

4/3, 4/2 and 3/2 directional valve with mechanical, manual and fluidic actuation

RE 22331/11.07
Replaces: 02.03

1/12

Types WM., WN, WP and WHD

Size 10
Component series 3X
Maximum operating pressure 315 bar [4569 psi]
Maximum flow 120 l/min [31.7 US gpm]



H5554

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Features

- Direct operated directional spool valve
- Type of actuation:
 - Roller plunger
 - Hand lever
 - Rotary knob
 - Pneumatic
 - Hydraulic
- Porting pattern to ISO 4401-05-04-0-05, NFPA T3.5.1 R2 and ANSI B93-7 D05
- For subplates, see data sheet RE 45054 (separate order)

Information on available spare parts:
www.boschrexroth.com/spc

Ordering code

		10		3X	/	/		*
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3 main ports	= 3
4 main ports	= 4
– Mechanical, manual actuation:	
Roller plunger	= WMR ¹⁾
Roller plunger	= WMU ¹⁾
Hand lever	= WMM
Rotary knob	= WMD
Rotary knob, lockable	= WMDA ²⁾
– Fluidic actuation:	
Pneumatic (Pilot pressure 1.5 to 6 bar [21.8 to 87 psi])	= WN
Pneumatic (Pilot pressure 4.5 to 12 bar [65.3 to 174 psi])	= WP
Hydraulic	= WHD
Size 10	= 10
Symbols, e.g. C, E, EA, EB, see page 3	

Component series 30 to 39 = 3X
(30 to 39: unchanged connection and installation connections)

With spring return	= No code
Without spring return	= O
With detent	= F
Without spring return, with detent	= OF

	Spool positions		Type							
	2	3	WMR	WMU	WMM	WMD	WMDA	WN	WP	WHD
No code	•	•	•	•	•	•	•	•	•	•
O	•	•	•	•	•	•	•	•	•	•
F	•	•	•	•	•	•	•	•	•	•
OF	•	•	•	•	•	•	•	•	•	•

• = available

Standard types and components can be found in the EPS (standard price list).

Further details in clear text	
No code =	Seal material
V =	NBR seals
	FKM seals
	(other seals on request)
	⚠ Attention!
	Observe compatibility of seals with hydraulic fluid used!
No code =	Without throttle insert
B08 ³⁾ =	Throttle Ø 0.8 mm [0.0315 inch]
B10 ³⁾ =	Throttle Ø 1.0 mm [0.0394 inch]
B12 ³⁾ =	Throttle Ø 1.2 mm [0.0472 inch]

¹⁾ See page 11

²⁾ Key
– Series 30: Material no. **R900006980**,
– From series 31: Material no. **R900008158**,
is included in the scope of supply.

³⁾ To be used, if flow > performance of the valve, effective in P-channel.

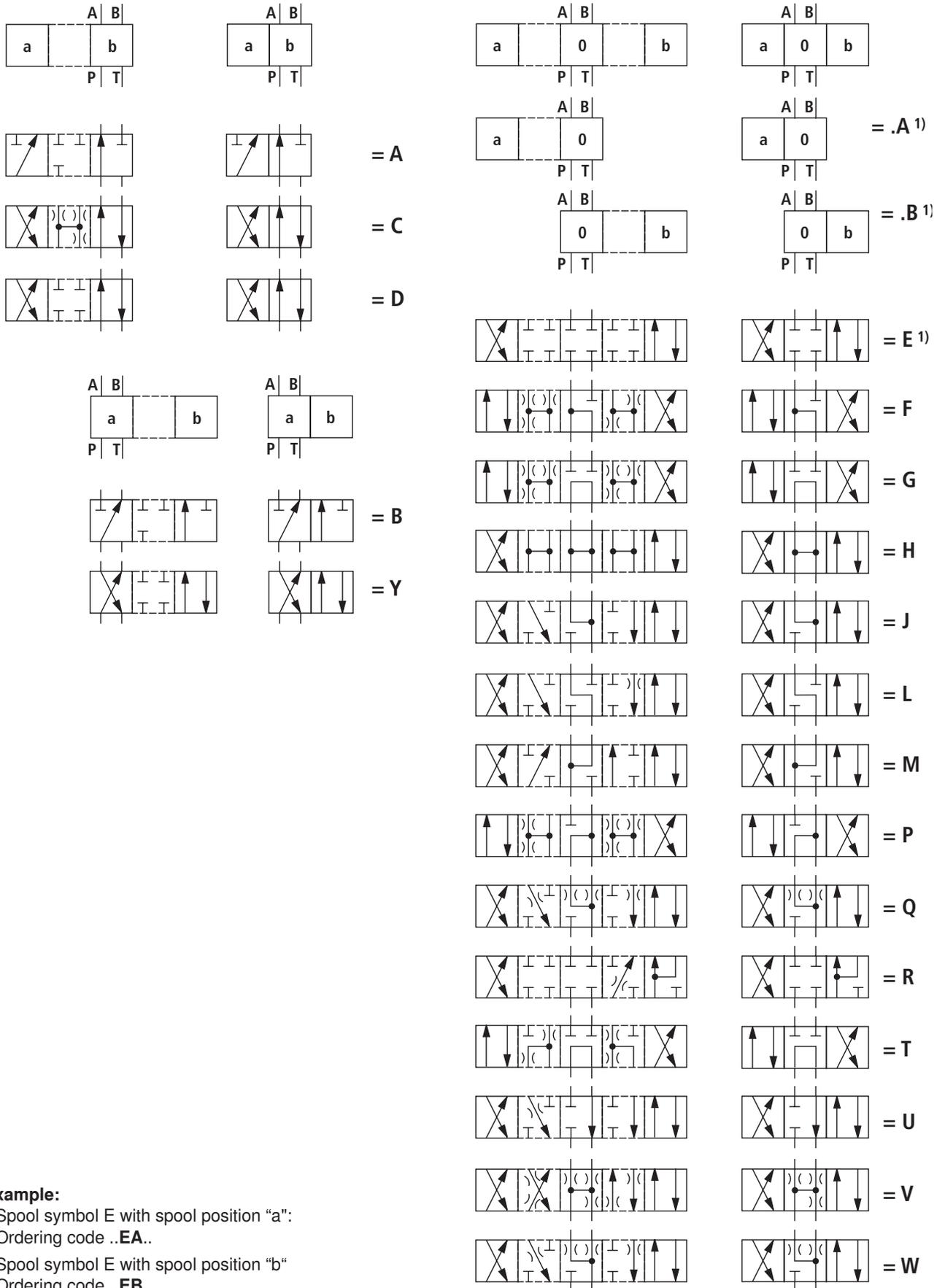
Note!

