

**MANNESMANN
REXROTH****4/2 and 4/3-way Directional Valves
Pilot Operated Type 4WEH...
Externally Pilot Operated Type 4 WH...****RE
24 751/03.97**

Replaces: 12.95

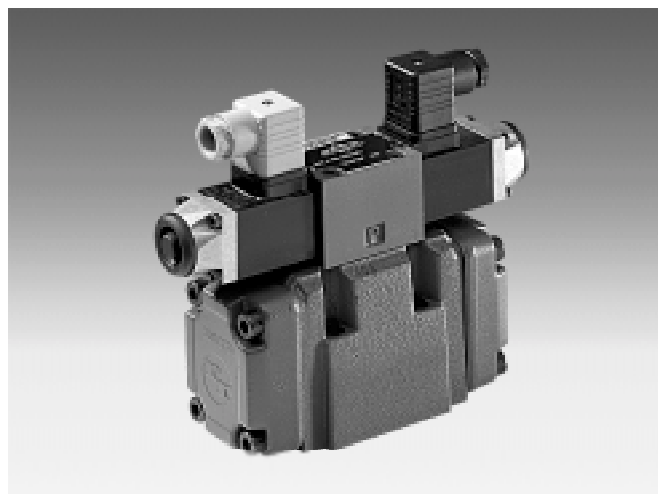
Size 10 to 32

up to 350 bar

up to 1100 L/min

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 data sheets RE 45 054 to RE 45 060 (separate order), see pages 18 to 22
- Spring or pressure-centred, spring or hydraulic offset
- Wet-pin DC or AC solenoids, optional
- Manual override, optional
- Electrical connection as individual or central connection (see RE 23 177 or RE 23 178)
- Shifting time adjustment, optional
- Pre-load valve in the P-channel of the main valve, optional
- Auxiliary equipment to data sheet RE 24 830:
 - Stroke adjustment at main spool, optional
 - Stroke adjustment and/or end position indicator, optional
 - Mechanical or inductive limit switch (proximity type) at the main spool, optional



H/A/D 5559/96*

4WEH 10 .4X/..6A...K4.. with plug-in connector



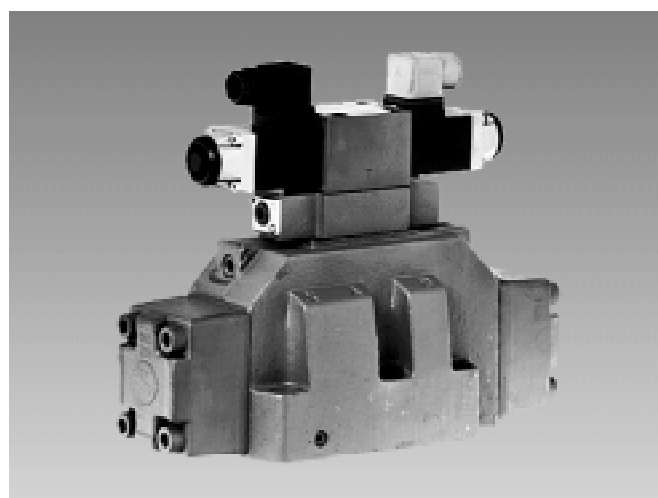
K 4091/13

4WEH 22 E 7X/..6A..N..K4.. with plug-in connector



K 3481/4

4WH 32 .6X/..



K 3477/2

4WEH 25 E6X/..6A..N..S..K4.. with plug-in connector

Pilot oil supply

4WEH... and 4WH...

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.

4WEH..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.

Changeover from external to internal or from internal to external pilot oil supply (size 16): Remove the cover on the solenoid side "a", remove the plugs and turn end-for-end, insert plugs and replace the cover.

4WEH..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 subplate are plugged.

4WEH..T..

The pilot oil supply is sourced **externally** via channel X from a separate circuit. The pilot oil drain is led **internally** via channel T to tank. Port Y in the subplate is plugged.

- 1 Plug screw M6 DIN 906–8.8, 3 A/F – pilot oil drain
- 2 Plug screws M6 DIN 906–8.8, 3 A/F – pilot oil supply
- 3 Plug screws M8 x 1 DIN 906–8.8, 4 A/F – for external sealing

Tightening torques M_A for cover fixing screws:

Size 16: 35 Nm

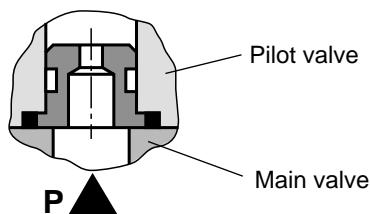
Size 25: 68 Nm

Tightening torque M_A for pilot valve fixing screws:

Sizes 10 to 32: 9 Nm

Throttle insert

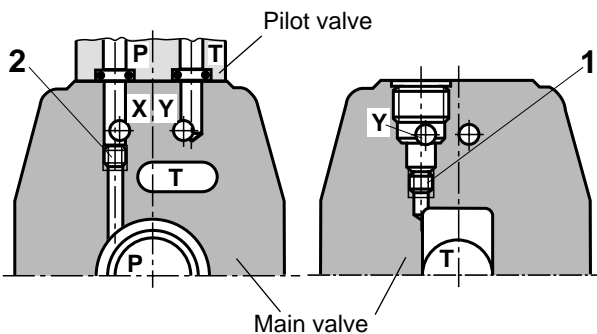
The use of a throttle insert is required if the pilot oil supply in the P channel of the pilot valve is to be limited (see page 6, ³⁾). This throttle is inserted in the P channel of the pilot valve.



Size 10

Section A – A

Section C – C



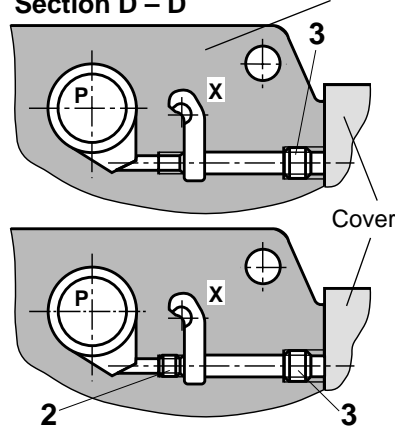
Pilot oil supply
external: 2 plugged
internal: 2 open

Pilot oil drain
external: 1 plugged
internal: 1 open

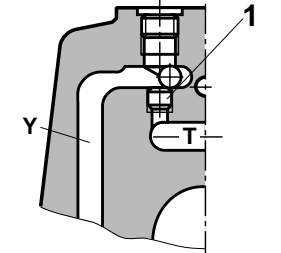
Size 16

Section D – D

Main valve



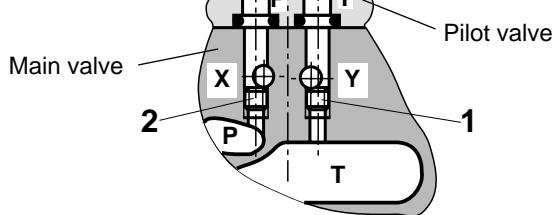
Section C – C



Pilot oil supply
external: 2 plugged
internal: 2 open
Pilot oil drain
external: 1 plugged
internal: 1 open

Size 25 (type 4W.H 22 .7X/...)

Section A – A



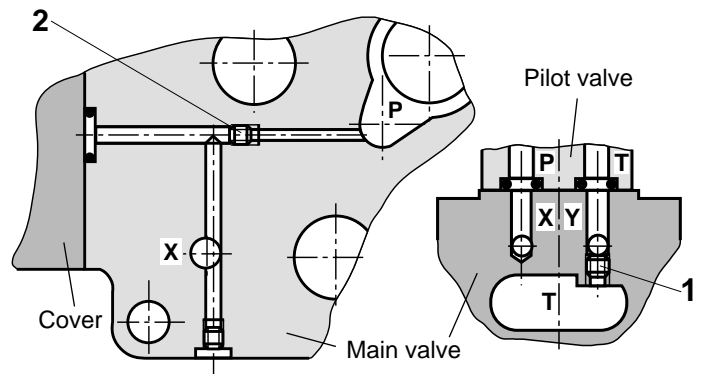
Pilot oil supply
external: 2 plugged
internal: 2 open

Pilot oil drain
external: 1 plugged
internal: 1 open

Size 25 (type 4W.H 25 .6X/...)

