

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

**RE 22280/04.10**  
Replaces: 10.07

1/12

## Type WMR, WMU, WMM, WMD(A) and WMRZ

Size 6  
Component series 5X, 6X  
Maximum operating pressure 315 bar [4569 psi]  
Maximum flow 60 l/min [15.8 US gpm]



H7114

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## Features

- Direct operated directional seat valve
- Actuating elements:
  - Roller plunger
  - Handle-operated lever
  - Rotary knob
- Porting pattern according to DIN 24340 form A (**without** locating hole)
- Porting pattern according to ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (**with** locating hole)
- Subplates according to data sheet 45052 (separate order)
- Inductive position switch and proximity sensors (contactless), see data sheet 24830

Information on available spare parts:  
[www.boschrexroth.com/spc](http://www.boschrexroth.com/spc)

## Ordering code

		6	/	J	/			*
3 main ports	= 3							
4 main ports	= 4							
<b>Type of actuation</b>								
Roller plunger <sup>1)</sup>	= WMR							
Roller plunger <sup>1)</sup>	= WMRZ							
Roller plunger <sup>1)</sup>	= WMU							
Handle-operated lever	= WMM							
Rotary knob	= WMD							
Rotary knob, lockable <sup>2)</sup>	= WMDA							
Size 6	= 6							
Spool symbols, e.g. C, E, EA, EB, etc. <sup>3)</sup>								
Component series 50 to 59 (50 to 59: unchanged installation and connection dimensions)	= 5X							
Component series 60 to 69 (only WMRZ type) (60 to 69: unchanged installation and connection dimensions)	= 6X							
With spring return (available for WMR, WMRZ, WMU, WMM)	= no code							
With detent (available for WMM, WMD, WMDA)	= F							
Improved corrosion protection (only "WMM" design) <sup>4)</sup>	= J							
Further details in the plain text								
<b>no code =</b> Without locating hole <b>/60 <sup>5)</sup> =</b> With locating hole <b>/62 =</b> With locating hole and locating pin ISO 8752-3x8-St								
<b>Seal material</b> <b>no code =</b> NBR seals <b>V =</b> FKM seals (other seals upon request) Attention! Observe compatibility of seals with hydraulic fluid used!								
<b>Clamping length</b> <b>no code =</b> 42 mm (standard unit) <b>Z =</b> 22 mm (only "WMRZ" design)								
<b>no code =</b> Without throttle insert <b>B08 <sup>6)</sup> =</b> Throttle-Ø 0.8 mm <b>B10 <sup>6)</sup> =</b> Throttle-Ø 1.0 mm <b>B12 <sup>6)</sup> =</b> Throttle-Ø 1.2 mm								
<b>Spool position monitoring <sup>7)</sup></b> <b>no code =</b> Without position switch <b>QMAG24 =</b> Monitored spool position "a" <b>QMBG24 =</b> Monitored spool position "b" <b>QM0G24 =</b> Monitored rest position								
For further details see data sheet 24830								

**Standard types and standard units are contained in the EPS (standard price list).**

<sup>1)</sup> See page 10.

<sup>2)</sup> Key with material no. **R900006980** for series 50 to 52 and **R900008158** from series 53 is included in the scope of delivery.

<sup>3)</sup> For spool symbols and examples see page 3 and 4.

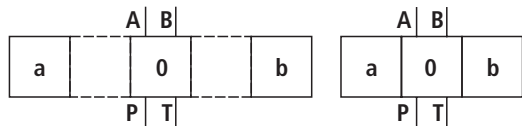
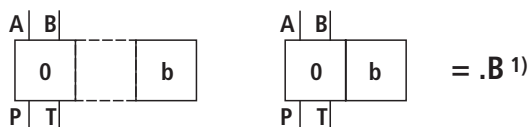
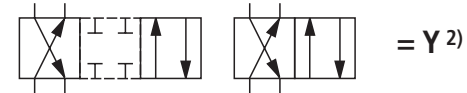
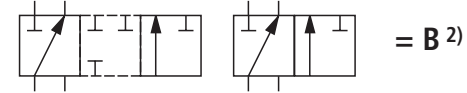
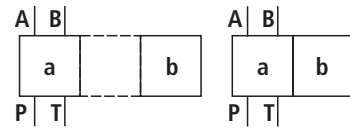
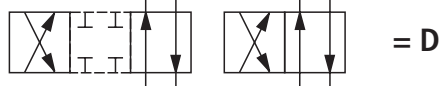
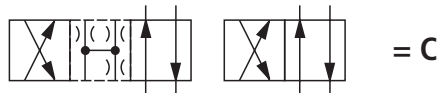
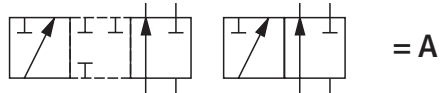
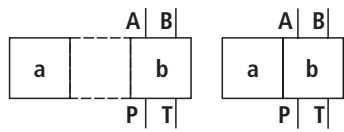
<sup>4)</sup> The external parts made of metal are galvanized, treated with corrosion protection or made of stainless steel. This design is also suitable for on-wall applications.

