (ET, T) see pages 3 or 10.
X = external; **Y** = internal	**Type 4WEH.../...T...** 	

Preferred types (readily available)

Typ, Size 10	Material-No.
4WEH 10 C4X/6EG24N9ETK4	R900941581
4WEH 10 C4X/6EG24N9K4	R900925268
4WEH 10 D4X/6EG24N9ETK4	R900926575
4WEH 10 D4X/6EG24N9K4	R900931316
4WEH 10 E4X/6EG24N9ETK4	R900928594
4WEH 10 E4X/6EG24N9K4	R900928168
4WEH 10 G4X/6EG24N9ETK4	R900942019
4WEH 10 G4X/6EG24N9K4	R900961516
4WEH 10 H4X/6EG24N9K4	R900920717
4WEH 10 J4X/6EG24N9ETK4	R900926574
4WEH 10 J4X/6EG24N9K4	R900578288
4WEH 10 M4X/6EG24N9K4	R900754735
4WEH 10 Q4X/6EG24N9ETK4	R900973945
4WEH 10 Q4X/6EG24N9K4	R900924732
4WEH 10 R4X/6EG24N9ETK4	R900952799
4WEH 10 R4X/6EG24N9K4	R900947420
4WEH 10 T4X/6EG24N9K4	R900977227
4WEH 10 V4X/6EG24N9K4	R900958747
4WEH 10 HD4X/6EG24N9ETK4	R900929469
4WEH 10 HD4X/6EG24N9K4	R900957389

Typ, Size 16	Material-No.
4WEH 16 C7X/6EG24N9ETK4	R900922081
4WEH 16 C7X/6EG24N9K4	R900924024
4WEH 16 D7X/6EG24N9ETK4	R900922083
4WEH 16 D7X/6EG24N9K4	R900923989
4WEH 16 E7X/6EG24N9ETK4	R900922084
4WEH 16 E7X/6EG24N9K4	R900923811
4WEH 16 G7X/6EG24N9ETK4	R900926886
4WEH 16 G7X/6EG24N9K4	R900926378
4WEH 16 H7X/6EG24N9ETK4	R900926207
4WEH 16 H7X/6EG24N9K4	R900933198
4WEH 16 J7X/6EG24N9ETK4	R900922085
4WEH 16 J7X/6EG24N9K4	R900925580
4WEH 16 M7X/6EG24N9ETK4	R900926887
4WEH 16 M7X/6EG24N9K4	R900929281
4WEH 16 R7X/6EG24N9ETK4	R900925977
4WEH 16 R7X/6EG24N9K4	R900929283
4WEH 16 T7X/6EG24N9ETK4	R900926888
4WEH 16 T7X/6EG24N9K4	R900942302
4WEH 16 V7X/6EG24N9K4	R900712908
4WEH 16 W7X/6EG24N9ETK4	R900925961
4WEH 16 W7X/6EG24N9K4	R900927092
4WEH 16 K7X/6EG24N9K4	R900963501
4WEH 16 Z7X/6EG24N9K4	R900939796
4WEH 16 HC7X/6EG24N9K4	R900956808
4WEH 16 HD7X/6EG24N9ETK4	R900922079
4WEH 16 HD7X/6EG24N9K4	R900925823

NG 22, 25 and 32 see page 8

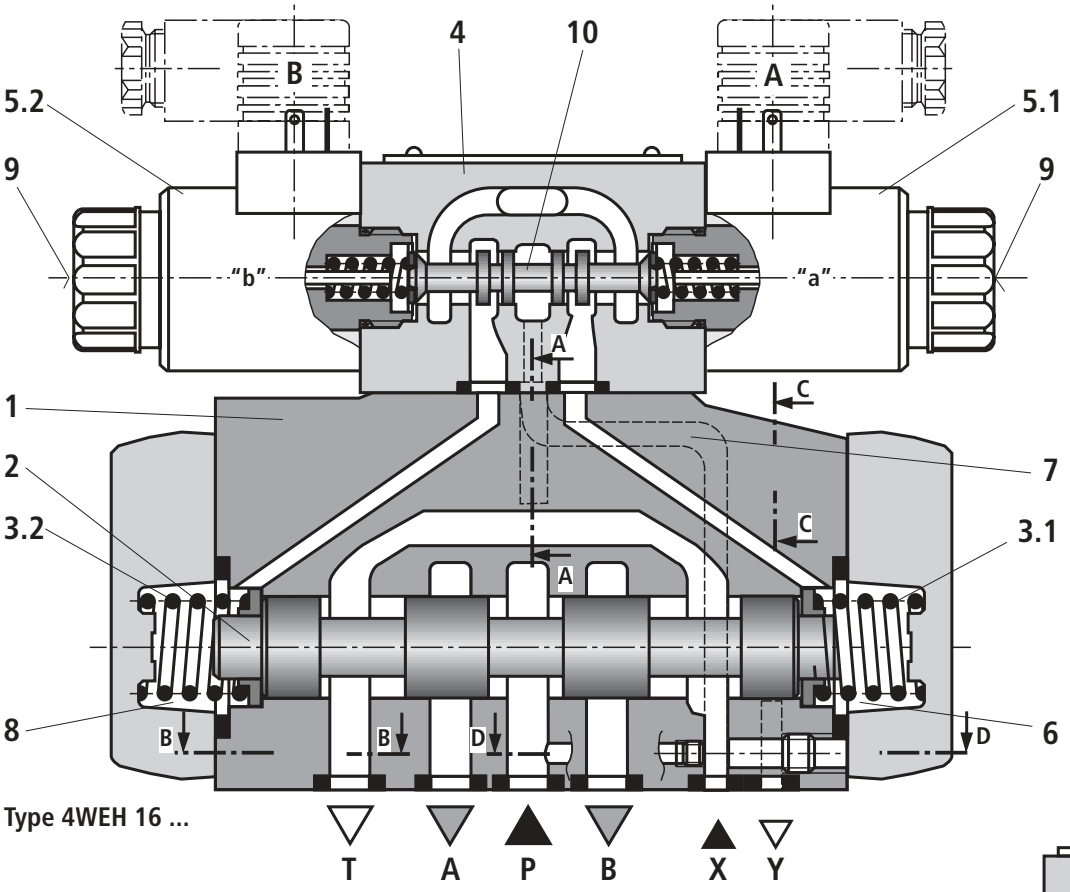
Preferred types (readily available)

Typ, Size 22	Material-No.
4WEH 22 C7X/6EG24N9ETK4/B10	R900722936
4WEH 22 C7X/6EG24N9K4	R900930928
4WEH 22 D7X/6EG24N9ETK4/B10	R900951901
4WEH 22 D7X/6EG24N9K4	R900920169
4WEH 22 E7X/6EG24N9ETK4/B10	R900931338
4WEH 22 E7X/6EG24N9K4	R900981655
4WEH 22 G7X/6EG24N9ETK4/B10P4.5	R900930144
4WEH 22 G7X/6EG24N9K4	R900927611
4WEH 22 H7X/6EG24N9ETK4/B10P4.5	R900730904
4WEH 22 H7X/6EG24N9K4	R900934810
4WEH 22 J7X/6EG24N9ETK4/B10P4.5	R900932049
4WEH 22 J7X/6EG24N9K4	R900916452
4WEH 22 M7X/6EG24N9K4	R900766705
4WEH 22 Q7X/6EG24N9ETK4/B10	R900951218
4WEH 22 Q7X/6EG24N9K4	R900747704
4WEH 22 R7X/6EG24N9ETK4/B10	R900932992
4WEH 22 R7X/6EG24N9K4	R900923680
4WEH 22 W7X/6EG24N9ETK4/B10	R900956272
4WEH 22 W7X/6EG24N9K4	R900978642
4WEH 22 HD7X/6EG24N9ETK4/B10	R900926507
4WEH 22 HD7X/6EG24N9K4	R900925823
4WEH 22 HK7X/6EG24N9ETK4/B10	R900753578
4WEH 22 K7X/6EG24N9ETK4/B10	R900963669
4WEH 22 K7X/6EG24N9K4	R900978132
4WEH 22 Z7X/6EG24N9K4	R900705849

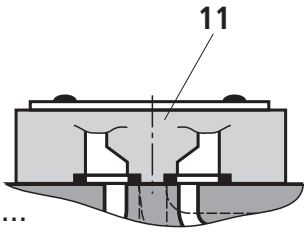
Typ Size 25	Material-No.
H-4WEH 25 C6X/6EG24N9K4	R900924322
H-4WEH 25 D6X/6EG24N9K4	R900907357
H-4WEH 25 E6X/6EG24N9K4	R900932453
H-4WEH 25 G6X/6EG24N9K4	R900936600
H-4WEH 25 H6X/6EG24N9K4	R900949851
H-4WEH 25 J6X/6EG24N9K4	R900929180
H-4WEH 25 Q6X/6EG24N9K4	R900780849
H-4WEH 25 R6X/6EG24N9K4	R900708262
H-4WEH 25 T6X/6EG24N9K4	R900701990
H-4WEH 25 W6X/6EG24N9K4	R900931313
H-4WEH 25 HD6X/6EG24N9K4	R900769948
H-4WEH 25 Z6X/6EG24N9K4	R900921602

Typ, Size 32	Material-No.
4WEH 32 C6X/6EG24N9EK4/B10P4.5	R900700270
4WEH 32 C6X/6EG24N9K4	R900942550
4WEH 32 D6X/6EG24N9EK4/B10	R900957519
4WEH 32 D6X/6EG24N9K4	R900937068
4WEH 32 E6X/6EG24N9ETK4/B10	R900954291
4WEH 32 E6X/6EG24N9K4	R900972539
4WEH 32 G6X/6EG24N9EK4/B10	R900715427
4WEH 32 G6X/6EG24N9K4	R900947978
4WEH 32 H6X/6EG24N9K4	R900951221
4WEH 32 J6X/6EG24N9ETK4/B10	R900932052
4WEH 32 J6X/6EG24N9K4	R900933558
4WEH 32 M6X/6EG24N9EK4/B10	R900766461
4WEH 32 M6X/6EG24N9K4	R900947975
4WEH 32 Q6X/6EG24N9ETK4/B10	R900961918
4WEH 32 Q6X/6EG24N9K4	R900702114
4WEH 32 R6X/6EG24N9ETK4/B10	R900966086
4WEH 32 W6X/6EG24N9K4	R900732830
4WEH 32 HC6X/6EG24N9K4	R900916934
4WEH 32 HDR6X/6EG24N9ETK4/B10	R900968228
4WEH 32 HDC6X/6EG24N9K4	R900949136

Further preferred types and standard units are to be found in the EPS (Standard Price List).



Type 4WEH 16 ...



Type 4WH…

Directional valves, type 4WEH…

Valves of type WEH are directional spool valves with electro-hydraulic operation. They control the start, stop and direction of a flow.