Section B – B

Section A – A

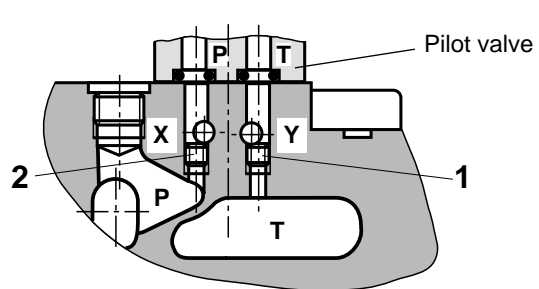


Pilot oil supply
external: 2 plugged
internal: 2 open

Pilot oil drain
external: 1 plugged
internal: 1 open

Size 32

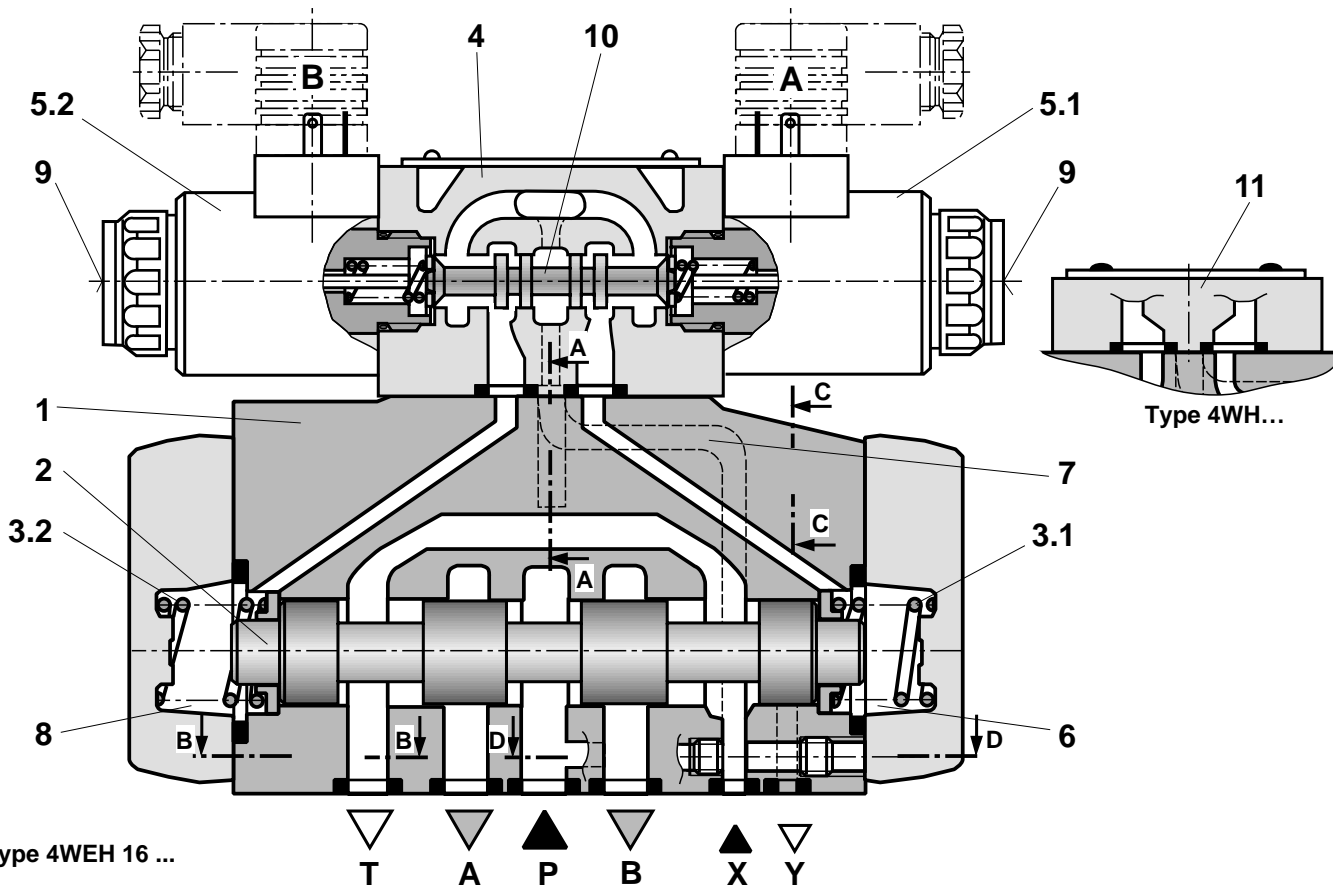
Section A – A



Pilot oil supply
external: 2 plugged
internal: 2 open

Pilot oil drain
external: 1 plugged
internal: 1 open

Functional description, section



Type 4WEH 16 ...

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 fluid 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 of 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 shifted 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 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-energized, 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 manual override (9) permits 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 fluid 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 pilot connecting plate (11).

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

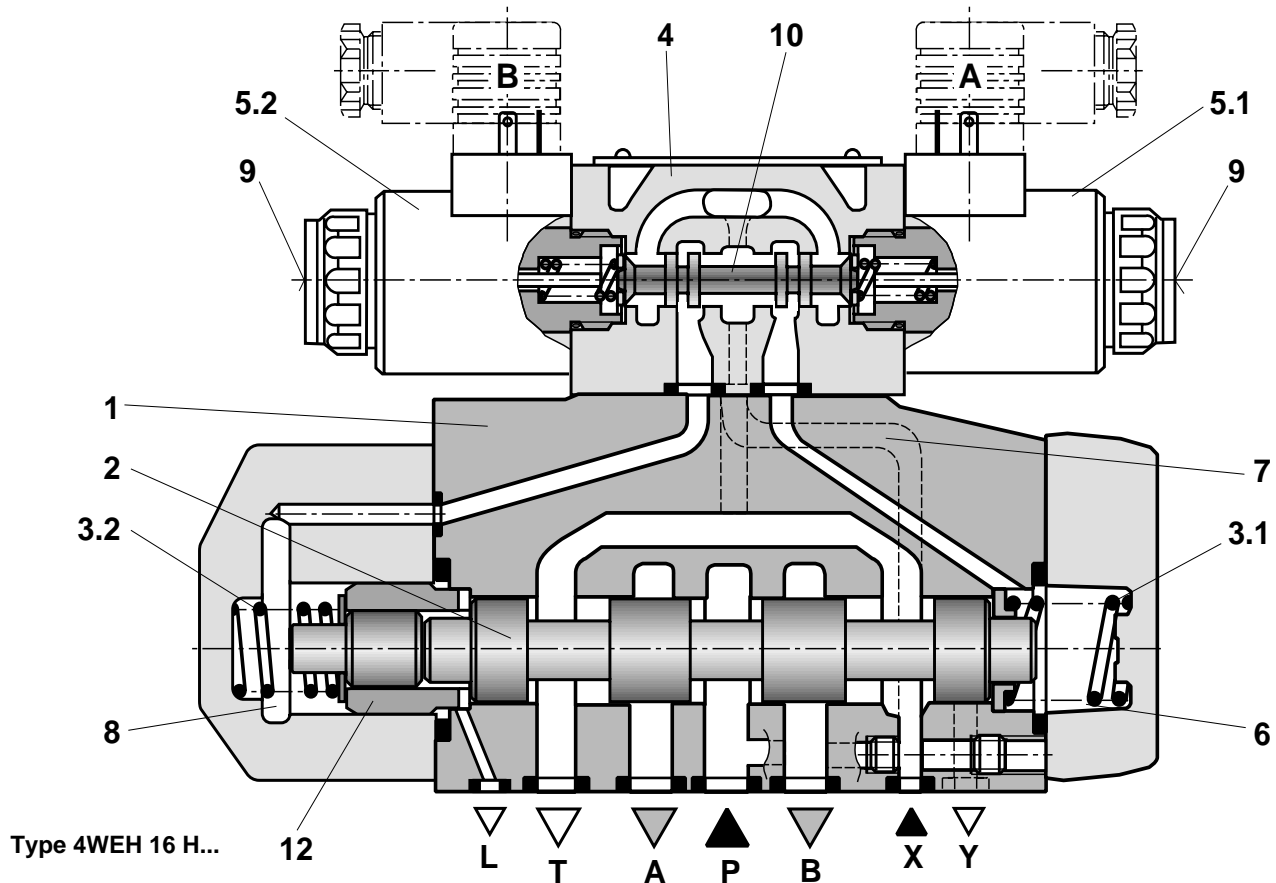
The control spool (2) is held in the neutral or in the initial position either by springs or by means of pressure. Pilot oil supply and pilot oil drain are external (see page 2).

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 connector 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 shifted 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.

Functional description, section



Type 4WEH 16 H...

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 front 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.

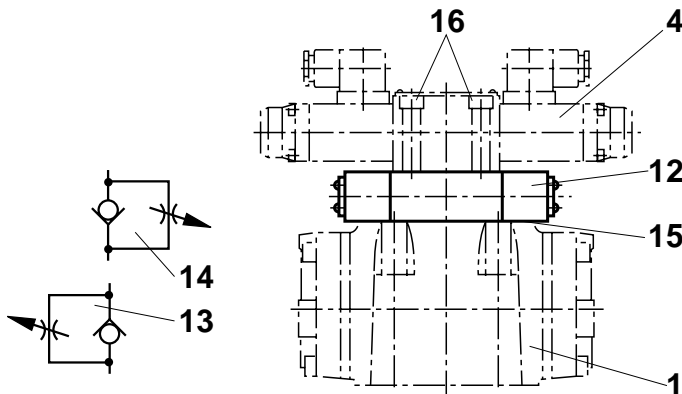
The unloaded spool area displaces the returning pilot oil via the pilot valve into the Y channel (external).

Shifting time adjustment, pressure reducing valve, pre-load valve

Shifting time adjustment

In order to influence the shifting time of the main valve (1) a double throttle check valve (12) (type Z2 FS 6 to data sheet RE 27 506) is installed.

Changeover from meter-in (13) to meter-out control (14):
 Remove the pilot valve (4) (leave the O-ring support plate (15) in place), rotate the throttle check valve (12) about its longitudinal axis and refit it, replace the pilot valve (4).
 Tightening torque for screws (16) $M_A = 9 \text{ Nm}$.



Type 4WEH 10 ..4X/...S or S2

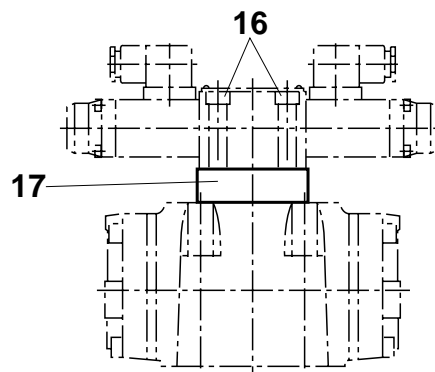
Pressure reducing valve "D3"

The pressure reducing valve (17) must be used if the pilot pressure is higher than 250 bar.
 Thus, the secondary pressure is held constant at 45 bar.

⚠ Attention!

When using a pressure reducing valve "D3" (17), a throttle insert "B10" must be installed in the P channel of the pilot valve.

Tightening torque of screws (16) $M_A = 9 \text{ Nm}$.



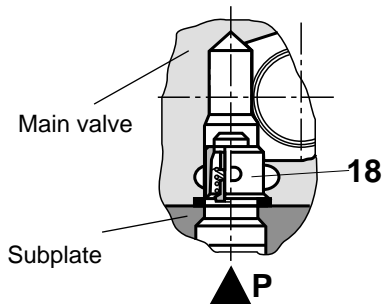
Type 4WEH 10 ..4X/.../..D3

Pre-load valve (not for size 10)

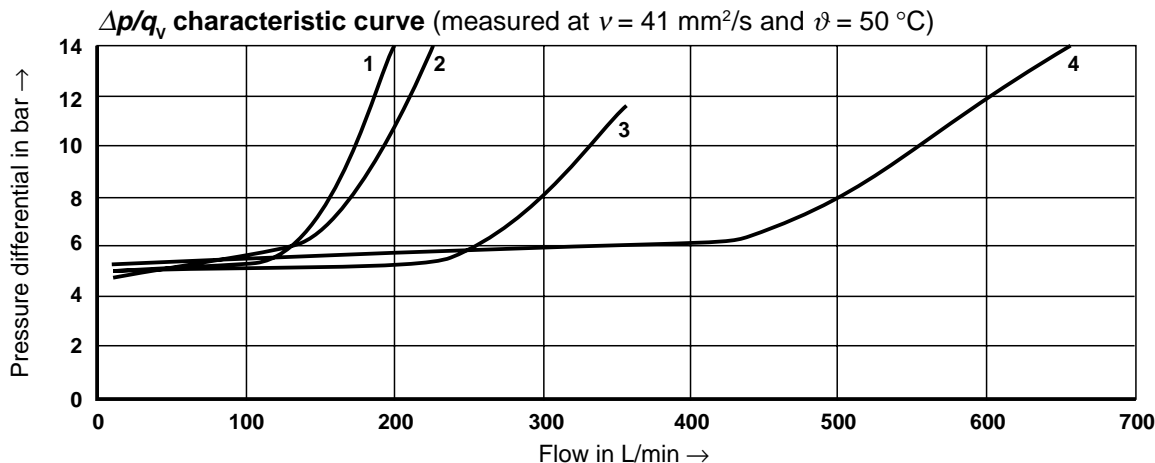
In valves with pressureless by-pass and internal pilot oil supply, a pre-load valve (18) must be installed in the P channel of the main valve to build up the minimum pilot pressure.