Directional valves with rotary knob are generally provided with a detent. Directional valves with hand lever are optionally available as 2- or 3-position valve, and with hydraulic or pneumatic actuation only as 2-position valve with detent. Directional valves with roller plunger are generally designed without detent.

Depending on the valve type, when actuating elements with detents are used, each spool position can be locked.

When actuating elements without return spring and without detent are used, the spool position in the non-operated state is not defined.

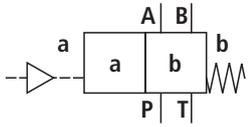
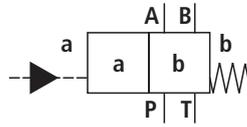
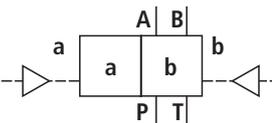
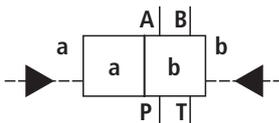
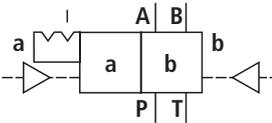
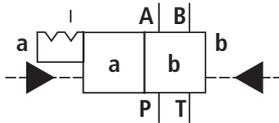
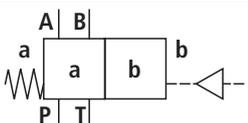
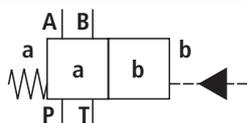
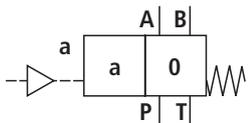
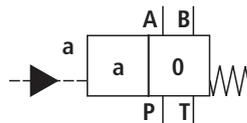
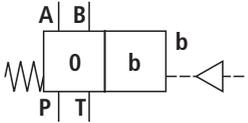
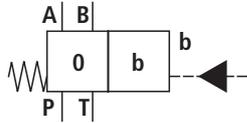
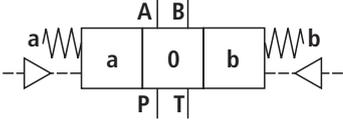
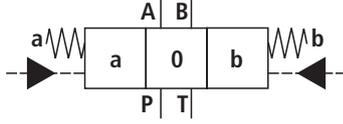
Spool symbols



1) Example:

- Spool symbol E with spool position "a":
Ordering code ..EA..
- Spool symbol E with spool position "b":
Ordering code ..EB..

Type of actuation: Fluidic actuation

Ordering code			Type of actuation	
Spool symbol	Actuating side	Detent	Pneumatic Type WN, WP	Hydraulic Type WHD
A, C, D				
		../O..		
		../OF..		
B, Y				
E, F, G, H, J, L, M, P, Q, R, T, U, V, W	"a" 1) = .A			
	"b" 1) = .B			
				

1) See Spool symbols on page 3

Type of actuation: Mechanical, manual actuation

Ordering code			Type of actuation		
Spool symbol	Actuating side	Raste	Roller plunger Type WMR, WMU	Hand lever Type WMM	Rotary knob Type WMD, WMDA
A, C, D		../F..			
B, Y					
		../F..			
E, F, G, H, J, L, M, P, Q, R, T, U, V, W	"a" ¹⁾ = .A	../F..			
	"b" ¹⁾ = .B	../F..			
		../F..			