The directional valves basically consist of the main valve with housing (1), main control spool (2), one or two return springs (3.1) and (3.2), and the pilot valve (4) with one or two solenoids „a" (5.1) and/or „b" (5.2).

The main control spool (2) in the main valve is held in the neutral or in the initial position either by the springs or by means or pressure. In the initial position, the two spring chambers (6) and (8) are connected to the tank without pressure via the pilot valve (4). The pilot valve is supplied with pilot fluid via the pilot line (7). The pilot oil supply can be either internal or external (external via port X).

When the pilot valve is operated, e. g. solenoid „a", the pilot spool (10) is moved to the left and thus spring chamber (8) is pressurised with pilot pressure. Spring chamber (6) remains unpressurised.

The pilot pressure acts on the left hand side of the main control spool (2) and pushes it against the spring (3.1). As a consequence, the ports P to B and A to T are connected in the main valve.

When the solenoid is de-energised, the pilot spool returns to its initial position (exception: detented spool). The spring chamber (8) is unloaded to tank.

The pilot oil is expelled from the spring chamber via the pilot valve into the Y channel.

The pilot oil supply and drain are internal or external (external via port Y).

An optional hand override (9) permits the pilot spool (10) to be operated without energising the solenoid.

Directional valves, type 4WH…

Valves of type WH are directional spool valves with hydraulic operation. They control the start, stop and direction of a flow.

The directional valves basically consist of the valve housing (1), the main control spool (2), one or two return springs (3.1) and (3.2) in the case of valves with spring return or spring centring, and the inter-connecting plate (11).

The control spool (2) is operated directly by means of hydraulic pressure.

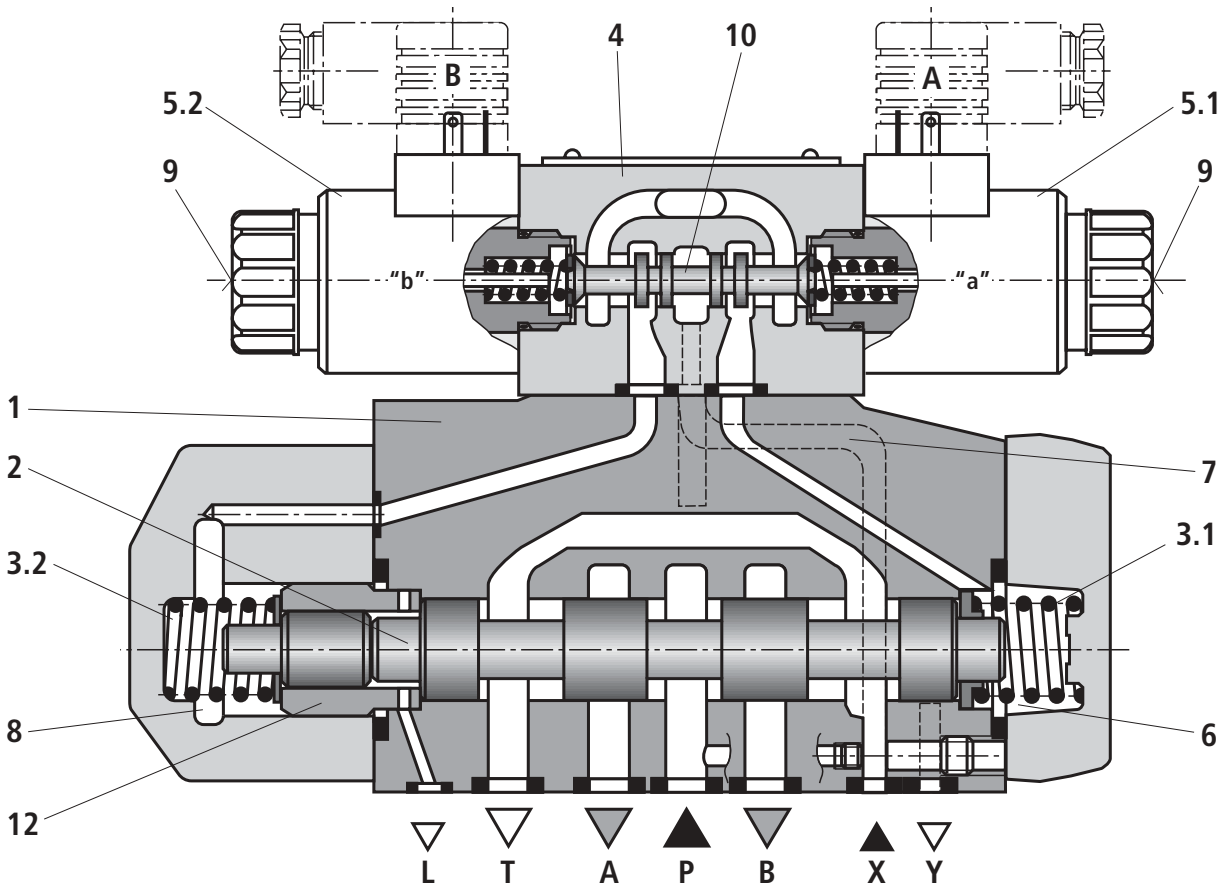
The control spool (2) is held in the neutral or in the inital position either by springs or by means of pressure. Pilot oil supply and pilot oil drain are external (see page 9).

4/3-way directional valve with spring centring of the control spool

In this model, the main control spool (2) is held in the neutral position by two return springs (3.1) and (3.2). The two spring chambers (6) and (8) are connected to ports X and Y via the inter-connecting plate (11).

When one of the two ends of the main control spool (2) is pressurised with pilot pressure, the spool is moved to the switched position. The required ports in the valve are then opened to flow.

When the pilot pressure is removed, the spring on the opposite side to the pressurised spool area causes the spool to return to its neutral or initial position.



4/3-way directional valve with pressure centring of the main control spool, type 4WEH…H

The main control spool (2) in the main valve is held in the neutral position by pressurisation of the two end faces. A centring sleeve (12) is supported in the housing and holds the spool in position.

By removing the pressure from one of the spool ends, the main control spool (2) is moved to the shifted position.

The unloaded spool area displaces the returning pilot oil via the pilot valve into the Y-channel (external).

Pilot oil supply

Type 4WH…
The pilot oil supply is **external** via channels X and Y.

Type 4WEH…
The pilot oil drain is **external** via channel X from a separate circuit.
The pilot oil drain is **external** via channell Y to tank.

Type 4WEH…E…
The pilot oil supply is **internal** from channel P of the main valve. (see also page 11, foot notes [3) and 4)])

The pilot oil drain is **external** via channel Y to tank. Port X in the subplate is plugged.

Conversion from external to internal or from internal to external pilot oil supply for **NS16**: Remove the cover on the solenoid side „B", Remove or fit the plug (2) and replace the cover.

Type 4WEH…ET…
The pilot oil supply is **internal** from channel P of the main valve.

The pilot oil drian is **internal** via channel T to tank. Ports X and Y in the subplate are plugged.

Type 4WEH…T…
The pilot oil supply is **external** via channel X from a separate circuit.

The pilot oil drain is **internal** via channel T to tank. Port Y is the subplate is plugged.

1 Plug M6 DIN 906–8.8, 3A/F – pilot oil drain

2 Plug M6 DIN 906–8.8, 3A/F – pilot oil supply

3 Plug M8 x 1 DIN 906–8.8, 4A/F – for external sealing

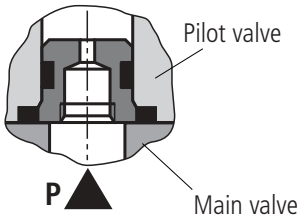
Tightening torque M_A for cover fixing screws:

NS16: 35 Nm; **NS25**: 68 Nm

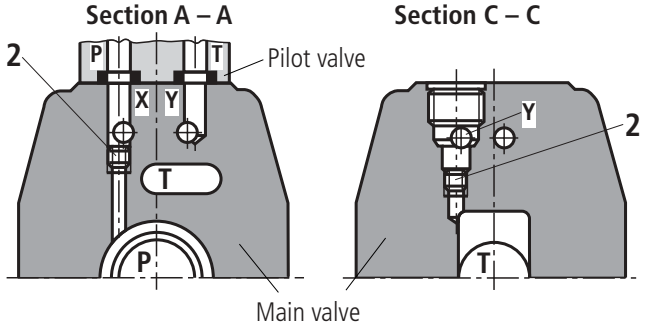
Tightening torque M_A for pilot valve fixing screws:
NS 10 to 32: 9 Nm

Throttle insert

The use of a throttle insert is required if the pilot oil supply in the P channel of the pilot valve is to be limited (see page 3, [6)]). This throttle is inserted in the P channel of the pilot valve.



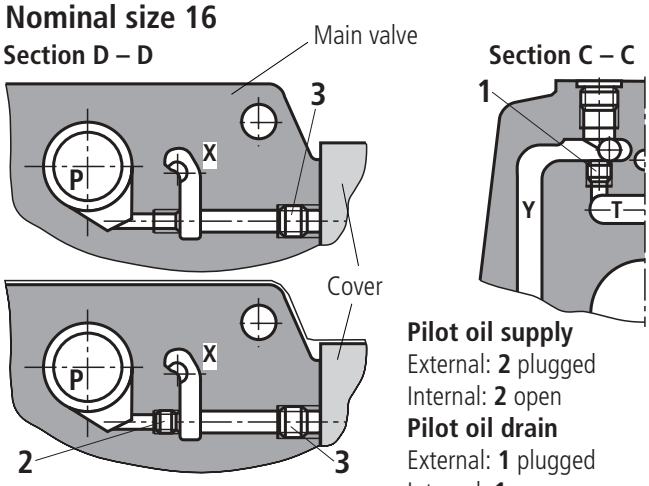
Nominal size 10



Pilot oil supply
External: **2** plugged
Internal: **2** open

Pilot oil drain
External: **1** plugged
Internal: **1** open

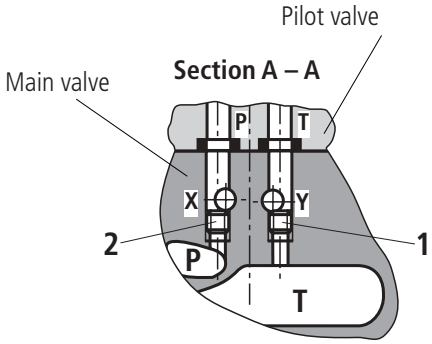
Nominal size 16



Pilot oil supply
External: **2** plugged
Internal: **2** open

Pilot oil drain
External: **1** plugged
Internal: **1** open

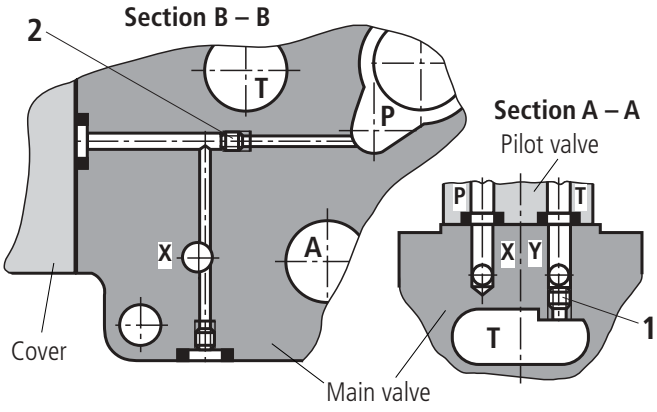
Nominal size 25
(type 4W.H **22** .7X/…)