The pressure differential of the pre-load valve must be added to the pressure differential of the main valve (see characteristic curve) in order to determine the actual value.

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



Size	Order number
	P 4,5
16	302628
25 (type 4W.H 22 .7X/...)	315596
25 (type 4W.H 25 .6X/...)	303717
32	317066



- 1 Size 16
- 2 Size 25 (type 4W.H 25 .6X/...)
- 3 Size 25 (type 4W.H 22 .7X/...)
- 4 Size 32

Ordering code

1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17	19	20	21	22	23	
			4				/								/						*

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

Up to 350 bar = **H** -

4-way design = **4**

Types of operation

Electro-hydraulic = **WEH**

Hydraulic = **WH**

Size

Size 10 = **10**

Size 16 = **16**

Size 25 (type 4W.H 22 .7X/...) ⁷⁾ = **22**

Size 25 (type 4W.H 25 .6X/...) ⁸⁾ = **25**

Size 32 = **32**

Spool return

By means of springs = **No code**

Hydraulic ⁵⁾ = **H**

For symbols, see page 7

Series 40 to 49 ¹⁾ (size 10) = **4X**

Series 60 to 69 ¹⁾ {sizes 25 (4W.H 25.) and 32} = **6X**

Series 70 to 79 ¹⁾ {size 16, 25 (4W.H 22.)} = **7X**

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

Without spring return = **O**

Without spring return with detent ²⁾ (in the pilot valve) = **OF**

Pilot valve with wet-pin solenoids ²⁾

Standard valve (RE 23 177) = **6A**

High-performance valve (RE 23 178) = **6E**

24 V DC = **G24**

230 V AC 50/60 Hz = **W230**

For further voltages, frequencies and electric data, see data sheets RE 23 177/RE 23 178 ²⁾

Without manual override = **No code**

With manual override ²⁾ = **N**

With protected manual override ²⁾ = **N9**

Pilot oil supply external, Pilot oil drain external ⁶⁾ = **No code**

Pilot oil supply internal, Pilot oil drain external ^{3), 6)} = **E**

Pilot oil supply internal, Pilot oil drain internal ³⁾ = **ET**

Pilot oil supply external, Pilot oil drain internal ⁶⁾ = **T**

Type 4WH... **only** available as No code!

Versions ET and T as 3-position valve with pressure centring only possible if $p_{pilot} \geq 2 \times p_{tank} + p_{pilot min}$!

Further details in clear text

No code = NBR seals
V = FPM seals
(other seals on enquiry)

⚠ Attention!

Take the compatibility of the seals and the hydraulic fluid into account!

No code = Without pressure reducing valve

D3 ⁴⁾ = With pressure reducing valve

Pre-load valve (not for size 10) ^{2), 4)}

No code = Without pre-load valve

P 4,5 = With pre-load valve ($p_{crack} = 4.5$ bar)

Throttle insert ²⁾

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

Auxiliary equipment

Stroke adjustment, end position indicator and mechanical limit switch

For ordering code, see RE 24 830

Auxiliary equipment

Inductive limit switch

For ordering code, see RE 24 830

Electrical connections ²⁾

K4 ⁹⁾ = Individual connection; with component plug DIN 43 650-AM2, without plug-in connector

ohne Bez. = Without shifting time adjustment

S = Shifting time adjustment as meter-in control

S2 = Shifting time adjustment as meter-out control

p_{pilot} = pilot pressure

$p_{pilot min}$ = minimum pilot pressure

p_{tank} = tank pressure

p_{crack} = cracking pressure

1) Unchanged installation and connection dimensions

2) These ordering codes may only be used with electro-hydraulic operation.

3) With internal pilot oil supply:

- **Minimum pilot pressure:** Please note page 10 !

- In order to avoid excessive pressure peaks, a **throttle insert (B10)** should be provided in the P port of the pilot valve (see page 2).

4) Only in conjunction with throttle insert "B10"

5) • 2 positions (hydraulic end position):

only spools C, D, K, Z, Y

- 3 positions (hydraulic centring):

only for size 16, size 25 (type H-4W.H 25 ...) and size 32

6) With external pilot oil supply X or pilot oil drain Y for valves of size 10 which are to be used with sandwich plates, version SO 30 must be provided.

The designation SO 30 must be entered at the end of the type designation (sandwich plate).

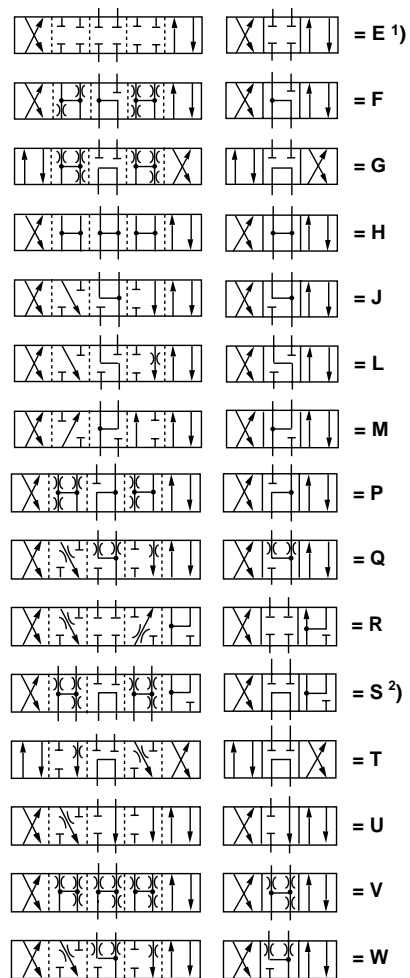
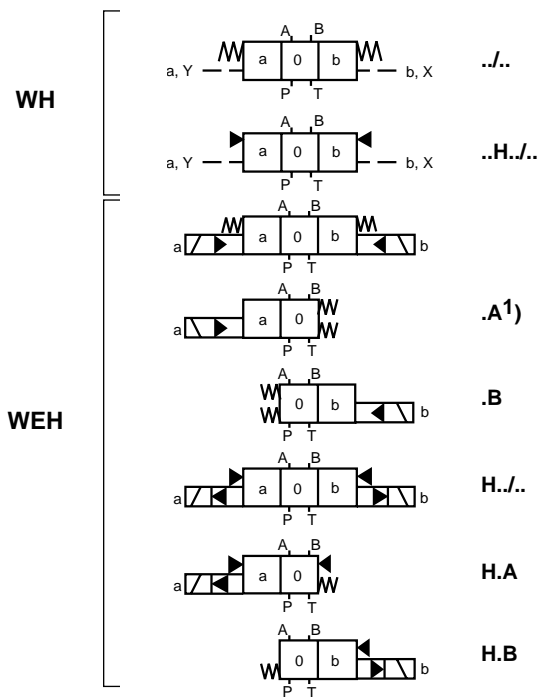
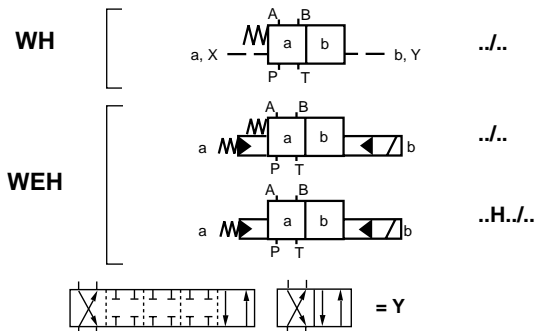
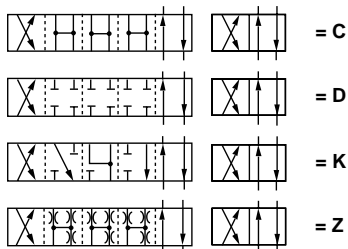
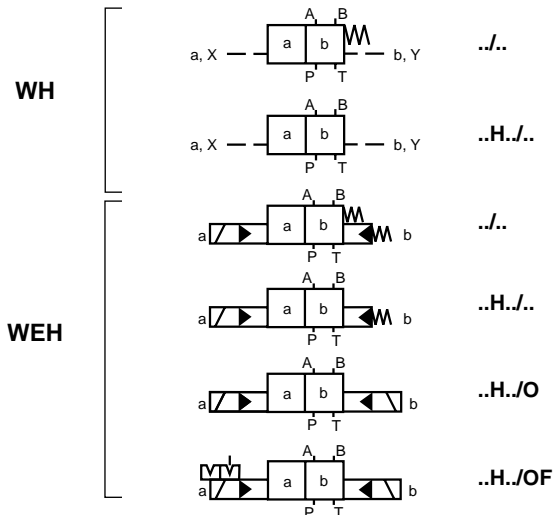
7) Standard version

8) High-performance version

9) Plug-in connectors have to be ordered separately (see RE 23 177/RE 23 178)..

10) not for NS 16

Symbols



1) Example: Spool E, solenoid on side "a"
 Order example:
 H-4WEH 16 EA7X/6EG24N9ETSK4..B10..V..