¹⁾ See Spool symbols on page 3

Function, section

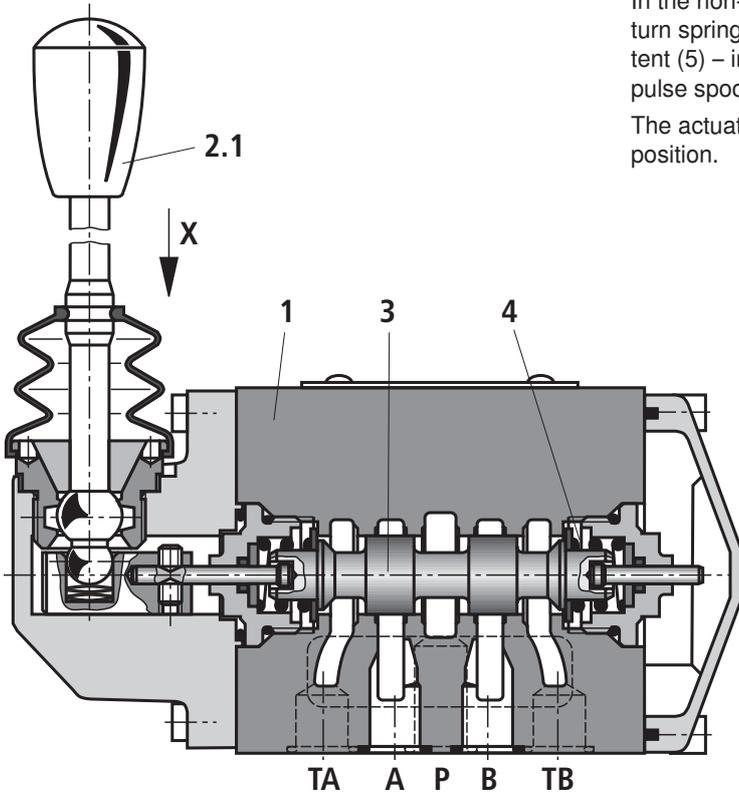
Valves of type WM. are mechanically, manually operated directional spool valves, those of types WN, WP and WHD are fluidically operated.

They control the start, stop and direction of a flow.

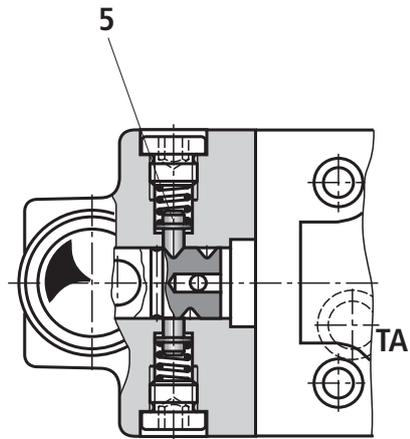
These directional valves basically consist of housing (1), one actuating element (2.1) (roller plunger, hand lever, rotary knob) or two actuating elements (2.2) (hydraulic, pneumatic actuators), control spool (3) and one or two return springs (4).

In the non-operated condition, control spool (3) is held by return springs (4) – in the case of rotary knob operation by detent (5) – in the central or initial position (an exception are impulse spools with hydraulic or pneumatic actuation).

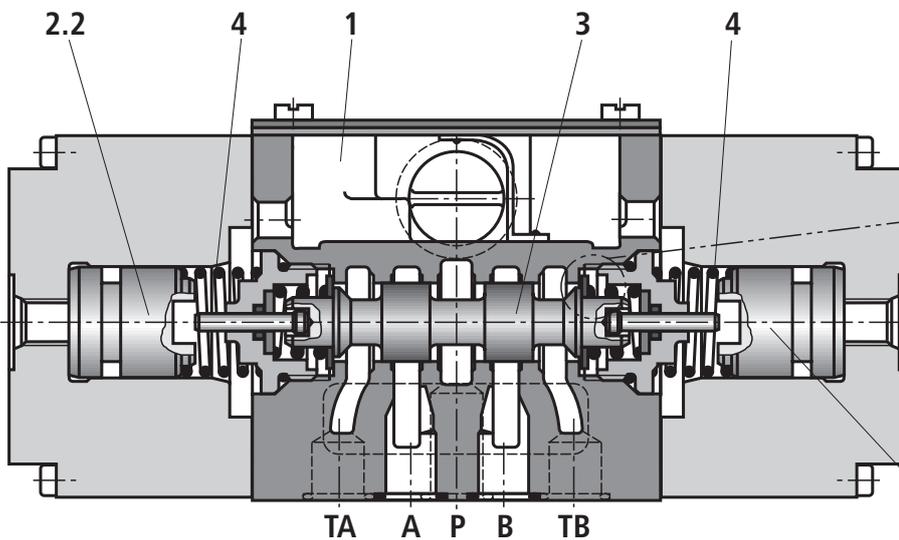
The actuating elements shift control spool (3) to the desired position.