Pilot oil supply
External: **2** plugged
Internal: **2** open

Pilot oil drain
External: **1** plugged
Internal: **1** open

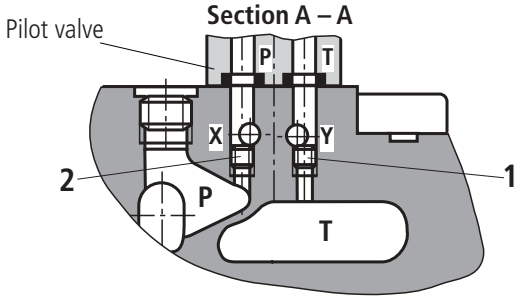
Nominal size 25 (type 4W.H **25** .6X/…)



Pilot oil supply
External: **2** plugged
Internal: **2** open

Pilot oil drain
External: **1** plugged
Internal: **1** open

Nominal size 32



Pilot oil supply
External: **2** plugged
Internal: **2** open

Pilot oil drain
External: **1** plugged
Internal: **1** open

Technical data (for applications outside these parameters, please consult us!)

General

Nominal sizes				**NS10**	**NS16**	**NS25** 4W.H **22**…	**NS25** 4W.H **25**…	**NS32**
Weight	Valve with one solenoid		kg	Approx. 6.4	Approx. 8.5	Approx. 11.5	Approx. 17.6	Approx. 40.5
	Valve with two solenoids, spring centered		kg	Approx. 6,8	Approx. 8.9	Approx. 11.9	Approx. 18.0	Approx. 41.0
	Valve with two solenoids, pressure centered		kg	Approx. 6.8	Approx. 8.9	Approx. 11.9	Approx. 19.0	Approx. 41.0
	Valve with hydraulic operation (4WH…)		kg	Approx. 5.5	Approx. 7.3	Approx. 10.5	Approx. 16.5	Approx. 39.5
	Switching time adjustment		kg	Approx. 0.8	Approx. 0.8	Approx. 0.8	Approx. 0.8	Approx. 0.8
	Pressure reducing valve		kg	Approx. 0.4	Approx. 0.4	Approx. 0.4	Approx. 0.4	Approx. 0.4
Installation				Optional; horizontal with hydraulic spool return „H“ and symbols C, D, K, Z, Y				
Ambient temperataure range			°C	– 30 to + 50				
Hydraulic								
Max. operating pressure – Ports P, A, B	Type 4WEH		bar	280	280	280	–	280
	Type H-4WEH		bar	350	350	350	350	350
– Port T	With external pilot oil drain Y		bar	315 [5]	250	250	250	250
	With internal pilot oil drain Y [1]		bar	210 DC; 160 AC				
– Port Y	With external pilot oil drain:		bar	210 DC; 160 AC				
	Type 4WH		bar	250	250	210	250	250
Pressure fluid				Mineral oil (HL, HLP) to DIN 51 524 [6]; Fast bio-degradable pressure fluids to VDMA 24 568 (see also RE 90 221); HETG (rape seed oil) [6]; HEPG (polyglycols) [7]; HEES (synthetic ester) [7]; Other pressure fluids on request				
Pressure fluid temperature range			°C	– 30 to + 80 (for NBR seals)				
				– 20 tos + 80 (for FKM seals)				
Viscosity range			mm^2/s	10 to 800				
Cleanliness class to ISO code				Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15 [8]				
Maximum control pressure (with higher control pressures a pressure reducing valve must be used.)			bar	250	250	210	250	250
Minimum control pressure – External pilot oil supply X, internal pilot oil supply X (for spools: D, K, E, J, L, M, Q, R, U, W)								
	3-position valves, spring-centred	Type H-4WEH…	bar	10	14	12.5	13	8.5
		Type 4WEH…	bar	10	14	10.5	13	8.5
	3-position valves, pressure-centered		bar	–	14	–	18	8.5
	2-position valves with spring offset	Type H-4WEH…	bar	10	14	14	13	10
		Type 4WEH…	bar	10	14	11	13	10
	2-position valves hydraulic offset		bar	7	14	8	8	5
	– Internal pilot oil supply X (for spools C, F, G, H, P, T, V, Z, S [2])		bar	4.5 [3]	4.5 [4]	4.5 [4]	4.5 [4]	4.5 [4]

Explanation of the footnotes, see page 13!

Technical data (for applications outside these parameters, please consult us!)

Hydraulic

Nominal sizes		**NS10**	**NS16**		**NS25** 4W.H **22**…	**NS25** 4W.H **25**…		**NS32**	
Switching pilot oil volume									
– 3-position valve, spring centered	cm^3	2.04	5.72		7.64	14.2		29.4	
– 2-position valve	cm^3	4.08	11.45		15.28	28.4		58.8	
– 3-position valve, pressure centered	cm^3		WH	WEH		WH	WEH	WH	WEH
From the neutral position to the switched position „a“	cm^3	–	2.83	2.83	–	7.15	7.15	14.4	14.4
From the switched position „a“ to the neutral position	cm^3	–	5.72	2.9	–	14.18	7.0	29.4	15.1
From the neutral position to the switched position „b“	cm^3	–	5.72	5.72	–	14.18	14.15	29.4	29.4
From the switched position „b“ to the neutral position	cm^3	–	8.55	2.83	–	19.88	5.73	43.8	14.4
Pilot oil flow for the shortest switching time	L/min	Approx. 35	Approx. 35		Approx. 35	Approx. 35		Approx. 45	

1) As a 3-position valve, pressure centring is only possible when $p_{St} \geq 2 \times p_{Tank} + p_{St\ min}$.

2) Spool S, only for NS16

3) For symbols C, F, G, H, P, T, V, Z internal pilot oil supply is only possible when the flow from P to T, in the mid position (for 3-position valve) or during moving through the mid position (for 2-position valves), when the flow is high enough so that the pressure differential from P to T reaches a minimum value of 6.5 bar.

4) For spools C, F, G, H, P, T, V, Z, S [2] – via a back pressure value (not NS10) or appropriately high flows

5) Type 4WEH 10...: 280 bar
Type H-4WEH 10...: 315 bar

6) Suitable for NBR **and** FKM seals

7) **Only** suitable for FKM seals

8) The cleanliness class stated for the components must be adhered too in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.
For the selection of filters see catalogue sheets RE 50 070, RE 50 076 and RE 50 081.

Switching times (= from contact received at the pilot valve up to start of opening at the control land on the main valve)

Nominal size 10 – AC (~) and DC (=)

Control pressure	bar	70		140		210		250	
Voltage type		~	=	~	=	~	=	~	=
Valve switching time from the neutral position to the switched position									
– 3-position valve	ms	30	65	25	60	20	55	15	50
– 2-position valve	ms	35	80	30	75	25	70	20	65
Valve switching time from the switched position to the neutral position									
– 3-position valve	ms	30	30	30	30	30	30	30	30
– 2-position valve	ms	35	40	30	35	25	30	20	25

Nominal size 16 – AC (~) and DC (=)

Control pressure	bar	70		140		210		250	
Voltage type		~	=	~	=	~	=	~	=
Valve switching time from the neutral position to the switched position									
– 3-position valve, spring centered	ms	25…30	40	25…30	40	25…30	40	20…25	40
– 2-position valve	ms	30…35	55	30…35	55	30…35	55	25…30	50
– 3-position valve, pressure centered „0“ to „a“	ms	30	40	30	40	30	35	30	35
„0“ to „b“	ms	30	40	30	40	30	40	30	40
Valve switching time from the switched position to the neutral position									
– 3-position valve, spring centered	ms	35…50	45	35…50	45	30…45	40	30…45	35
– 2-position valve	ms	35…50	45	35…50	45	30…45	40	30…45	35
– 3-position valve, pressure centered „0“ to „a“ or „b“ to „0“	ms	20…35	20	20…55	20	20…35	20	20…35	20

Technical data (for applications outside these parameters, please consult us!)

Switching times (= from contact received at the pilot valve up to start of opening at the control land on the main valve)

Nominal size 25 (type 4W.H **22**…) – AC (~) and DC (=)

Control pressure	bar	35		70		140		210	
Voltage type		~	=	~	=	~	=	~	=
Valve switching time from the neutral position to the switched position									
– 3-position valve, spring centered	ms	50	100	40	80	35	65	30	60
– 2-position valve	ms	100	160	90	110	75	95	70	85
Valve switching time from the switched position to the neutral position									
– 3-position valve, spring centered	ms	35…50	35	35…50	35	35…50	35	35…50	35
– 2-position valve	ms	90…105	95	65…80	70	50…65	55	45…60	50

Nominal size 25 (type 4W.H **25**…) – AC (~) and DC (=)

Control pressure	bar	70		140		210		250	
Voltage type		~	=	~	=	~	=	~	=
Valve switching time from the neutral position to the switched position									
– 3-position valve, spring centered	ms	50	85	40	75	35	70	30	65
– 2-position valve	ms	120	160	100	130	85	120	70	105
– 3-position valve, pressure centered									
„0" to „a"	ms	30	55	30	55	25	50	25	50
„0" to „b"	ms	35	65	35	65	30	60	30	60
Valve switching time from the switched position to the neutral position									
– 3-position valve, spring centered	ms	40…55	40	40…55	40	40…55	40	40…55	40
– 2-position valve	ms	35…50	45	35…50	45	30…45	40	30…45	35
– 3-position valve, pressure centered									
„0" to „a" or „b" to „0"	ms	30…50	30	30…50	30	30…50	30	30…50	30