2) Spool S only for size 16

Valve opening in neutral position for spools Q, V and W

Spool \ Size	Valve opening in neutral position in mm ²				
	10	16	25 (type 4W.H 22.7X/...)	25 (type 4W.H 25.6X/...)	32
Q	P-A	—	—	—	—
	P-B	—	—	—	—
	A-T	13	32	78	83
	B-T	13	32	78	83
	B-T	13	32	78	83
V	P-A	13	32	73	83
	P-B	13	32	73	83
	A-T	13	32	84	83
	B-T	13	32	84	83
	B-T	13	32	84	83
W	P-A	—	—	—	—
	P-B	—	—	—	—
	A-T	2,4	6	10	14
	B-T	2,4	6	10	14
	B-T	2,4	6	10	14

Detailed and simplified symbols for 3-position valves

	Valve with spring-centred neutral position	Valve with pressure-centred neutral position (only sizes 16, 25 (type 4W.H 25.6X/...) and 32)
X = external; Y = external	<p>Type 4WEH../..</p>	<p>Type 4WEH..H../..</p>
X = internal; Y = external	<p>Type 4WEH../..E..</p>	<p>Type 4WEH..H../..E..</p>
X = internal; Y = internal	<p>Type 4WEH../..ET..</p>	<p>3-position valves, pressure-centred, preferably with external pilot oil supply and/or drain (No code, E) For the preconditions for internal pilot oil supply and/or drain (ET, T) see page 6 or 10.</p>
X = external; Y = internal	<p>Type 4WEH../..T..</p>	

Detailed and simplified symbols for 2-position valves

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

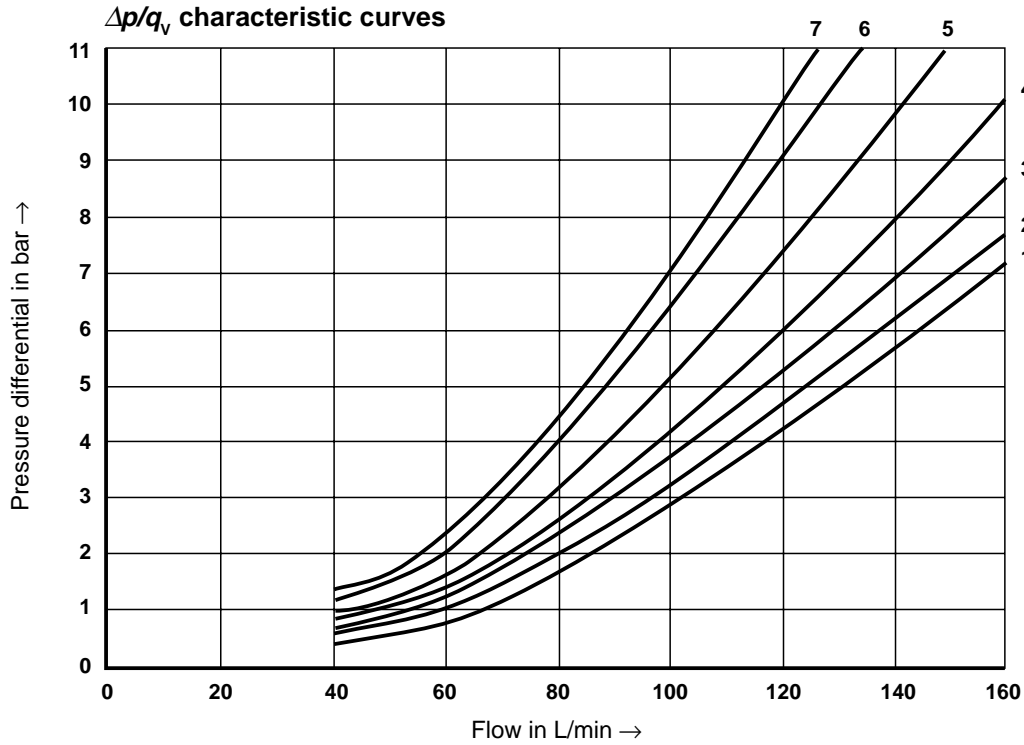
Technical data (For applications outside these parameters, please consult us!)											
Sizes (ordering code)		10	16	25 Type 4W.H 22.7X/...		25 Type 4W.H 25.6X/...		32			
Operating pressure, max.											
– Port P, A, B	Type 4WEH	bar	280	280	280	–		280			
	Type H-4WEH	bar	350	350	350	350		350			
– Port T	Pilot oil drain Y external	bar	315 ⁵⁾	250	250	250		250			
	Pilot oil drain Y internal ¹⁾	bar	160 ⁶⁾ / 210 ⁷⁾ DC								
– Port Y	Pilot oil drain external:										
	– DC	bar	160 ⁶⁾ / 210 ⁷⁾								
	– AC	bar	100 ⁶⁾ / 160 ⁷⁾								
	with version 4WH	bar	250	250	210	250		250			
Pilot pressure, max.		bar	250	250	210	250		250			
(With higher pilot pressures, a pressure reducing valve is required.)											
Pilot pressure, min.											
– Pilot oil supply X external, pilot oil supply X internal (not with spools: C, F, G, H, P, T, V, Z, S ²⁾)				H-4W...	4W...						
	3-position valve, spring-centred	bar	10	14	12.5	10.5	13		8.5		
	3-position valve, pressure-centred	bar	–	14	–		18		8.5		
	2-position valve, with spring offset	bar	10	14	14	11	13		10		
	2-position valve, with hydraulic offset	bar	7	14	8		8		5		
– pilot oil supply X internal (with 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⁾			
¹⁾ As 3-position valve with spring-centring only possible if $P_{pilot} \geq 2 \times P_{tank} + P_{pilot min}$					of 6.5 bar from P to T.						
²⁾ Spool S only for size 16					⁴⁾ For spools C, F, G, H, P, T, V, Z, S ²⁾ (by means of a pre-load valve or a sufficiently large flow)						
³⁾ For symbols C, F, G, H, P, T, V, Z internal pilot oil supply is only possible, if the flow from P to T in the neutral position (in a 3-position valve) or when the valve is moving through the neutral position (in a 2-position valve) is large enough to ensure a minimum pressure differential					⁵⁾ Type 4WEH 10...: 280 bar, Type H-4WEH 10...: 315 bar						
					⁶⁾ Standard valve "6A" (RE 23 177), not with 16, series 7X						
					⁷⁾ High-performance valve "6E" (RD 23 178)						
Hydraulic fluid		Mineral oil (HL, HLP) to DIN 51 524 ⁸⁾ ; Fast bio-degradable hydraulic fluids to VDMA 24 568 (see also RE 90 221); HETG (rape seed oil) ⁸⁾ ; HEPG (polyglycols) ⁹⁾ ; HEES (synthetic esters) ⁹⁾ ; other hydraulic fluids on enquiry									
⁸⁾ Suitable for NBR and FPM seals											
⁹⁾ Only suitable for FPM seals											
Fluid temperature range		°C	– 30 to + 80 (for NBR seals) – 20 to + 80 (for FPM seals)								
Viscosity range		mm ² /s	2.8 to 500								
Cleanliness		Maximum permissible degree of contamination of the hydraulic fluid to NAS 1638 class 9. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.									
Pilot oil volume for shifting operation											
– 3-position valve, spring-centred	cm ³	2.04	5.72	7.64		14.2		29.4			
	cm ³	4.08	11.45		15.28		28.4		58.8		
– 3-position valve, pressure-centred	cm ³		WH	WEH			WH	WEH	WH	WEH	
	from neutral position to shifted position "a"	cm ³	–	2.83	2.83	–		7.15	7.15	14.4	14.4
	from shifted position "a" to neutral position	cm ³	–	5.72	2.9	–		14.18	7.0	29.4	15.1
	from neutral position to shifted position "b"	cm ³	–	5.72	5.72	–		14.18	14.15	29.4	29.4
from shifted position "b" to neutral position	cm ³	–	8.55	2.83	–		19.88	5.73	43.8	14.4	
Pilot oil flow for shortest shifting time		L/min	approx. 35	approx. 35	approx. 35	approx. 35		approx. 45			
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-centred	kg	approx. 6.8	approx. 8.9	approx. 11.9		approx. 18.0		approx. 41.0			
Valve with two solenoids, pressure-centred	kg	approx. 6.8	approx. 8.9	approx. 11.9		approx. 19.0		approx. 41.0			
Valve with hydraulic operation (4 WH...)	kg	approx. 5.5	approx. 7.3	approx. 10.5		approx. 16.5		approx. 39.5			
Shifting 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 position		optional; valve with hydraulic spool return "H" (spools C, D, K, Z, Y) horizontal									

Shifting times ¹⁾

¹⁾ Shifting time = Contacting at the pilot valve up to start of opening of the control land in the main valve

Size 10 Pilot valve series 5X/A	Shifting time of the valve from neutral position to shifted position with AC (–) and DC (=) operation																	
	at pilot pressure	bar	~ 70 =				~ 140 =				~ 210 =				~ 250 =			
	– 3-position valve	ms	30	65	25	60	20	55	15	50								
	– 2-position valve	ms	35	80	30	75	25	70	20	65								
	Shifting time of the valve from shifted position to neutral position																	
	– 3-position valve	ms	30															
– 2-position valve	ms	35	40	30	35	25	30	20	25									
Size 16 Pilot valve series 6X/E	Shifting time of the valve from neutral position to shifted position with AC (–) and DC (=) operation																	
	at pilot pressure	bar	~ 70 =				~ 140 =				~ 210 =				~ 250 =			
	– 3-position valve, spring-centred	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-centred	ms	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
	Solenoid operated	ms	30	30	40	40	30	30	40	40	30	30	35	40	30	30	35	40
	Shifting time of the valve from shifted position to neutral position																	
	– 3-position valve, spring-centred	ms	20 to 35 for ~ / 30 for =															
– 2-position valve	ms	35...50	45	35...50	45	30...45	40	30...45	35									
– 3-position valve, pressure-centred	ms	from –	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
Solenoid operated	ms	20...35	20	20...55	20	20...35	20	20...35	20	20...35	20	20...35	20	20...35	20			
Size 25 (4W.H 22..7X) Pilot valve series 5X/A	Shifting time of the valve from neutral position to shifted position with AC (–) and DC (=) operation																	
	at pilot pressure	bar	~ 35 =				~ 70 =				~ 140 =				~ 210 =			
	– 3-position valve, spring-centred	ms	50	100	40	80	35	65	30	60								
	– 2-position valve	ms	110	160	90	110	75	95	70	85								
	Shifting time of the valve from shifted position to neutral position																	
	– 3-position valve, spring-centred	ms	35 to 50 for ~ / 35 for =															
– 2-position valve	ms	90...105	95	65...80	70	50...65	55	45...60	50									
Size 25 (4W.H 25..6X) Pilot valve series 5X/A	Shifting time of the valve from neutral position to shifted position with AC (–) and DC (=) operation																	
	at pilot pressure	bar	~ 70 =				~ 140 =				~ 210 =				~ 250 =			
	– 3-position valve, spring-centred	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-centred	ms	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
	Solenoid operated	ms	30	35	55	65	30	35	55	65	25	30	50	60	25	30	50	60
	Shifting time of the valve from shifted position to neutral position																	
	– 3-position valve, spring-centred	ms	40 to 55 for ~ / 40 for =															
– 2-position valve	ms	120	125	85	100	85	90	75	80									
– 3-position valve, pressure-centred	ms	from –	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
Solenoid operated	ms	30...50	30	35	30...50	30	35	30...50	30	35	30...50	30	35	30...50	30	35		
Size 32 Pilot valve series 5X/A	Shifting time of the valve from neutral position to shifted position with AC (–) and DC (=) operation																	
	at pilot pressure	bar	~ 50 =				~ 150 =				~ 250 =							
	– 3-position valve, spring-centred	ms	65	80	50	90	35	105										
	– 2-position valve	ms	100	130	75	100	60	115										
	– 3-position valve, pressure-centred	ms	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
	Solenoid operated	ms	55	60	100	105	40	45	85	95	35	40	85	95				
	Shifting time of the valve from shifted position to neutral position																	
	– 3-position valve, spring-centred	ms	60 to 75 for ~ / 50 for =															
– 2-position valve	ms	115...130	90	85...100	70	65...80	65											
– 3-position valve, pressure-centred	ms	from –	a	b	a	b	a	b	a	b	a	b	a	b	a	b		
Solenoid operated	ms	30...65	30	40	60...90	30	30	105...155	50	50								

Characteristic curves: Type 4WEH 10... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)



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

Shifting performance limits: Type 4WEH 10... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)

2 and 3-position valves			
Permissible flow q_v in L/min			
Spool	Operating pressure p_{max} in bar		
	200	250	315
E, J, L, M, Q, R, U, V, W, C, D, K, Z, Y	160		
H	160	150	120
G, T	160	160	140
F, P	160	140	120

General:

⚠ Attention!