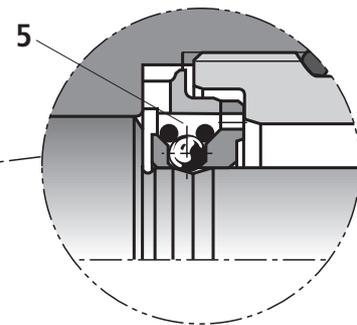
Type 4WMM 10 E3X/...



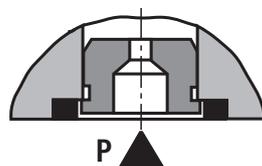
Type 4WMM 10 E3X/F/... (with detent)



Type 4WHD 10 E3X/...



Type 4WHD 10 D3X/OF...
(with detent – impulse spool)



Throttle insert

The use of a throttle insert is required, if, due to given operating conditions, flows may occur during shifting operations, which exceed the performance limit of the valve.

They are to be inserted in the P-channel of the directional valve.

Technical data (for applications outside these parameters, please consult us!)**– Mechanical, manual actuation****General**

Valve type		WMR, WMU	WMM	WMD, WMDA
Weight	kg [lbs]	3.3 [7.3]	3.8 [8.4]	3.7 [8.2]
Actuating force	– With detent	N [lbf]	–	16 to 23 [3.6 to 5.1]
	– With spring return	N [lbf]	–	20 to 27 [4.5 to 6.1]
	– 2 spool positions	N [lbf]	70 to 140 [15.7 to 31.5]	–
	– 3 spool positions	N [lbf]	70 to 175 [15.7 to 39.3]	–
Installation position		Optional		
Ambient temperature range	°C [°F]	–30 to +80 [–22 to +176] (NBR seals) –20 to +80 [–4 to +176] (FKM seals)		

Hydraulic

Maximum operating pressure	– Ports A, B, P	bar [psi]	315 [4569]	
	– Port T	bar [psi]	160 [2320] With symbol A or B, port T must be used as leakage oil port, if the operating pressure is higher than the permissible tank pressure.	
Maximum flow		l/min [US gpm]	120 [31.7]	
Flow cross-section (spool position 0)	– Spool symbol V	mm ² [inch ²]	11 [0.017] (A/B → T); 10.3 [0.016] (P → A/B)	
	– Spool symbol W	mm ² [inch ²]	2.5 [0.004] (A/B → T)	
	– Spool symbol Q	mm ² [inch ²]	5.5 [0.009] (A/B → T)	
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 ¹⁾ ; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) ¹⁾ ; HEPG (polyglycols) ²⁾ ; HEES (synthetic esters) ²⁾ ; other hydraulic fluids on request	
Hydraulic fluid temperature range		°C [°F]	–30 to +80 [–22 to +176] (NBR seals) –20 to +80 [–4 to +176] (FKM seals)	
Viscosity range		mm ² /s [SUS]	2.8 to 500 [35 to 2320]	
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 ³⁾	

¹⁾ Suitable for NBR and FKM seals

²⁾ Only suitable for FKM seals

³⁾ The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

Technical data (for applications outside these parameters, please consult us!)**– Fluidic actuation****General**

Valve type			WN	WP	WHD
Weight	– 1 actuator	kg [lbs]	3.0 [6.6]	3.0 [6.6]	3.0 [6.6]
	– 2 actuators		3.3 [7.3]	3.3 [7.3]	3.3 [7.3]
Installation position			Optional		
Ambient temperature range		°C [°F]	–30 to +80 [–22 to +176] (NBR seals) –20 to +80 [–4 to +176] (FKM seals)		

Hydraulic

Maximum operating pressure	– Ports A, B, P	bar [psi]	315 [4569]		
	– Port T	bar [psi]	160 [2320] With symbol A or B, port T must be used as leakage oil port, if the operating pressure is higher than the permissible tank pressure.		
Pilot pressure		bar [psi]	1.5 to 6 [22 to 87]	4.5 to 12 [65 to 174]	5 to 160 [73 to 2320]
Maximum flow		l/min [US gpm]	120 [31.7]		
Flow cross-section (spool position 0)	– Spool symbol V	mm ² [inch ²]	11 [0.017] (A/B → T); 10.3 [0.016] (P → A/B)		
	– Spool symbol W	mm ² [inch ²]	2.5 [0.004] (A/B → T)		
	– Spool symbol Q	mm ² [inch ²]	5.5 [0.009] (A/B → T)		
Pilot volume		cm ³ [inch ³]	12.4 [0.76]	3.83 [0.23]	3.83 [0.23]
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 ¹⁾ ; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) ¹⁾ ; HEPG (polyglycols) ²⁾ ; HEES (synthetic esters) ²⁾ ; other hydraulic fluids on request		
Hydraulic fluid temperature range		°C [°F]	–30 to +80 [–22 to +176] (NBR seals) –20 to +80 [–4 to +176] (FKM seals)		
Viscosity range		mm ² /s [SUS]	2.8 to 500 [35 to 2320]		
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 ³⁾		
Switching time	– ON	ms	10 to 35	10 to 25	15 to 30
	– OFF	ms	20 to 45	10 to 25	15 to 30