<sup>5)</sup> Locating pin ISO 8752-3x8-St, material no. **R900005694**, separate order

<sup>6)</sup> Used for volume flow > performance limit of the valve, effective in channel P.

<sup>7)</sup> Only for valves with 2 spool positions, not for "J" design

### Spool symbols



**1) Example:**

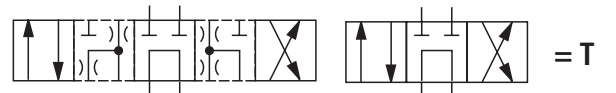
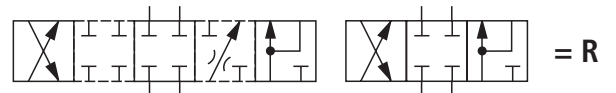
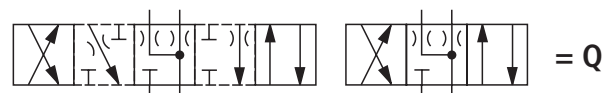
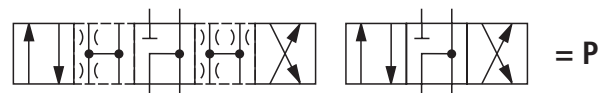
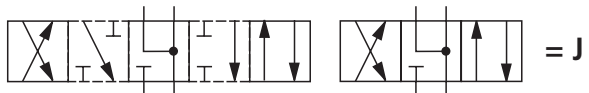
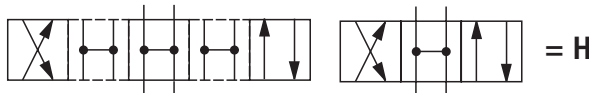
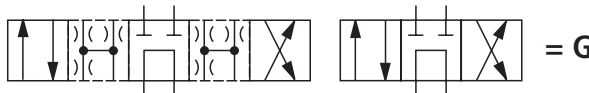
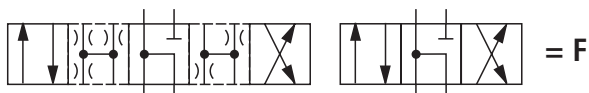
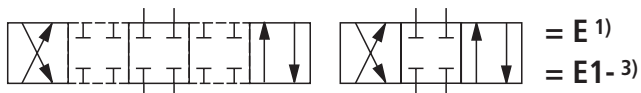
- Spool E with spool position "a" → ordering code **..EA..**
- Spool E with spool position "b" → ordering code **..EB..**

<sup>2)</sup> Only WMR/WMU and WMM types available.

<sup>3)</sup> **Symbol E1-:** P → A/B pre-opening

**Attention!**

Caution due to pressure intensification in conjunction with single-rod cylinders!



### Types of operation

Codification			Type of actuation				
Spool symbol	Actuating side	Detent	Roller plunger Type WMRZ <sup>2)</sup>	Roller plunger Type WMR, WMU	Handle-operated lever Type WMM	Rotary knob Type WMD, WMDA	
A, C, D, EA, JA, GA		../F..					
B, Y, EA, JA, GA							
		../F..					
E1- 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 symbol page 3

2) Only as 2 position valve possible

## Function, section

Type WM.. valves are mechanical, manually actuated directional spool valves.

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

Directional valves basically consist of housing (1), one actuating element (2) (roller plunger, hand-controlled lever, rotary knob), control piston (3), and one or two return springs (4).