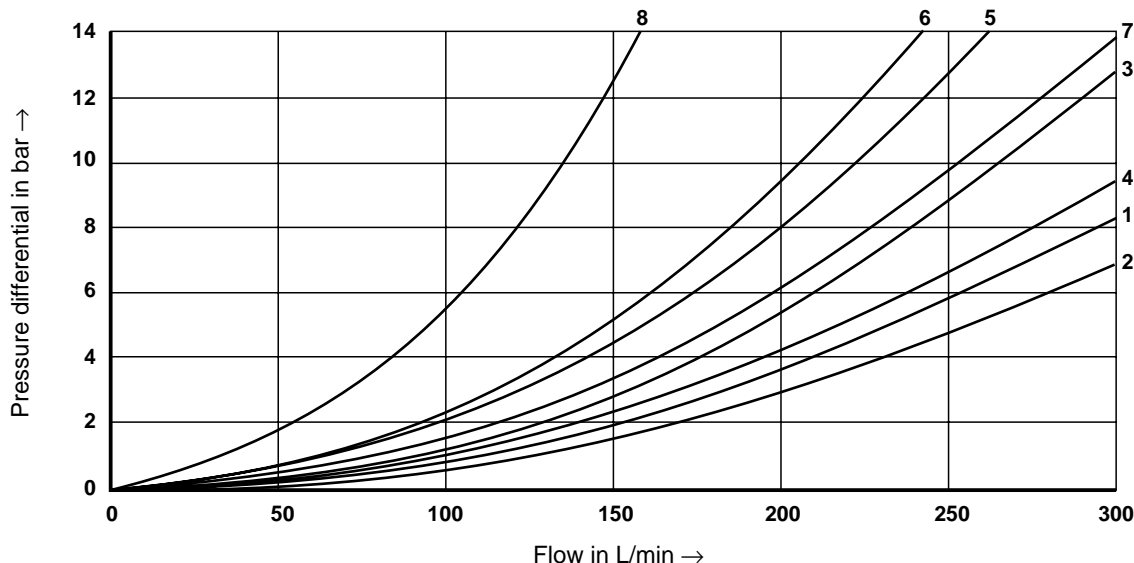
The shifting performance limits shown are valid for applications with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

As a result of the flow forces occurring within the valve with only one direction of flow (e.g. from P to A with port B blocked) the permissible performance limits may be considerably lower! (In the case of applications of this kind, please consult us.)

The performance limits were determined with the solenoid at operating temperature, 10% undervoltage and with no tank pre-loading.

Characteristic curves: Type 4WEH 16... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)

$\Delta p/q_v$ characteristic curves



Spool	Shifted 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	-
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 at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)

Re the performance limits, see "General", page 12.

2-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
	70	140	210	280	350	
with spring offset in the main valve ¹⁾						Spools C, Z up to approx. 160 L/min
C, D, K, Z, Y	300	300	300	300	300	
with spring offset in the main valve ²⁾						
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	
with hydraulic offset in the main valve						Spools HC, HZ up to ca. 160 L/min
HC, HD, HK	300	300	300	300	300	
HZ, HY	300	300	300	300	300	

- The flow values given are achieved when the minimum pilot pressure of 12 bar is present.
- The flow values given are limiting values at which the return spring can return the valve when the pilot pressure fails.

3-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
	70	140	210	280	350	
spring-centred						Spools F, G, H, P and S in general
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	
pressure-centred (at min. pilot pressure of 16 bar)						Spool V up to ca. 160 L/min
for all spools	300	300	300	300	300	

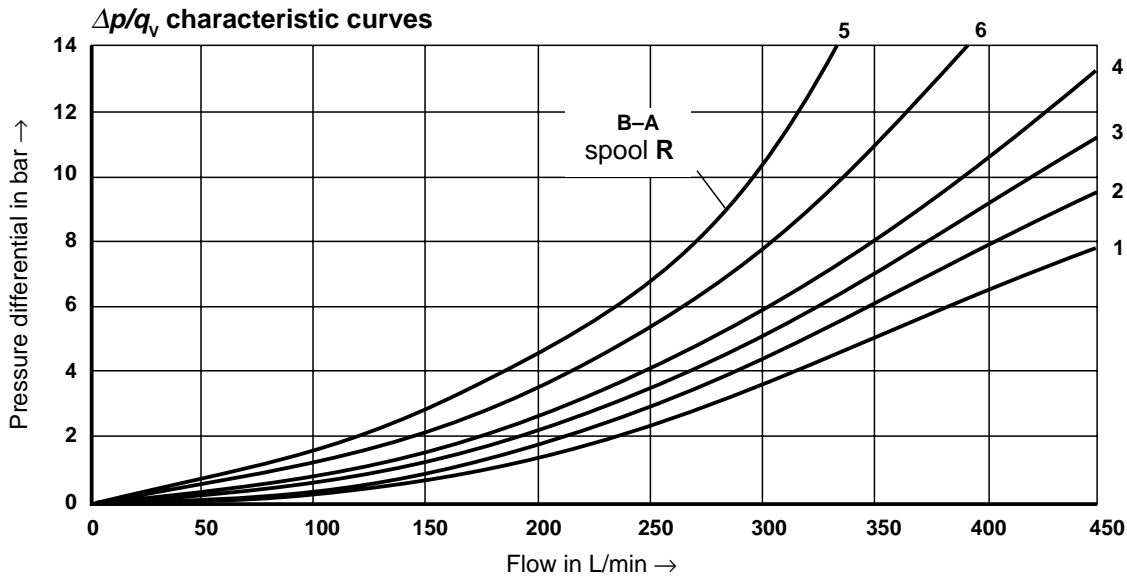
Attention!

When using 4/3-way directional valves with spring-centring of the control spool in the main valve, which exceeds the given performance limits, a higher pilot pressure is required.

Example: At 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 those valves is therefore only dependent on the Δp value which is acceptable for the system.

Characteristic curves: Type 4WEH 22... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)



Spool	Shifted position				Spool	Shifted position				Spool	Neutral position		
	P-A	P-B	A-T	B-T		P-A	P-B	A-T	B-T		A-T	B-T	P-T
E	2	2	1	4	P	2	2	1	4	F	-	-	4
F	1	2	1	2	Q	2	2	1	4	G	-	-	6
G	2	2	2	4	R	1	2	1	-	H	-	-	2
H	2	2	1	3	U	2	2	1	4	L	4	-	-
J	2	2	1	3	V	2	2	1	4	P	-	-	6
L	2	2	1	2	W	2	2	1	3	T	-	-	5
M	2	2	1	4	T	2	2	2	4	U	-	6	-

Performance limits: Type 4WEH 22... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)

Re the performance limits, see "General" page 12

2-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
		70	140	210	280	350
with spring offset in the main valve ¹⁾						
C, D, K, Z, Y	450	450	450	450	450	
with spring offset in the main valve ²⁾						
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	
with hydraulic offset in the main valve						
HC, HD, HK,	450	450	450	450	450	
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	

Spool Z up to approx. 180 L/min

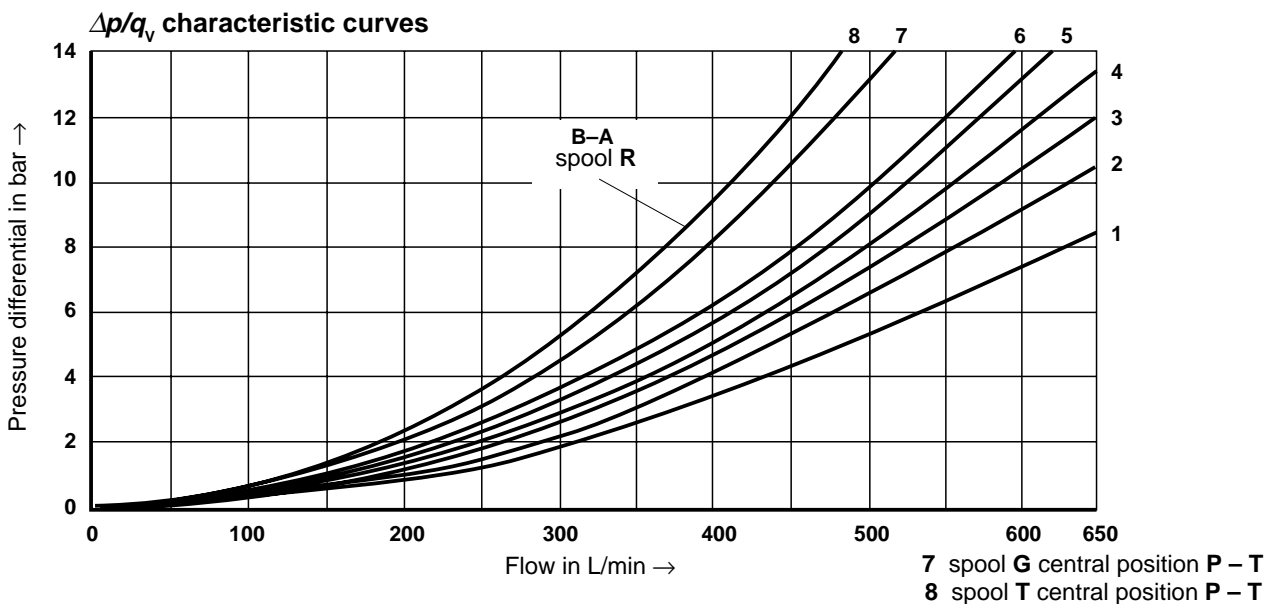
Spool HZ up to approx. 180 L/min

3-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
		70	140	210	280	350
spring-centred						
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	

Spools F, G, H, P and T in general, spool V up to approx. 180 L/min

- The flow values given are achieved when the minimum pilot pressure of 11 or 14 bar is present.
- The flow values given are limiting values at which the return spring can return the valve when the pilot pressure fails.