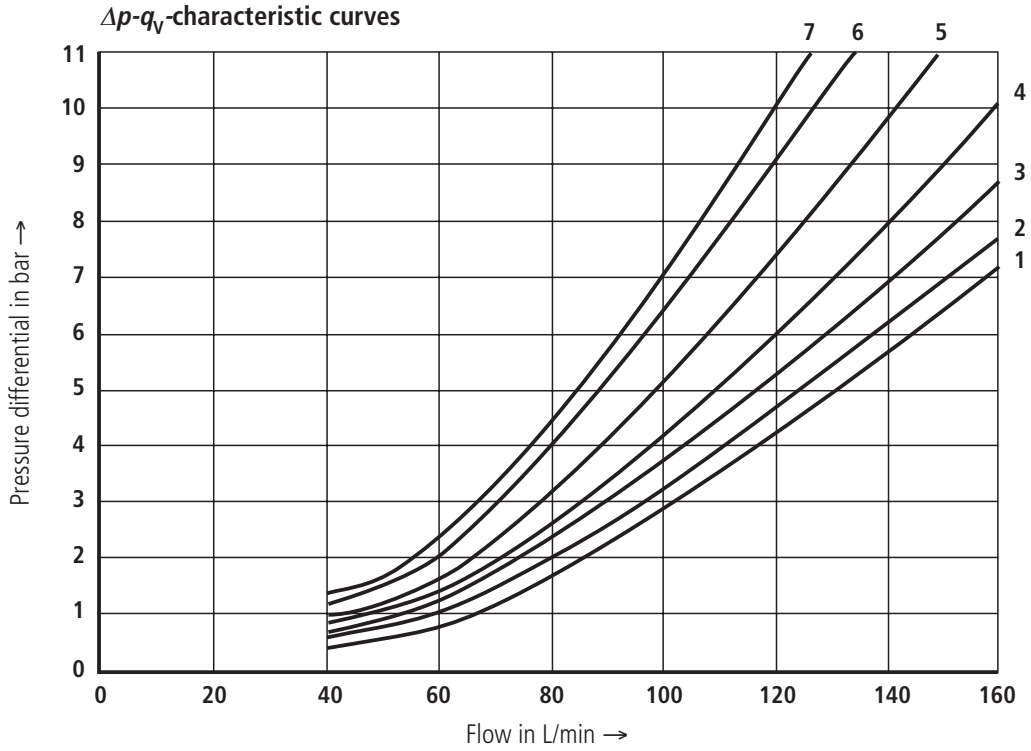
Nominal size 32 – AC (~) and DC (=)

Control pressure	bar	70		140		210	
Voltage type		~	=	~	=	~	=
Valve switching time from the neutral position to the switched position							
– 3-position valve, spring centered	ms	65	80	50	90	35	105
– 2-position valve	ms	100	130	75	100	60	115
– 3-position valve, pressure centered							
„0" to „a"	ms	55	100	40	85	35	85
„0" to „b"	ms	60	105	45	95	40	95
Valve switching time from the switched position to the neutral position							
– 3-position valve, spring centered	ms	60…75	50	60…75	50	60…75	50
– 2-position valve	ms	115…130	90	85…100	70	65…80	65
– 3-position valve, pressure centered							
„a" to „0"	ms	30…65	30	60…90	30	105…155	50
„b" to „0"	ms	30…65	40	60…90	30	105…155	50

Free-flow cross-section in the neutral position for spool types Q, V and W

Spool **Q**	A – T; B – T	mm^2	13	32	78	83	78
Spool **V**	A – T; B – T	mm^2	13	32	73	83	73
	P – A; P – B	mm^2	13	32	84	83	84
Spool **W**	A – T; B – T	mm^2	2.4	6	10	14	20

Characteristic curves: type 4WEH 10 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)



Spools	Switched position				Spools	Neutral position		
	P – A	P – B	A – T	B – T		A – T	B – T	P – T
E, Y, D	2	2	4	5				
F	1	4	1	4	**F**	3	–	6
G, T	4	2	2	6	**G, T**	–	–	7
H, C	4	4	1	4	**H**	1	3	5
J, K	1	2	1	3				
L	2	3	1	4	**L**	3	–	–
M	4	4	3	4				
P	4	1	3	4	**P**	–	7	5
Q, V, W, Z	2	2	3	5				
R	2	2	3	–				
U	3	3	3	4	**U**	–	4	–

Performance limits: type 4WEH 10 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

2- and 3-position valves
Maximum flow q_V in L/min

Spools	Operating pressure p_{max} in bar 200	250	315
E, J, L, M, Q, R, U, V, W, C, D, K, Z, Y	160	160	160
H	160	150	120
G, T	160	160	140
F, P	160	140	120

General:

⚠ Attention!

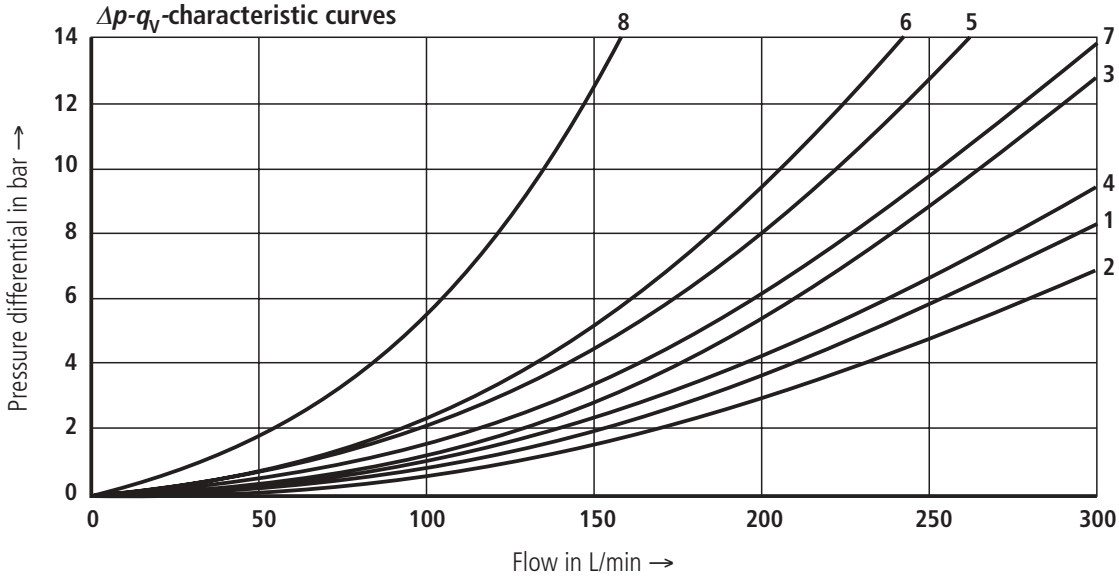
The switching power limits given are for applications featuring two flow directions (e. g. from P to A and simultaneous return flow from B to T).

Due to the flow forces active within the valves, the permitted power limit for directional valves may be considerably less where there is only one direction of flow (e. g. from P to A and port B blocked)!

(Please consult us for applications of this kind!)

The power limit for directional valves was determined using solenoids at their operating temperature, 10% under voltage and with no pre-loading of the tank.

Characteristic curves: type 4WEH 16 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)



Spools	Switched position				
	P – A	P – B	A – T	B – T	P – T
E, D, Y	1	1	1	3	–
F	2	2	3	3	–
G, T	5	1	3	7	6
H, C, Q, V, Z	2	2	3	3	–
J, K, L	1	1	3	3	–

Spools	Switched position				
	P – A	P – B	A – T	B – T	P – T
M, W	2	2	4	3	–
R	2	2	4	–	–
U	1	1	4	7	–
S	4	4	4	–	8

Performance limits: type 4WEH 16 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

2-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar				
	70	140	210	280	350
X external – Spring offset in main valve (at $p_{St\,min}$ = 12 bar)					
C, D, K, Y, Z	300	300	300	300	300
X external – Spring offset in main valve [1]					
C	300	300	300	300	300
D, Y	300	270	260	250	230
K	300	250	240	230	210
Z	300	260	190	180	160
X external – hydraulic offset in main valve					
HC, HD, HK, HZ, HY	300	300	300	300	300

For performance limits see „General" on page 13.

3-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar				
	70	140	210	280	350
X external – spring-centered					
E, H, J, L, M, Q, U, W, R	300	300	300	300	300
F, P	300	250	180	170	150
G, T	300	300	240	210	190
S	300	300	300	250	220
V	300	250	210	200	180
X external – pressure-centered (at a min. control pressure of 16 bar)					
All spools [2]	300	300	300	300	300

⚠ Attention!

[1] If the stated flow values are exceeded then it is not possible to guarantee the return spring function if the pilot pressure fails!

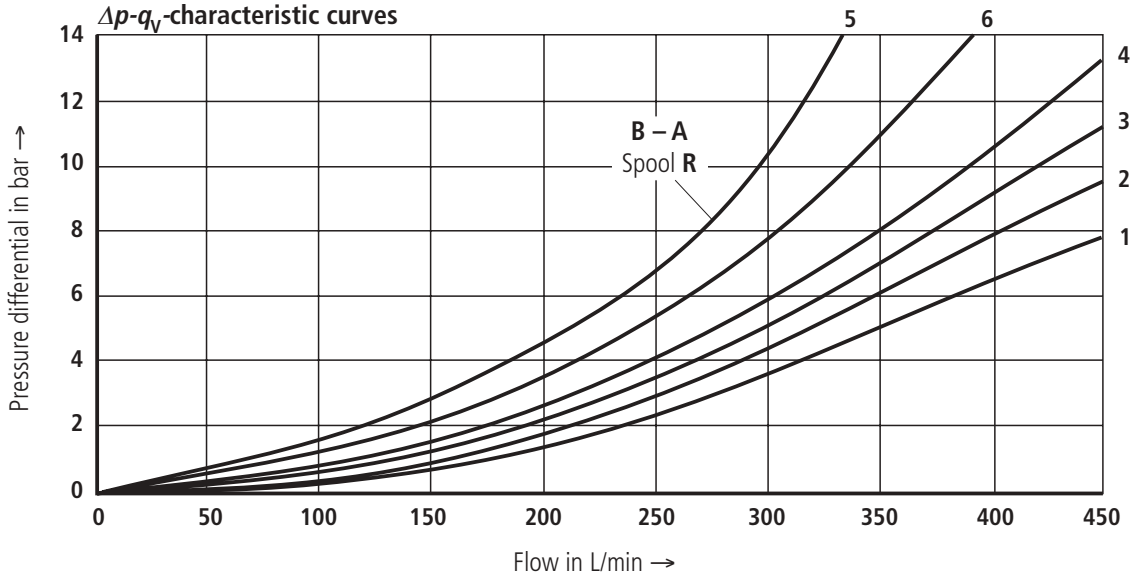
- With an **X internal** pilot oil supply and due to the negative overlap of the spools C, Z and HC, HZ and flows < 160 L/min a back pressure valve must be fitted.

⚠ Attention!

- When using a 4/3-way directional valve, with pressure centring of the control spool in the main valve, which exceeds the stated performance limits, a higher pilot pressure is required. So for, e.g. with an operating pressure of p_{max} = 350 bar and a flow of q_V = 300 L/min, a pilot pressure of 16 bar is required. The maximum flow for this valve is only dependent on the Δp value which the system can accept.
- With an **X internal** pilot oil supply and due to the negative overlap of the spools F, G, M, P and S a back pressure valve must be fitted.

[2] The back pressure valve is **not** required for flows > 160 L/min for the V spool.