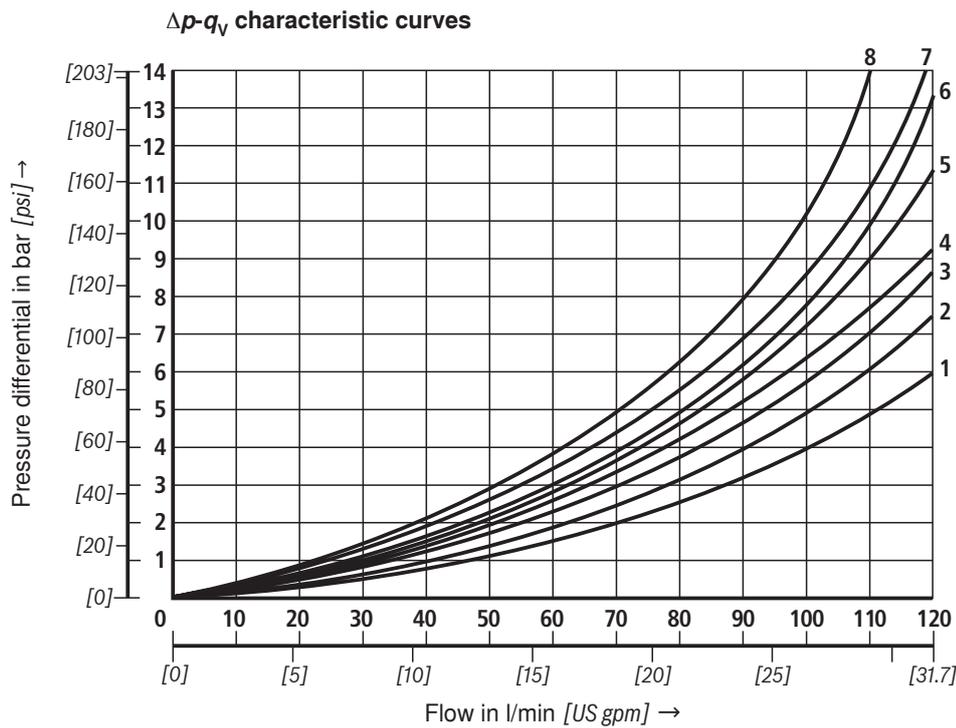
¹⁾ Suitable for NBR and FKM seals

²⁾ Only suitable for FKM seals

³⁾ The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

Characteristic curves (measured with HLP46, $\vartheta_{oil} (v = 190 \text{ SUS}) = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C} [104 \text{ }^\circ\text{F} \pm 9 \text{ }^\circ\text{F}]$)



Spool symbols	Direction of flow			
	P-A	P-B	A-T	B-T
A	4	3	-	-
B	3	4	-	-
C	3	3	4	4
D	3	3	5	5
E	2	2	4	4
F	1	2	3	4
G, T	4	4	7	7
H	1	1	5	5
J	2	2	3	3
L	3	3	2	4
M	1	1	4	4
P	3	1	5	5
Q	2	2	2	2
R	3	4	3	-
U	3	3	5	2
V	2	2	3	3
W	3	3	3	3
Y	4	4	6	6

8 Spool symbol "R" in spool position "b" (B → A)
 8 Spool symbols "G" and "T" in central position (P → T)

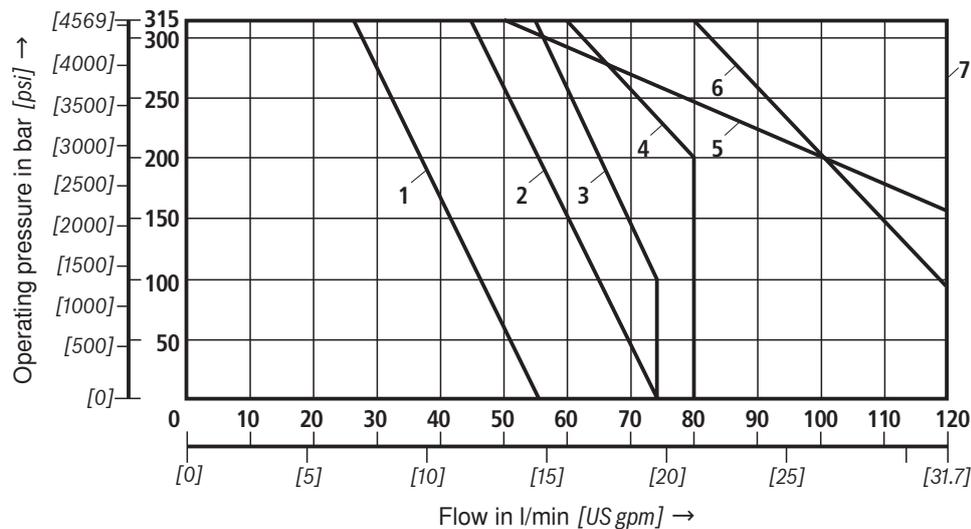
Performance limits (measured with HLP46, $\vartheta_{oil} (v = 190 \text{ SUS}) = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C} [104 \text{ }^\circ\text{F} \pm 9 \text{ }^\circ\text{F}]$)

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

visible switching performance limit may be significantly lower with only one direction of flow (e.g. from P to A while port B is blocked)!