Characteristic curves: Type 4WEH 25... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)



Spool	Shifted position				Spool	Shifted position			
	P-A	P-B	A-T	B-T		P-A	P-B	A-T	B-T
E	1	1	1	3	P	4	1	1	5
F	1	4	3	3	Q	2	2	3	5
G	3	1	2	4	R	2	1	1	–
H	4	4	3	4	U	2	1	1	6
J	2	2	3	5	V	4	4	3	6
L	2	2	3	3	W	1	1	1	3
M	4	4	1	4	T	3	1	2	4

Performance limits: Type 4WEH 25... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)

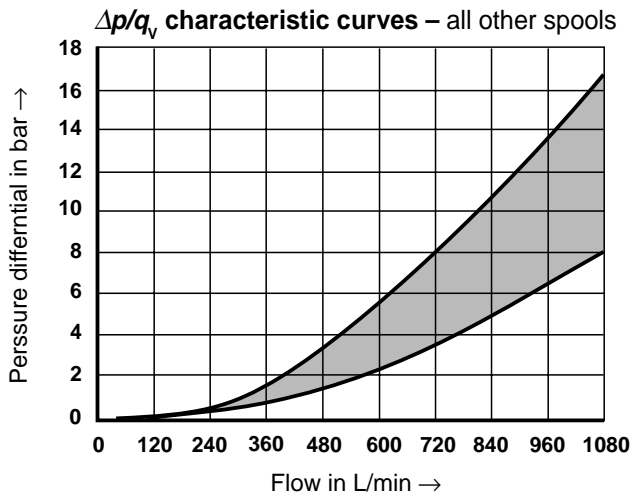
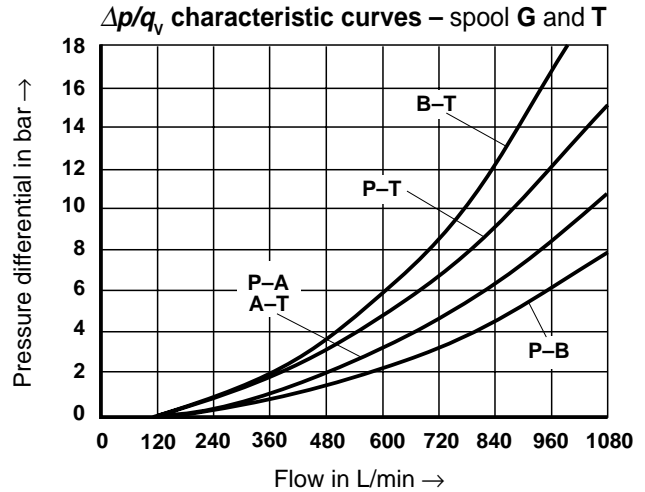
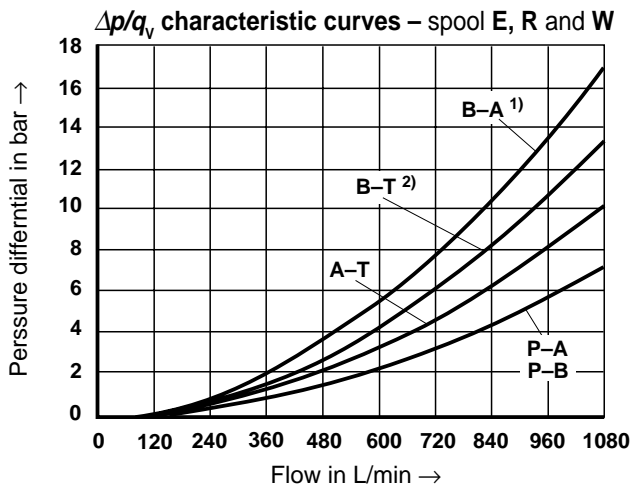
Re performance limits, see "General", page 12.

2-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
	70	140	210	280	350	
with spring offset in the main valve ¹⁾						
C, D, K, Z, Y	700	700	700	700	650	Spool C in general, spool Z up to approx. 180 L/min
with spring offset in the main valve ²⁾						
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	
with hydraulic offset in the main valve						Spool HC in general, spool HZ up to approx. 180 L/min
HC, HD, HK,	700	700	700	700	700	
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	

3-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
	70	140	210	280	350	
spring-centred						Spools F, G, H, P and T in general, spool V up to approx. 180 L/min
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	
pressure-centred (at min. pilot pressure of 18 bar)						
E, F, H, J	700	700	700	700	650	
L, M, P, Q	700	700	700	700	650	
R, U, V, W	700	700	700	700	650	
G, T	400	400	400	400	400	
at > 30 bar pilot pressure						
G, T	700	700	700	700	650	

- The flow values given are achieved when the minimum pilot pressure of 13 bar is present.
- The flow values given are limiting values at which the return spring can return the valve when the pilot pressure fails.

Characteristic curves: Type WEH 32... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)



- 1) only with spool R
- 2) not with spool R

Performance limits: Type WEH 32... (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50^\circ\text{C}$)

Re performance limits, see "General", page 12.

2-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
	70	140	210	280	350	
with spring offset in the main valve ¹⁾						Spool C in general, spool Z up to approx. 180 L/min
C, D, K, Z, Y	1100	1040	860	750	680	
with spring offset in the main valve ²⁾						
C	1100	1040	860	800	700	
D, Y	1100	1040	540	480	420	
K	1100	1040	860	500	450	
Z	1100	1040	860	700	650	
with hydraulic offset in the main valve						Spool HC in general, spool HZ up to ca. 180 L/min
HC, HD, HK,	1100	1040	860	750	680	
HZ, HY	1100	1040	860	750	680	

3-position valves						Pre-load valve, required for X = internal
Permissible flow q_v in L/min						
Spool	Operating pressure p_{max} in bar					
	70	140	210	280	350	
spring-centred						Spools F, G, H, P and T in general, spool V up to ca. 180 L/min
E, J, L, M, Q, R, U, W	1100	1040	860	750	680	
G, T, H, F, P	900	900	800	650	450	
V	1100	1000	680	500	450	
pressure-centred (at min. pilot pressure of 8.5 bar)						for all spools
for all spools						
for all spools						1100 1040 860 750 680

⚠ Attention!
 When using 4/3-way directional valves with spring-centring of the control spool in the main valve, which exceeds the given performance limits, a higher pilot pressure is required.
 Example: At an operating pressure of $p_{max} = 350 \text{ bar}$ and a flow of $q_v = 1100 \text{ L/min}$, a pilot pressure of 15 bar is required.
 The maximum flow for those valves is therefore only dependent on the Δp value which is acceptable for the system.

- 1) The flow values given are achieved when the minimum pilot pressure of 10 bar is present.
- 2) The flow values given are limiting values at which the return spring can return the valve when the pilot pressure

List of items

- 1 Main valve
 - 2 Pilot valve type 4WE 6 ...
to data sheet RE 23 177 ¹⁾/RE 23 178 ²⁾
- ⚠ Attention!**
Dimensions of size 10, 22, 25 and 32 correspond to the standard valve "6A" to data sheet RE 23 177
Dimensions of size 16 correspond to the standard valve "6E" to data 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 J... (1 solenoid "a")
for main valves with spools EA, FA, etc.,
spring return
 - Pilot valve type 4WE 6 M... (1 solenoid "a")
for main valves with spools HEA, HFA, etc.,
hydraulic spool return
 - 2.2 • Pilot valve type 4WE 6 Y... (1 solenoid)
for main valves with spool Y
spool HY
 - Pilot valve type 4WE 6 J... (1 solenoid "b")
for main valves with spools EB, FB, etc.,
spring return
 - Pilot valve type 4WE 6 M... (1 solenoid "b")
for main valves 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-centred
 - Pilot valve type 4WE 6 M... (2 solenoids)
for main valves with 3 positions, pressure-centred
 - 3.1 Solenoid "a" (grey plug-in connector)
 - 3.2 Solenoid "b" (black plug-in connector)
 - 4 Manual override "N", optional
– The manual override can only be operated up to a
tank pressure of up to approx. 50 bar.
Take care not to damage the manual override bore!
 - 5 Solenoid without manual override
 - 6 Height of the connector plate for hydraulic operation
(type 4WH...)
 - 7 Shifting time adjustment (A/F 6), optional
 - 8 Pressure reducing valve, optional
 - 9 Machined valve mounting surface, position of ports
 - 10 Nameplate for the pilot valve
 - 11 Nameplate for the entire valve
 - 12 R-rings/O-rings
 - 13 Space required to remove the plug-in connector
 - 14 2-position valves with spring offset
in the main valve (C, D, K, Z)
 - 15 2-position valves with spring offset
in the main valve (Y)
 - 16 3-position valves, spring-centred;
2-position valves with hydraulic offset in the main valve
 - 17 3-position valves, pressure-centred
 - 18 Locating pin

Order no. – Seal kit for main valve		
	NBR seals	FPM seals
Size 10	317200	317201
Size 16	314424	314425
Size 25 ⁶⁾	314435	314436
Size 25 ⁷⁾	314449	314450
Size 32	314443	314444

⁶⁾ Type 4W.H 22 .7X/...

⁷⁾ Type 4W.H 25 .6X/...