Characteristic curves: type 4WEH 22 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)



Spools	Switched position			
	P – A	P – B	A – T	B – T
E, M, P, Q, U, V	2	2	1	4
F	1	2	1	2
G, T	2	2	2	4
H, J, W	2	2	1	3
L	2	2	1	2
R	1	2	1	–

Spools	Neutral position		
	A – T	B – T	P – T
F	–	–	4
G, P	–	–	6
H	–	–	2
L	4	–	–
T	–	–	5
U	–	6	–

Performance limits: type 4WEH 22 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

2-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar				
	70	140	210	280	350
X external – Spring offset in main valve (at $p_{St\ min}$ = 11 bar / 14 bar)					
C, D, K, Y, Z	450	450	450	450	450
X external – Spring offset in main valve [1]					
C	450	450	320	250	200
D, Y	450	450	450	400	320
K	450	215	150	120	100
Z	350	300	290	260	160
X external – hydrualic offset in main valve					
HC, HD, HK, HZ, HY	450	450	450	450	450
HC../O..	450	450	450	450	450
HD../O..	450	450	450	450	450
HK../O..	450	450	450	450	450
HZ../O..	450	450	450	450	450
HC../OF..	450	450	450	450	450
HD../OF..	450	450	450	450	450
HK../OF..	450	450	450	450	450
HZ../OF..	450	450	450	450	450

3-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar				
	70	140	210	280	350
X external – spring-centered					
E, J, L, M, Q, U, W, R	450	450	450	450	450
H	450	450	300	260	230
G	400	350	250	200	180
F	450	270	175	130	110
V	450	300	240	220	160
T	400	300	240	200	160
P	450	270	180	170	110

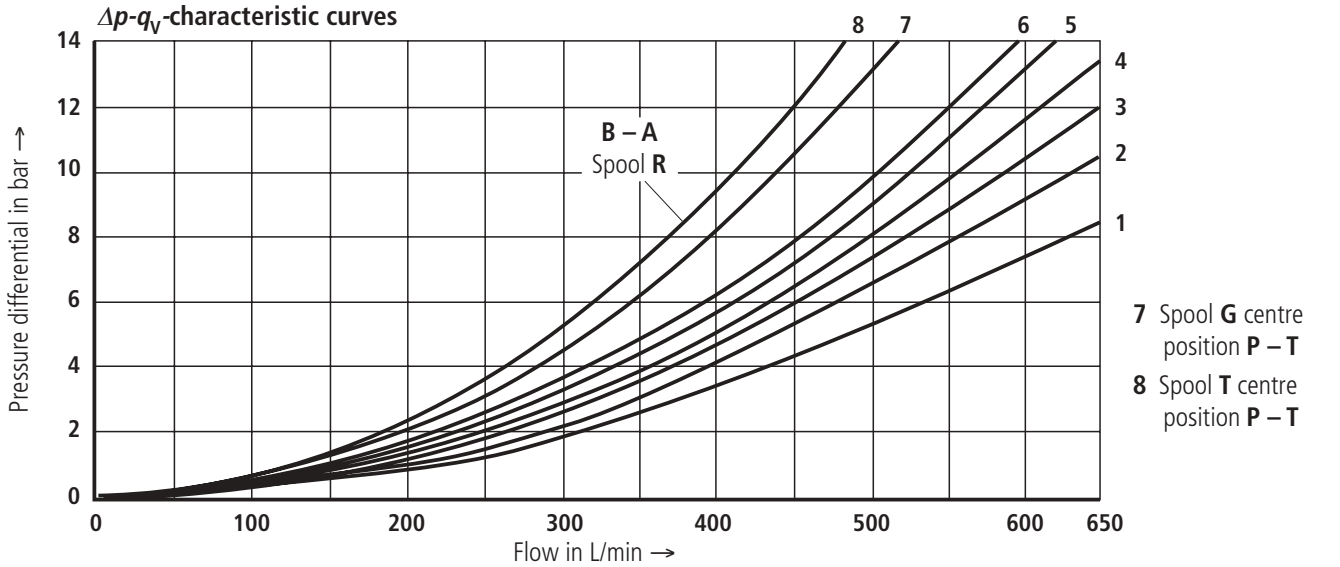
⚠ Attention!

[1] If the stated flow values are exceeded then it is not possible to guarantee the return spring function if the pilot pressure fails!

- With an **X internal** pilot oil supply and due to the negative overlap of the spools Z, HZ and V and flows < 180 L/min a back pressure valve must be fitted.
- With an **X internal** pilot oil supply and due to the negative overlap of the spools F, G, M, P and T a back pressure valve must be fitted.

For performance limits see „General" on page13.

Characteristic curves: type 4WEH 25 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)



Spools	Switched position			
	P – A	P – B	A – T	B – T
E	1	1	1	3
F	1	4	3	3
G	3	1	2	4
H	4	4	3	4
J, Q	2	2	3	5

Spools	Switched position			
	P – A	P – B	A – T	B – T
L	2	2	3	3
M	4	4	1	4
P	4	1	1	5
R	2	1	1	–

Spools	Switched position			
	P – A	P – B	A – T	B – T
U	4	1	1	6
V	2	4	3	6
W	1	1	1	3
T	3	1	2	4

Performance limits: type 4WEH 25 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

2-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar 70	140	210	280	350
X external – spring offset in main valve (at $p_{St\ min}$ = 13 bar)					
C, D, K, Y, Z	700	700	700	700	650
X external – spring offset in main valve [1]					
C	700	700	700	700	650
D, Y	700	650	400	350	300
K	700	650	420	370	320
Z	700	700	650	480	400
X external – hydraulic offset in main valve					
HC, HD, HK, HZ, HY	700	700	700	700	700
HC../O..	700	700	700	700	700
HD../O..	700	700	700	700	700
HK../O..	700	700	700	700	700
HZ../O..	700	700	700	700	700
HC../OF..	700	700	700	700	700
HD../OF..	700	700	700	700	700
HK../OF..	700	700	700	700	700
HZ../OF..	700	700	700	700	700

For performance limits see „General" on page 13.

⚠ Attention!

[1] If the stated flow values are exceeded then it is not possible to guarantee the return spring function if the pilot pressure fails!

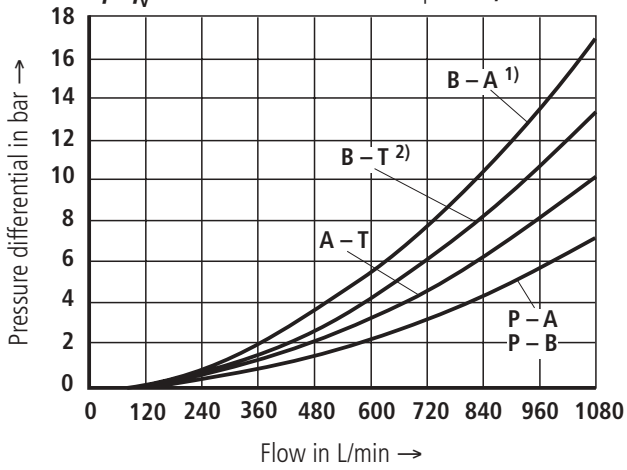
3-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar 70	140	210	280	350
X external – spring-centered					
E, L, M, Q, U, W	700	700	700	700	650
G, T	400	400	400	400	400
F	650	550	430	330	300
H	700	650	550	400	360
J	700	700	650	600	520
P	650	550	430	330	300
V	650	550	400	350	310
R	700	700	700	650	580
X external – pressure-centered (at a min. control pressure of 18 bar)					
E, F, H, J, L, M, P, Q, R, U, V, W	700	700	700	700	650
G, T	400	400	400	400	400
X external – pressure-centered (at a control pressure > 30 bar)					
G, T	700	700	700	700	650

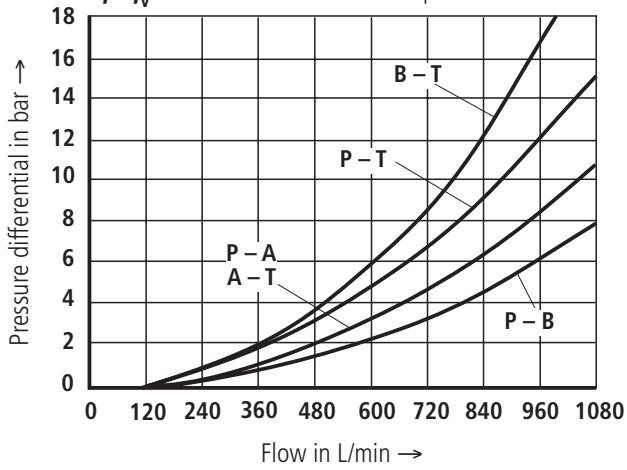
- With an **X internal** pilot oil supply and due to the negative overlap of the spools Z, HZ and V and flows < 180 L/min a back pressure valve must be fitted.
- With an **X internal** pilot oil supply and due to the negative overlap of the spools C, HC, F, H, P and T a back pressure valve must be fitted.

Characteristic curves: type 4WEH 32 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

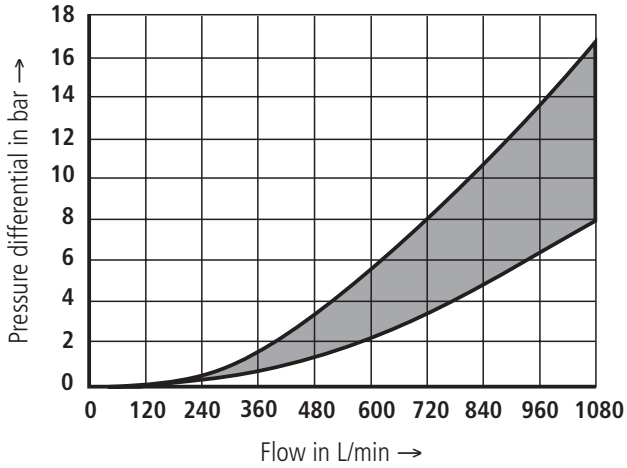
Δp-q_V-characteristic curves – spools **E, R** and **W**



Δp-q_V-characteristic curves – spools **G** and **T**



Δp-q_V-characteristic curves – all other spools



1) **Only** for spool **R**

2) **Not** for spool **R**

Performance limits: type 4WEH 32 … (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)

2-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar 70	140	210	280	350
X external – spring offset in main valve (at $p_{St\ min}$ = 10 bar)					
C, D, K, Y, Z	1100	1040	860	750	680
X external – spring offset in main valve 1)					
C	1100	1040	860	800	700
D, Y	1100	1040	540	480	420
K	1100	1040	860	500	450
Z	110	1040	860	700	650
X external – hydraulic offset in main valve					
HC, HD, HK, HZ, HY	1100	1040	860	750	680

For performance limits see „General" on page 13.

⚠ Attention!

1) If the stated flow values are exceeded then it is not possible to guarantee the return spring function if the pilot pressure fails!