In de-energized condition, the return springs (4) maintain the control piston (3) in center or initial position - if the rotary knob is actuated with a detent.

The control piston (3) is moved to the desired spool position by means of actuating elements.

### Detent

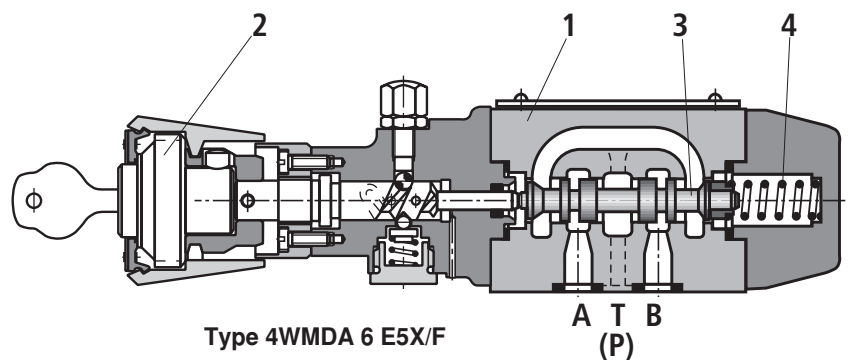
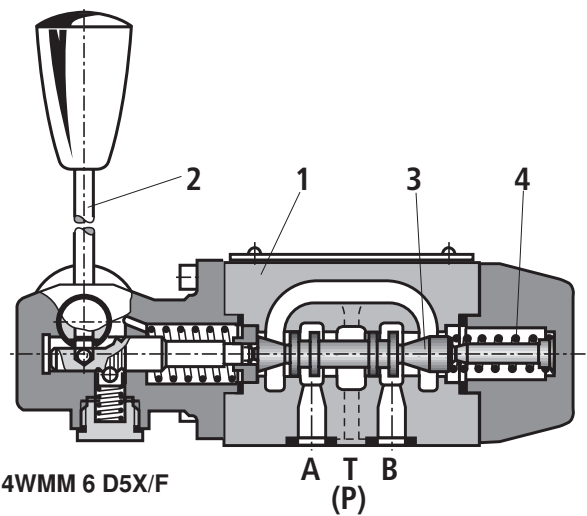
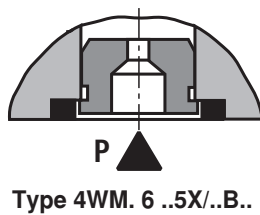
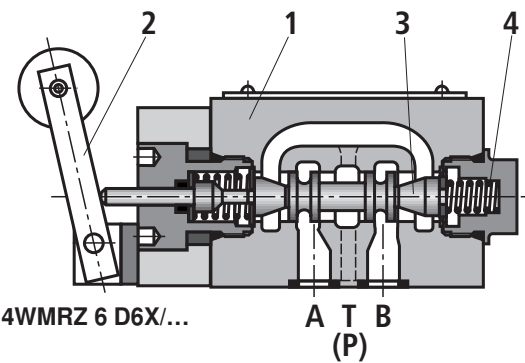
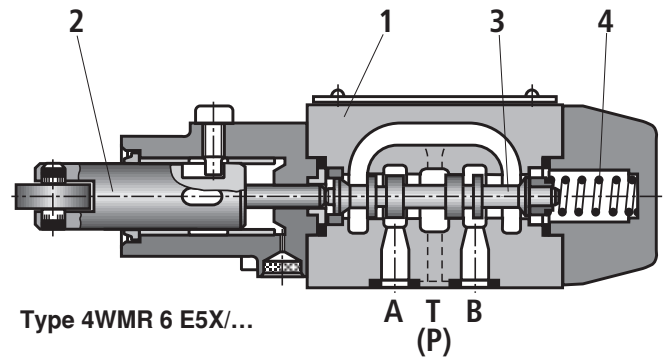
Directional valves with rotary knob are generally designed with detent. Directional valves with handle-operated lever are optionally available as 2 or 3 position valves with detent.

Directional valves with roller plunger are generally designed without detent. If actuating elements with detent are used, each spool position can be locked, depending on the valve type.

### Throttle insert

The use of a throttle insert is required when due to prevailing operating conditions, flows can occur during the switching processes, which exceed the performance limit of the valve.

It is inserted in channel P of the directional valve.