Due to the flow forces acting within the valves, the permis-

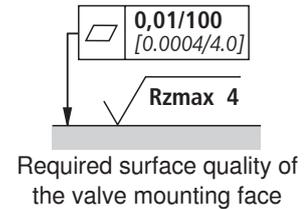
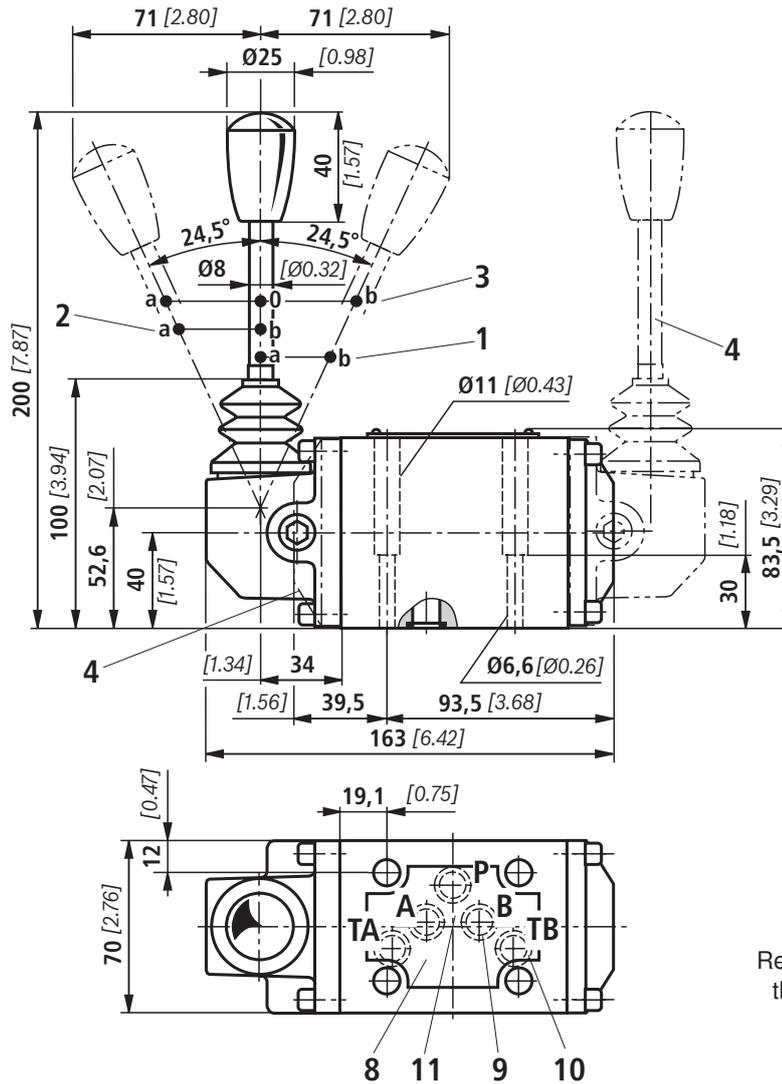
In such cases, please consult us.



Curve	Spool symbol
1	A, B
2	A/O
3	H
4	F, G, P, R, T
5	J, L, Q, U, W
6	C, D, E, M, V, Y
7	C/O, C/OF, D/O, D/OF

Unit dimensions (dimensions in mm [inch])

Type WMM



- 1 2-position valves, spool symbols B, Y, EB...
- 2 2-position valves, spool symbols A, C, D, EA...
- 3 3-position valves
- 4 Cover or hand lever for 2-position valve, spool symbols B, Y, EB...
- 8 Nameplate
- 9 Identical seal rings for ports A, B, P, TA, TB
- 10 An additional T-port (TB) can optionally be used with drilled blocks (not in conjunction with pressure reducing valves of type ZDR 10 D.. to data sheet RE 26585)
- 11 Porting pattern to ISO 4401-05-04-0-05, NFPA T3.5.1 R2 and ANSI B93-7 D05

Subplates to data sheet RE 45054 (separate order)