Size	Ports		
	A, B, T ³⁾ A, B, T, P ⁴⁾	X, Y, L X, Y, L	P ³⁾
10	R-ring 13 x 1.6 x 2	R-ring 11.18 x 1.6 x 1.78	
16	R-ring 22.53 x 2.3 x 2.62	R-ring 10 x 2 x 2	O-ring 22 x 2.5
25 ⁵⁾	R-ring 27.8 x 2.6 x 3	R-ring 19 x 3 x 3	O-ring 27 x 3
32	R-ring 42.5 x 3 x 3	R-ring 19 x 3 x 3	O-ring 42 x 3

¹⁾ Standard valve "6A", **not** for size 16, series 7X

²⁾ High-performance valve "6E"

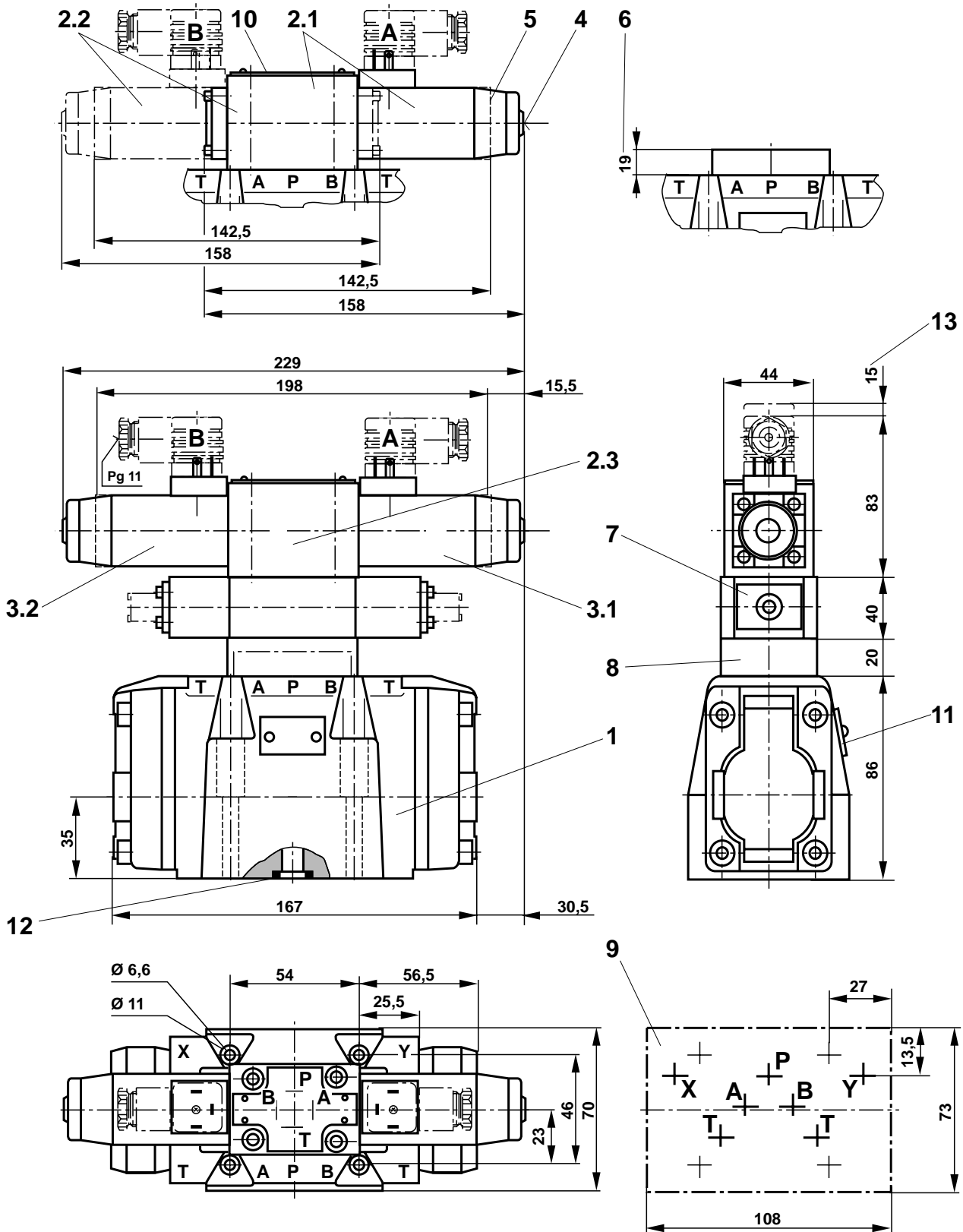
³⁾ Pre-load valve P 4,5 (not for size 10)

⁴⁾ Without pre-load valve

⁵⁾ Type 4W.H 22 .7X/... and type 4W.H 25 .6X/...

Unit dimensions: Type 4WEH 10 ...

(Dimensions in mm)



Subplates G 534/01 (G 3/4), **without** port X, Y
 G 535/01 (G 3/4), **with** port X, Y
 G 536/01 (G 1) }
 to data 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.

For items list, see page 17

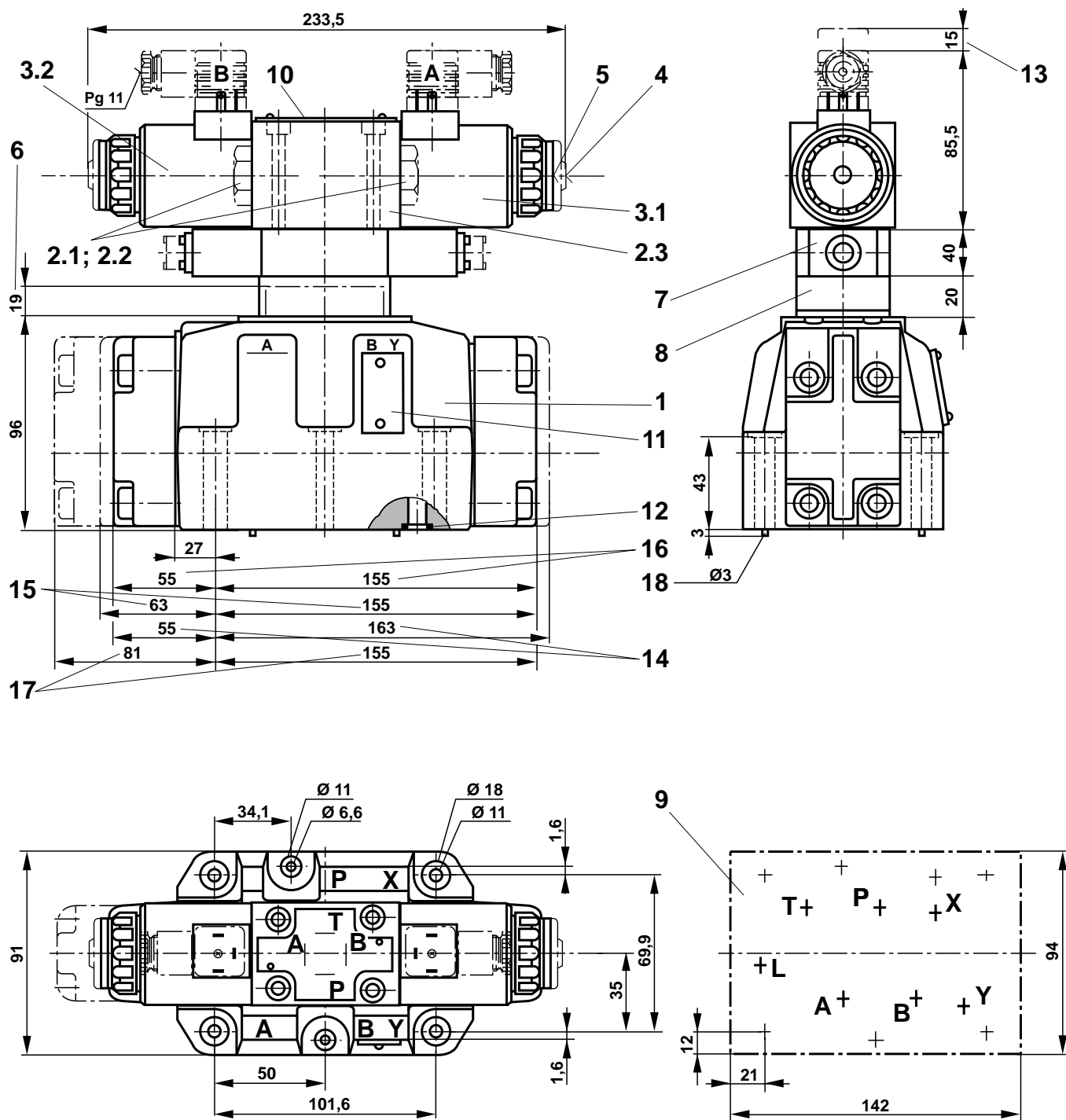
0,01/100mm

$R_{max} 4$

Required surface finish of the mating piece

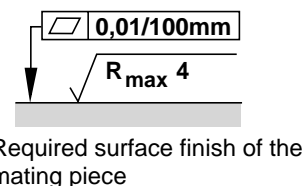
Unit dimensions: Type 4WEH 16...

(Dimensions in mm)



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 data sheet 45 056 and

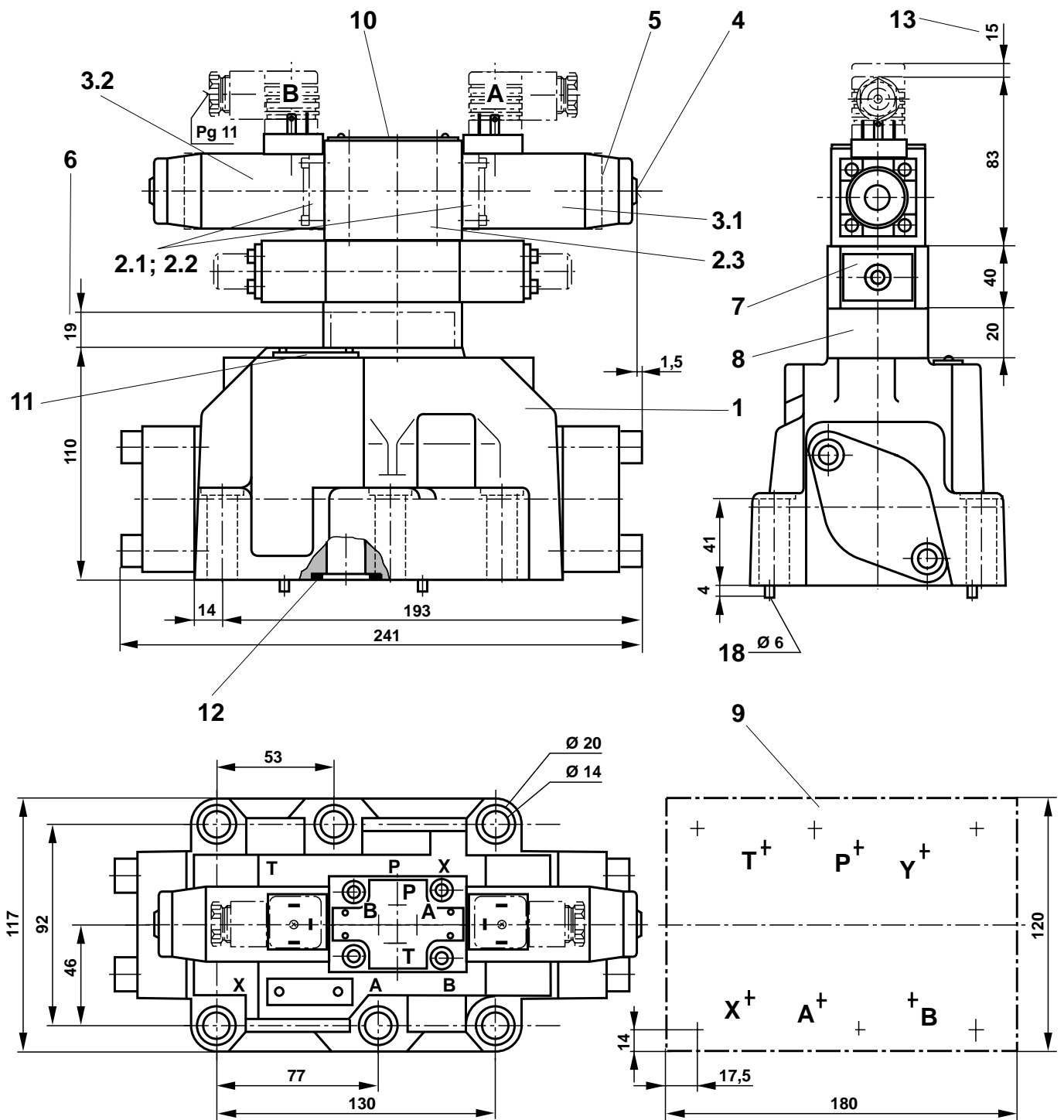
Valve fixing screws
 4 off M10 x 60 DIN 912-10.9, $M_A = 75 \text{ Nm}$
 2 off M6 x 60 DIN 912-10.9, $M_A = 15.5 \text{ Nm}$
 must be ordered separately.