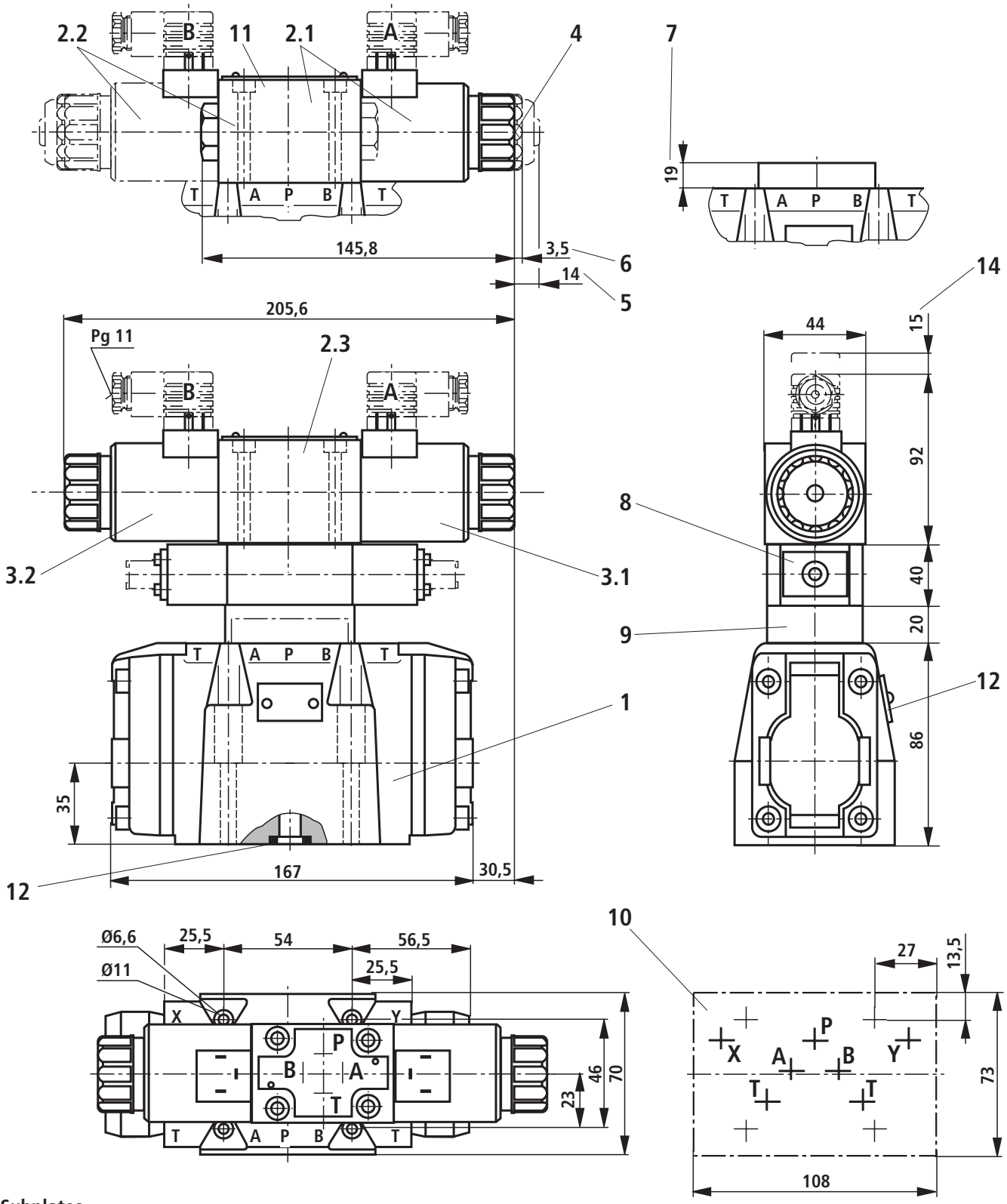
- With an **X internal** pilot oil supply and due to the negative overlap of the spools Z, HZ and V and flows < 180 L/min a back pressure valve must be fitted.

3-position valves – max. flow q_V in L/min

Spools	Operating pressure p_{max} in bar 70	140	210	280	350
X external – spring-centered					
E, J, L, M, Q, R, U, W	100	1040	860	750	680
G, T, H, F, P	900	900	800	650	450
V	1100	1000	680	500	450
X external – pressure-centered (at a min. control pressure of 8.5 bar)					
All spools	1100	1040	860	750	680

⚠ Attention!

- When using a 4/3-way directional valve, with pressure centring of the control spool in the main valve, which exceeds the stated performance limits, a higher pilot pressure is required. So for, e.g. with an operating pressure of p_{max} = 350 bar and a flow of q_V = 1100 L/min a pilot pressure of 15 bar is required. The maximum flow for this valve is only dependent on the Δp value which the system can accept.
- With an **X internal** pilot oil supply and due to the negative overlap of the spools C, HC, F, G, H, P and T a back pressure valve must be fitted.

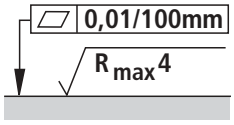


Subplates

- **Without** ports X, Y: G 534/01 (G 3/4)
- **With** ports X, Y: G 535/01 (G 3/4)
  G 536/01 (G 1)

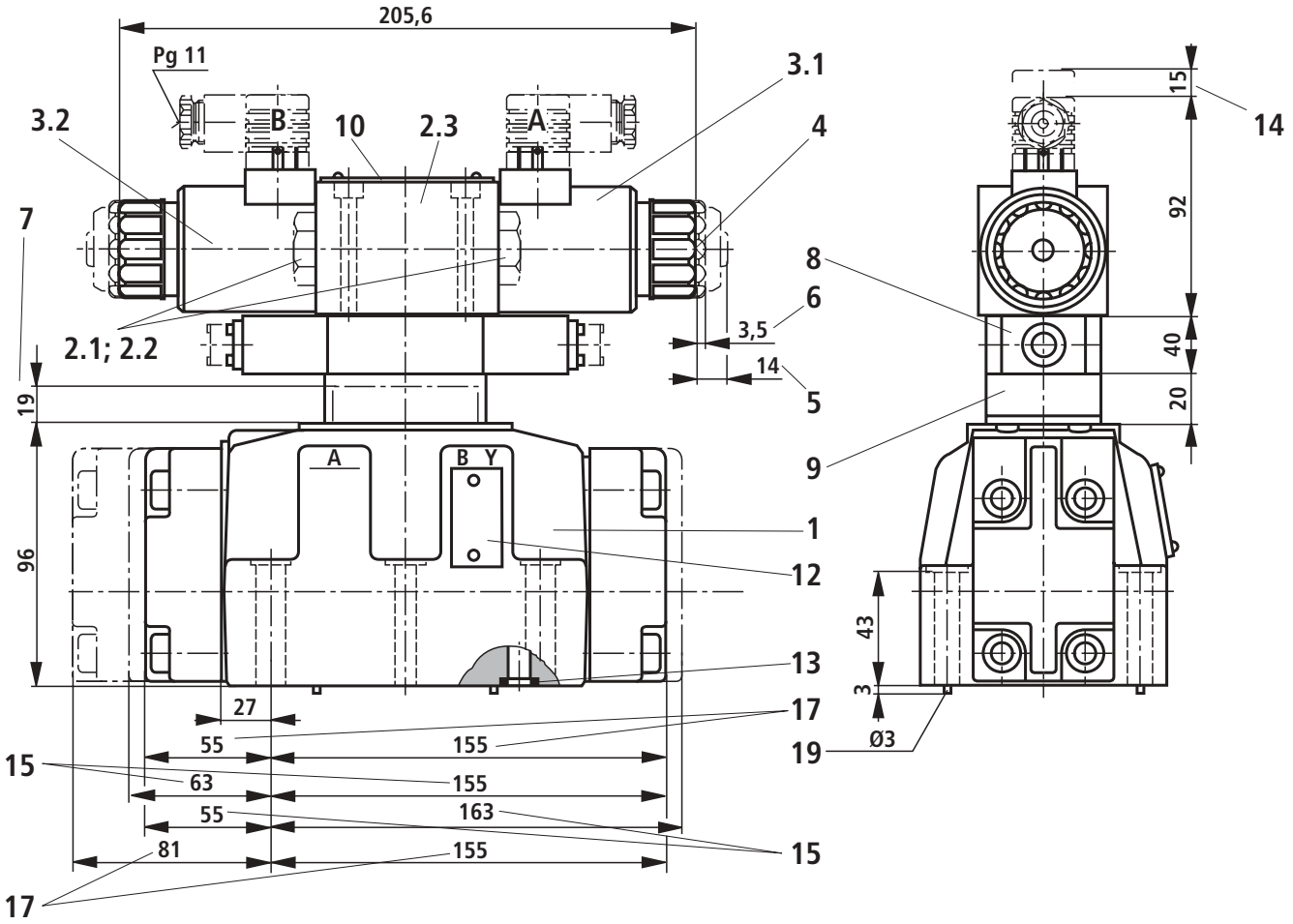
to catalogue sheet RE 45 054 and

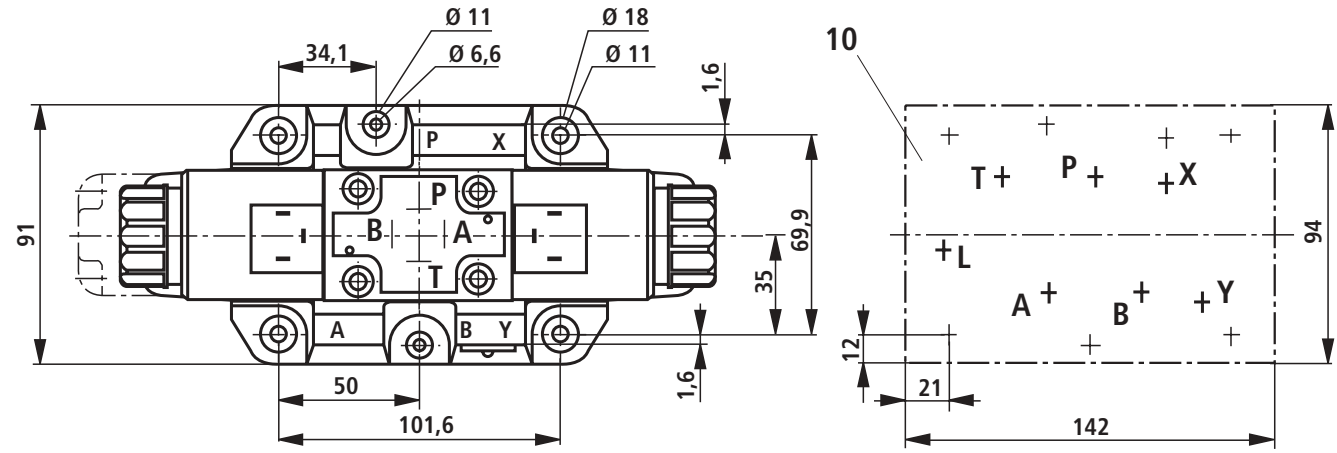
Valve fixing screws
4 off M6 x 45 DIN 912-10.9, M_A = 15.5 Nm
must be ordered separately.