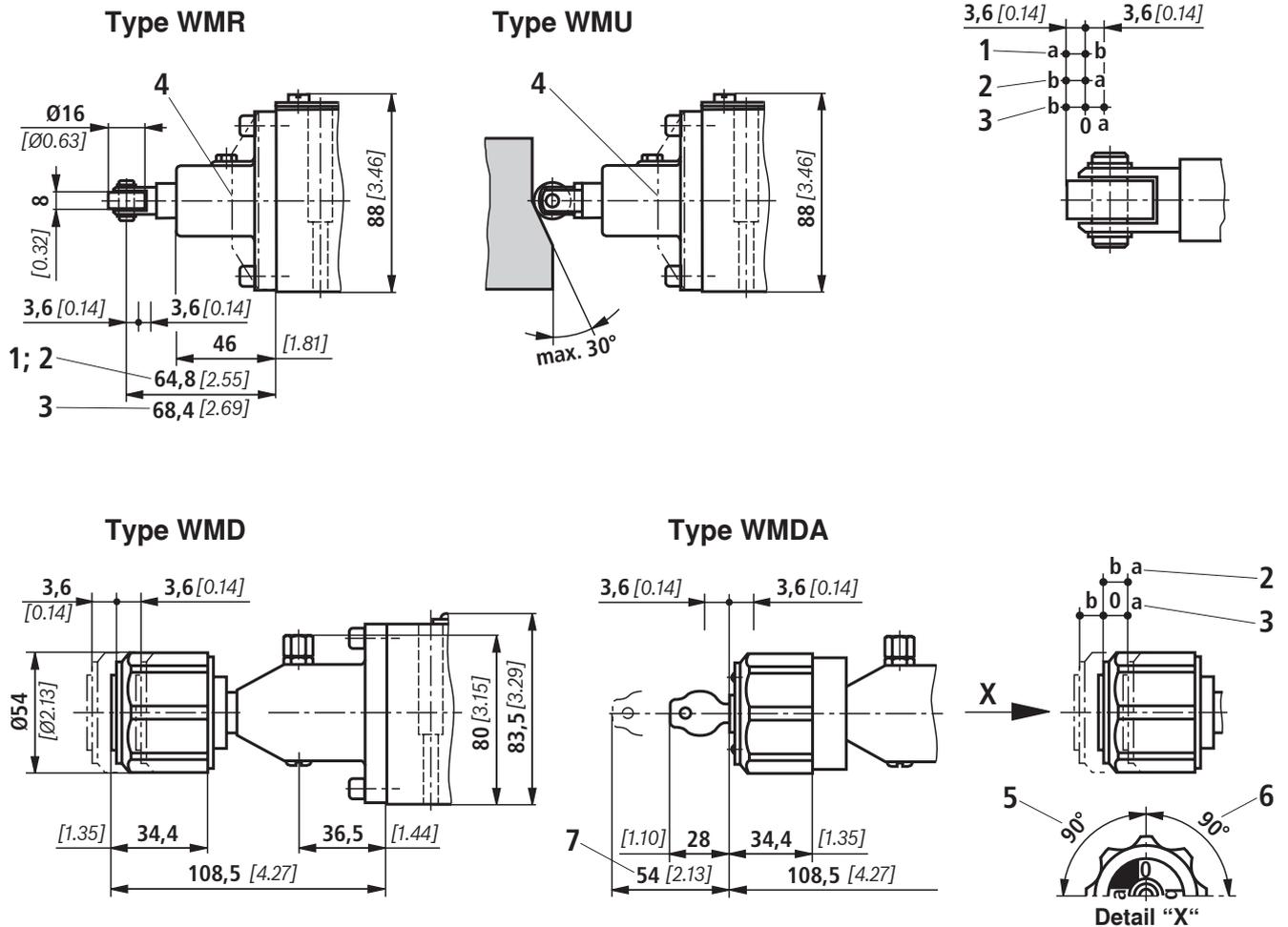
- G 66/01 (G3/8)
- G 67/01 (G1/2)
- G 534/01 (G3/4)
- G 66/12 (SAE-6)
- G 67/12 (SAE-8)
- G 534/12 (SAE-12)

For valve mounting screws, see page 11

Note!

On 2-position valves (spool symbol B and Y) the hand lever is mounted on valve side B.

Unit dimensions (dimensions in mm [inch])



- 1 2-position valves, spool symbols B, Y, EB...
- 2 2-position valves, spool symbols A, C, D, EA...
- 3 3-position valves
- 4 Cover or hand lever for 2-position valve, spool symbols B, Y, EB...
- 5 Switching angle 90° to the left for 3-position valves
- 6 Switching angle 90° to the right for 2- and 3-position valves
- 7 Space required to remove key

Subplates to data sheet RE 45054
(separate order)

G 66/01 (G3/8)
G 67/01 (G1/2)
G 534/01 (G3/4)
G 66/12 (SAE-6)
G 67/12 (SAE-8)
G 534/12 (SAE-12)

Valve mounting screws (separate order)