For items list, see page 17

Unit dimensions: Type 4WEH 22...

(Dimensions in mm)

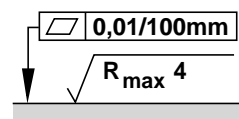


Subplates

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 data 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.

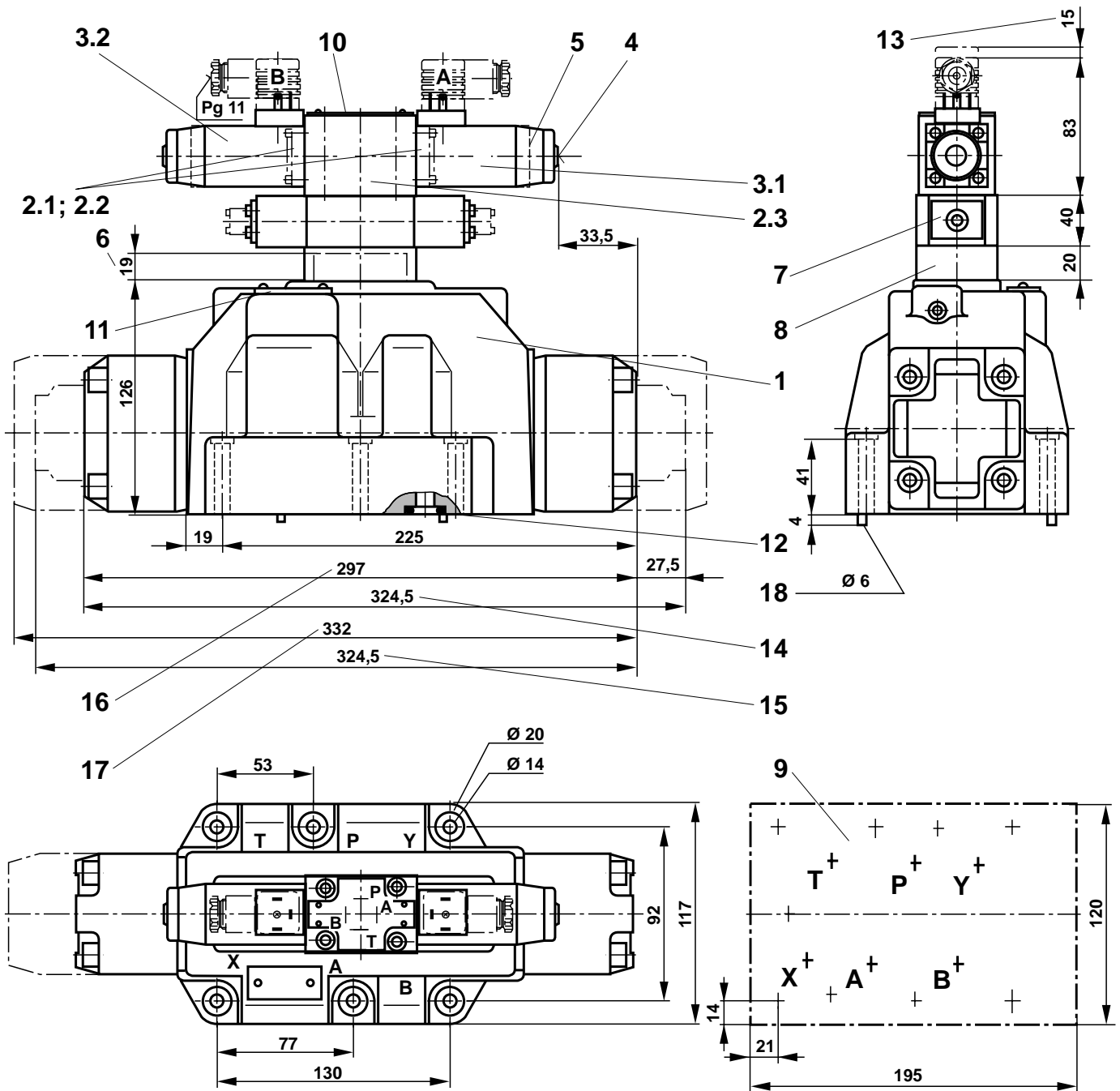


Required surface finish of the mating piece

For items list, see page 17

Unit dimensions: Type 4WEH 25...

(Dimensions in mm)

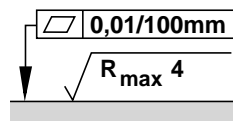


Subplates

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

Valve fixing screws

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

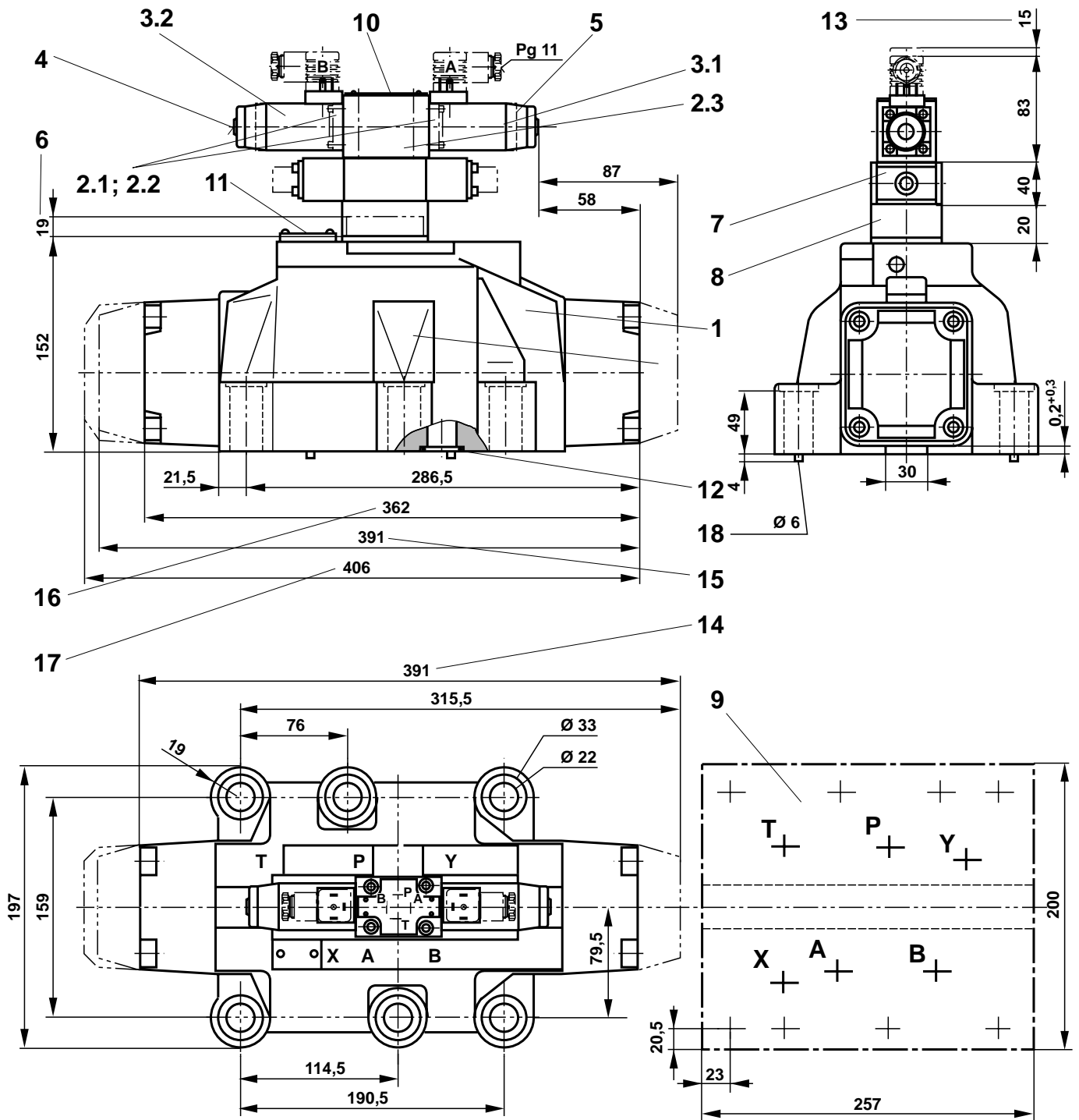


Required surface finish of the mating piece

For items list, see page 17

Unit dimensions: Type 4WEH 32...


(Dimensions in mm)



Subplates G 157/01 (G 1 1/2),
G 157/02 (M48 x 2),
G 158/10 (flange)
to data sheet 45 060 and

For items list, see page 17

Valve fixing screws
6 off M20 x 80 DIN 912-10.9, $M_A = 430 \text{ Nm}$
must be ordered separately.

 **Mannesmann Rexroth GmbH**
D-97813 Lohr am Main
Jahnstraße 3-5 • D-97816 Lohr am Main
Telefon 0 93 52 / 18-0 • Telefax 0 93 52 / 18-10 40
Telex 6 89 418-0

Mannesmann Rexroth Limited
Cromwell Road, St. Neots,
Huntingdon, Cambs. PE19 2ES
Tel: (01480) 476041
Fax: (01480) 219052