Required surface finish of the mating piece

For items list see page 23



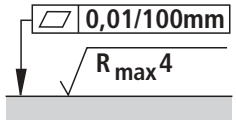


Subplates

G 172/01 (G 3/4)
G 172/02 (M27 x 2)
G 174/01 (G 1)
G 174/02 (M33 x 2)
G 174/08 (flange)
to catalogue sheet RE 45 056 and

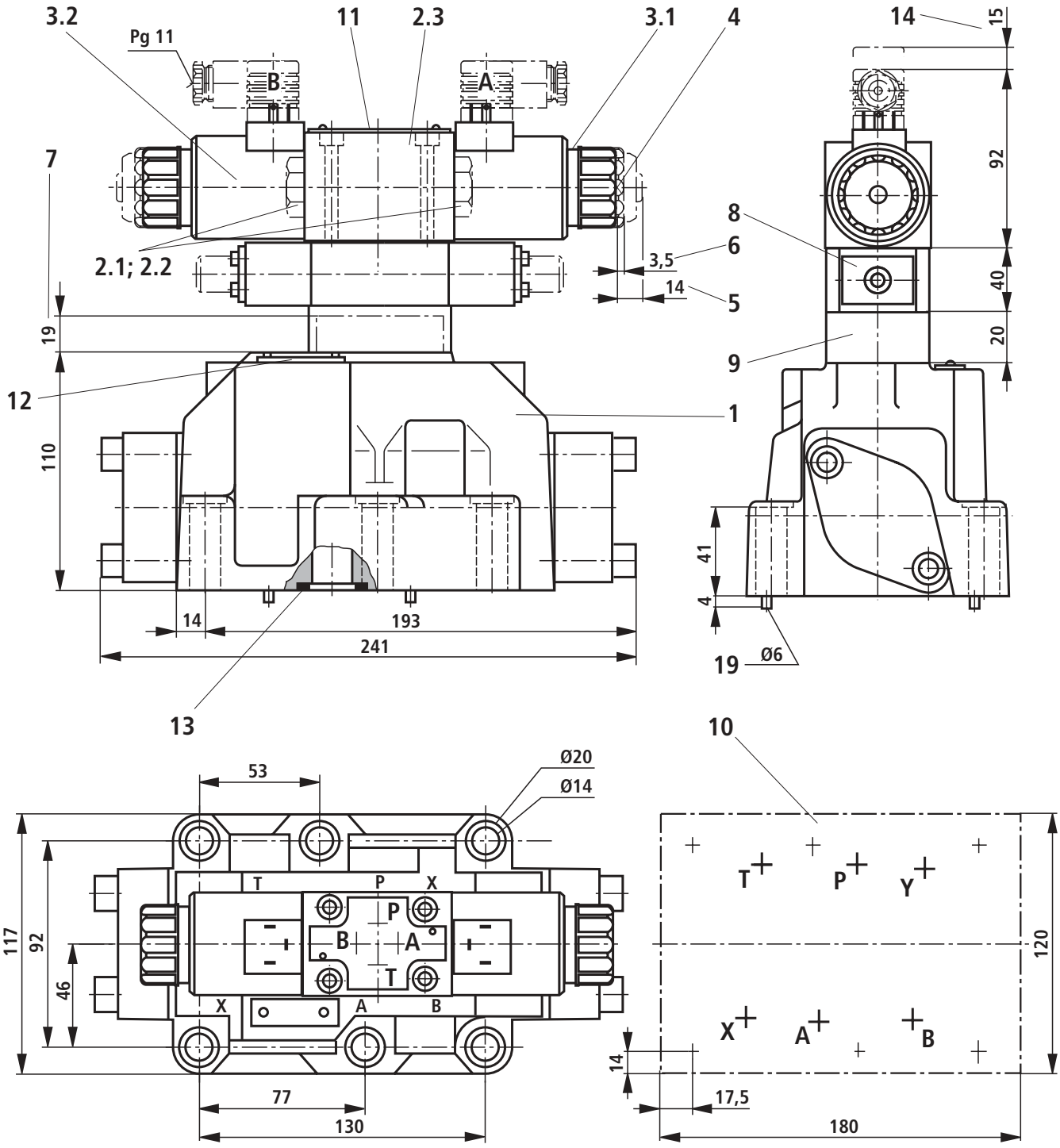
Valve fixing screws

4 off M10 x 60 DIN 912-10.9, M_A = 75 Nm
2 off M6 x 60 DIN 912-10.9, M_A = 15.5 Nm
must be ordered separately.



Required surface finish of the mating piece

For items list see page 23



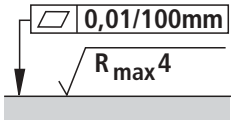
Subplates

G 150/01 (G 3/4)
G 151/01 (G 1)
G 154/01 (G 1 1/4
G 156/01 (G 1 1/2
to catalogue sheet RE 45 058 and

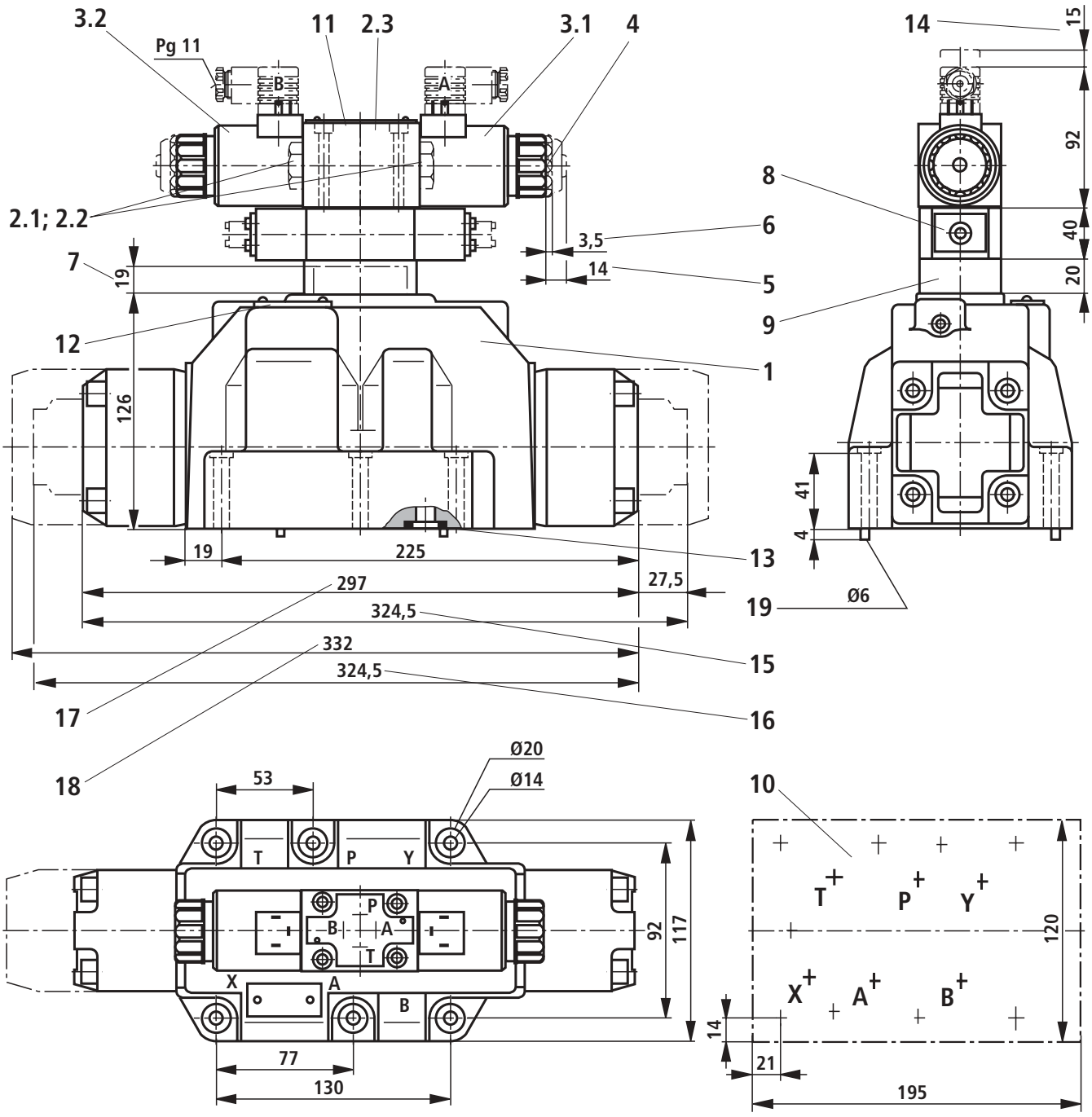
Valve fixing screws

6 off M12 x 60 DIN 912-10.9, M_A = 130 Nm
must be ordered separately.

For items list see page 23



Required surface finish of the mating piece

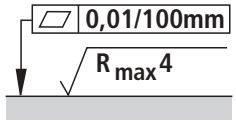


Subplates

G 151/01 (G 1)
G 153/01 (G 1), for valves with pressure-centered neutral position
G 154/01 (G 1 1/4)
G 154/08 (flange)
G 156/01 (G 1 1/2)
to catalogue sheet RE 45 058 and