4 hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9-fIZn-240h-L
or **1/4-20 UNC x 1-1/2"**
(Friction coefficient $\mu_{\text{total}} = 0.09$ to 0.14);
tightening torque $M_T = 12.5 \text{ Nm}$ [9.2 ft-lbs] $\pm 10\%$,
• Material no. metric **R913000058**
• Material no. UNC **R987800710**

or

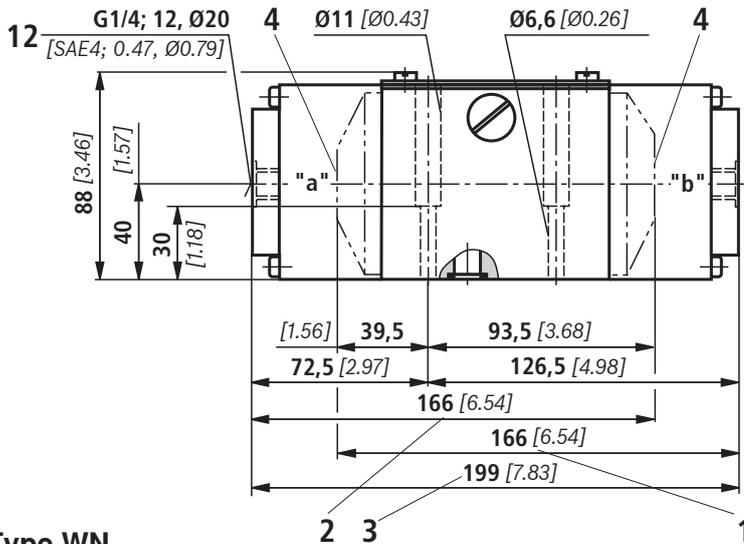
4 hexagon socket head cap screws
ISO 4762 - M6 x 40 - 10.9
(Friction coefficient $\mu_{\text{total}} = 0.12$ to 0.17);
tightening torque $M_T = 15.5 \text{ Nm}$ [11.4 ft-lbs] $\pm 10\%$

Note!

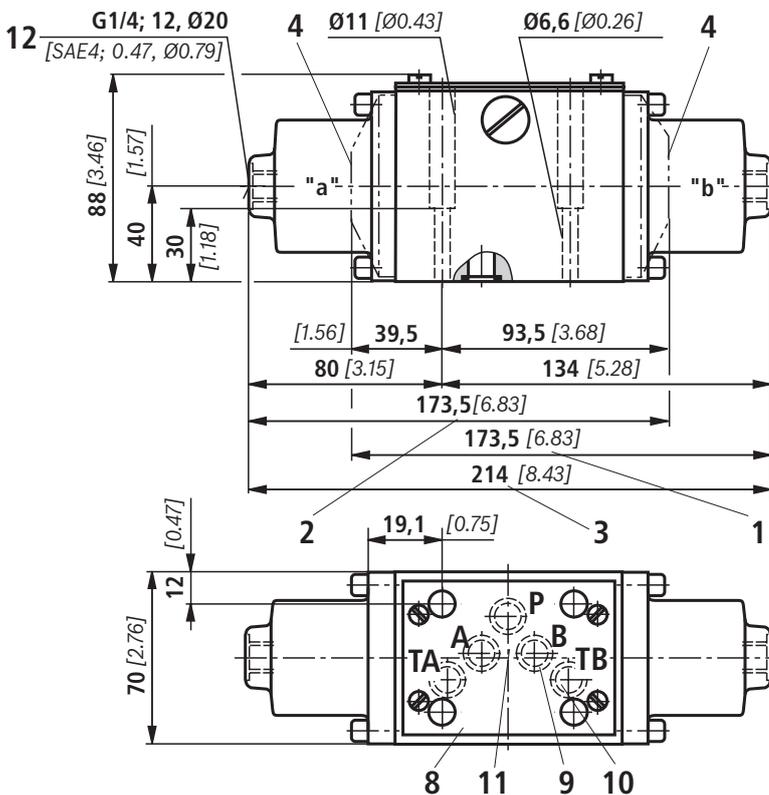
On 2-position valves (spool symbols B and Y) the roller plunger is mounted on valve side B.

Unit dimensions (dimensions in mm [inch])

Types WP, WHD

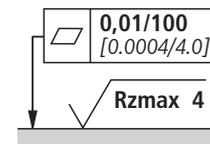


Type WN



- 1 2-position valves, spool symbols B, Y, EB...
- 2 2-position valves, spool symbols A, C, D, EA...
- 3 3-position valves
- 4 Cover for valves with one actuator (2-position valve)
- 8 Nameplate
- 9 Identical seal rings for ports A, B, P, TA, TB
- 10 An additional T-port (TB) can optionally be used with drill blocks (no in conjunction with pressure reducing valves of type ZDR 10 D.. to data sheet RE 26585)
- 11 Porting pattern to ISO 4401-05-04-0-05, NFPA T3.5.1 R2 and ANSI B93-7 D05
- 12 Pilot port

For subplates and valve mounting screws, see page 11



Required surface quality of the valve mounting face