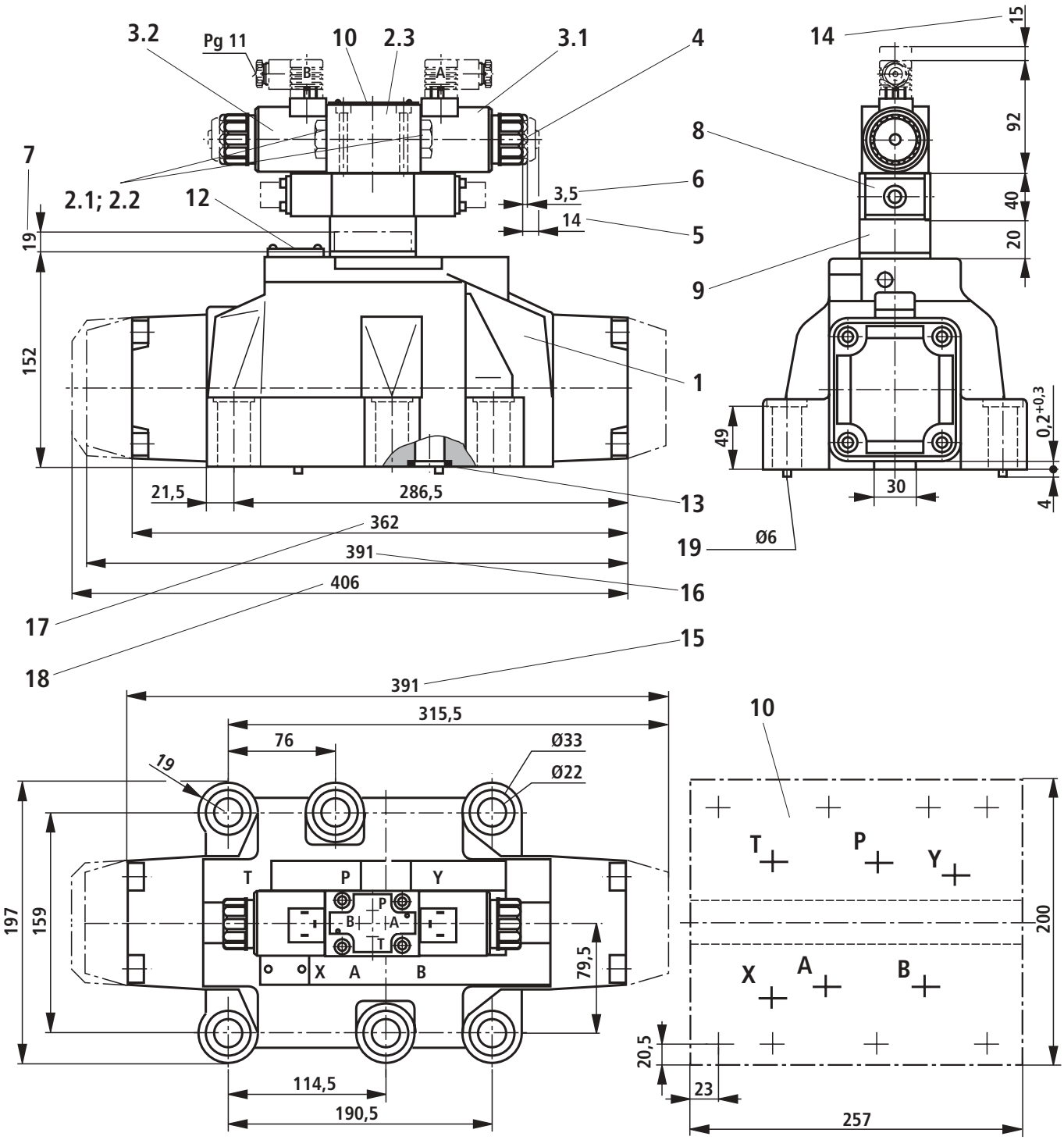
Valve fixing screws

6 off M12 x 60 DIN 912-10.9, M_A = 130 Nm
must be ordered separately.



Required surface finish of the mating piece

For items list see page 23



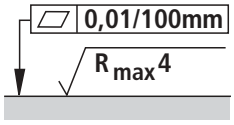
Subplates

G 157/01 (G 1 1/2)
G 157/02 (M48 x 2)
G 158/10 (flange)
to catalogue sheet RE 45 060 and

Valve fixing scrrews

6 off M20 x 80 DIN 912-10.9, M_A = 430 Nm
must be ordered separately.

For items list, see page 23



Required surface finish of the mating piece

Item description

1 Main valve

2 Pilot valve type 4WE 6 … to catalogue sheet RE 23 178

2.1
- Pilot valve type 4WE 6 D… (1 solenoid)
  for main valves with spools C, D, K, Z
  spools HC, HD, HK, HZ
- Pilot valve type 4WE 6 JA… (1 solenoid „a")
  for main valve with spools EA, FA etc., spring return
- Pilot valve type 4WE 6 MA… (1 solenoid „a")
  for main valve with spools HEA, HFA etc.,
  hydraulic spool return

2.2
- Pilot valve type 4WE 6 Y… (1 solenoid)
  for main valve with spool Y
  spool HY
- Pilot valve type 4WE 6 JB… (1 solenoid „b")
  for main valve with spools EB, FB etc., spring return
- Pilot valve type 4WE 6 MB… (1 solenoid „b")
  for main valve with spools HEB, HFB etc.,
  hydraulic spool return

2.3
- Pilot valve type 4WE 6 J… (2 solenoids)
  for main valves with 3-positions, spring-centered
- Pilot valve type 4WE 6 M… (2 solenoids)
  for main valves with 3-positions, pressure-centered

3.1 Solenoid „a"

3.2 Solenoid „b"

4 Hand override „N", optional
– The hand override can only be operated up to a tank pressure of up to approx. 50 bar.
Take care not to damage the hand override bore!

5 Solenoid **without** hand override

6 Solenoid **with** hand override

7 Height of the inter-connecting plate for hydraulic operation (type 4WH…)

8 Switching time adjustment (6A/F), optional

9 Pressure reducing valve, optional

10 Machined valve mounting surface, position of ports

11 Name plate for the pilot valve

12 Name plate for the entire valve

13 R-rings/O-rings

14 Space required to remove the plug-in connector

15 2-position valves with spring offset in main valve (C, D, K, Z)

16 2-position valves with spring offset in main valve (Y)

17 3-position valves, spring centered; 2-position valves with hydraulic offset in the main valve

18 3-position valves, pressure-centered

19 Locating pin

	Ports		
Type	**A, B, T** [1] **A, B, T, P** [2]	**X, Y, L**	**P** [1]
4W.H **10** …	R-ring 13 x 1.6 x 2	R-ring 11.18 x 1.6 x 1.78	
4W.H **16** …	R-ring 22.53 x 2.3 x 2.62	R-ring 10 x 2 x 2	O-ring 22 x 2.5
4W.H **22** …	R-ring 27.8 x 2.6 x 3	R-ring 19 x 3 x 3	O-ring 27 x 3
4W.H **25** …	R-ring 27.8 x 2.6 x 3	R-ring 19 x 3 x 3	O-ring 27 x 3
4W.H **32** …	R-ring 42.5 x 3 x 3	R-ring 19 x 3 x 3	O-ring 42 x 3

[1] Back pressure valve P4,5 (not for NS10)

[2] Without back pressure valve

Switching time adjustment, pressure reducing valve, back pressure valve

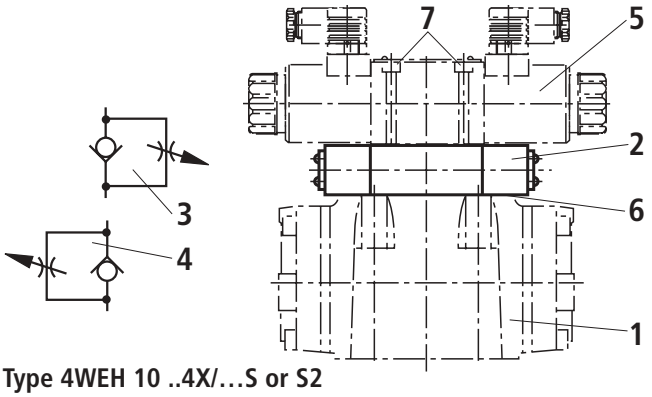
Switching time adjustment

In order to influence the switching time of the main valve (1) a double throttle check valve (2) (type Z2FS 6 to catalogue sheet RE 27 506) has to be fitted.

Conversion from meter-in (3) to meter-out control (4):

Remove the pilot valve (5) leave the seal ring support plate (6) in place, rotate the throttle valve (2) about its longitudinal axis and refit it, replace the pilot valve (5).

Tightening torque of the screws (7) M_A = 9 Nm.



Type 4WEH 10 ..4X/…S or S2

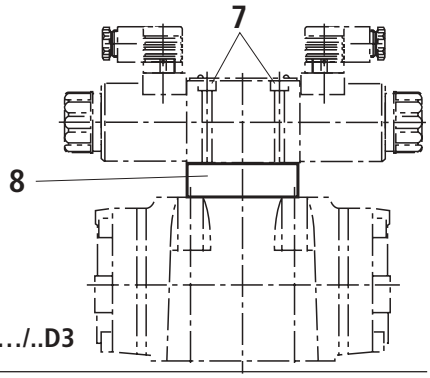
Pressure reducing valve „D3"

The pressure reducing valve (8) must be used it the pilot pressure is higher than 250 bar (for type 4WEH 22 …: 210 bar).

The secondary pressure is held constant at 45 bar.

⚠ Attention!
When using a pressure reducing valve „D3" (8), a throttle insert „B10" must be installed in the P-channel of the pilot valve.

Tightening torque of screws (7) M_A = 9 Nm.



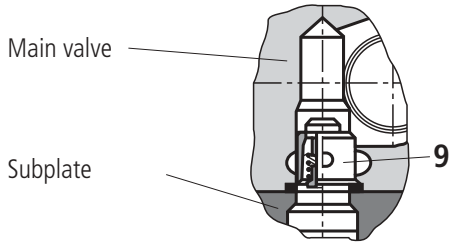
Type 4WEH 10 ..4X/…/..D3

Back pressure valve (not for NS 10)

In valves with zero pressure circulation and internal pilot oil supply, a back pressure valve (9) must be installed in the P-channel of the main valve to build up the minimun pilot pressure.

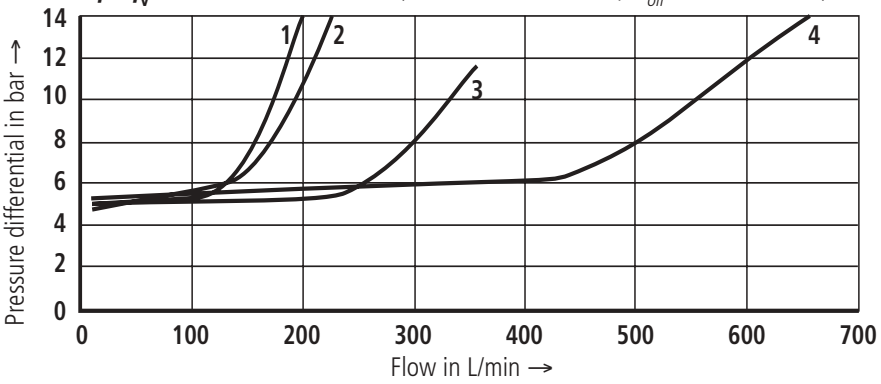
The pressure differential of the back pressure valve must be added to the pressure differential of the main valve (see characteristic curves) in order to determine the acutal value.

The opening pressure of this valve is approx. 4.5 bar.



Type	Marerial No. P4,5
Type 4W.H **16** …	R900302628
Type 4W.H **22** …	R900315596
Type 4W.H **25** …	R900303717
Type 4W.H **32** …	R900317066

***Δp–q*$_V$–characteristic curves** (measured with HLP46, ϑ_{oil} = 40 °C ± 5 °C)



1 NS 16
2 NS 25 (type 4W.H **25** .6X/…)
3 NS 25 (type 4W.H **22** .7X/…)
4 NS 32

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