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

<b>general</b>		
Weight	kg [lbs]	approx. 1.4 [3.1]
Installation position		Any
Ambient temperature range	°C [°F]	-30 to +80 [-22 to +176] (NBR seals) -20 to +80 [-4 to +176] (FKM seals)
<b>hydraulic</b>		
Maximum operating pressure	- Port A, B, P	bar [psi] 315 [4569]
	- Port T: • WMM, WMD, WMDA	bar [psi] 160 [2320]
	• WMR, WMRZ, WMU	bar [psi] 60 [900]
		With symbols A or B, port T must be used as leakage port if the operating pressure exceeds the permissible tank pressure.
Maximum flow	l/min [US gpm]	60 [16]
Flow cross-section	- Spool symbol Q	6 % of the nominal cross-section
	- Spool symbol W	3 % of the nominal cross-section
Hydraulic fluid		Mineral oil (HL, HLP) according to DIN 51524 <sup>1)</sup> ; fast biodegradable hydraulic fluids according to VDMA 24568 (see also RE 90221); HETG (rape seed oil) <sup>1)</sup> ; HEPG (polyglycols) <sup>2)</sup> ; HEES (synthetic esters) <sup>2)</sup> ; other hydraulic fluids upon 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 <sup>2</sup> /s [SUS]	2.8 to 500 [35 to 2320]
Maximum permitted degree of contamination of the hydraulic fluid - cleanliness class according to ISO 4406 (c)		Class 20/18/15 <sup>3)</sup>

<sup>1)</sup> Suitable for NBR **and** FKM seals

<sup>2)</sup> Suitable **only** for FKM seals

<sup>3)</sup> The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the service life of the components.

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

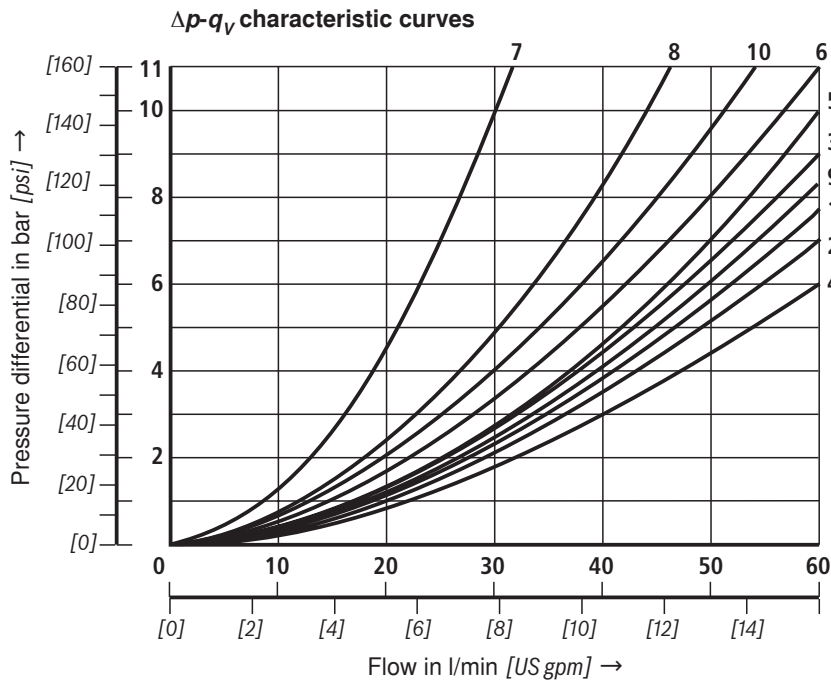
**Actuating force/torque**

		Type WMR/WMU			Type WMM	Type WMD	Type WMRZ
Operating pressure	- Port A, B, P bar [psi]	100 [1450]	200 [2900]	315 [4600]			315 [4600]
Actuating force at the roller plunger	- without tank pressure N [lbs]	100 [22.5]	112 [25.2]	121 [27.2]			30 [6.7]
	- with tank pressure N [lbs]	184 [41.4]	196 [44.1]	205 [46.1]			160 [36]
	(tank pressure, max. $p_T$ ) bar [psi]	60 bar [900 psi] - corresponds to 1.4 N [0.022 lbs] per bar [psi] of tank pressure					210 [47.2]
Maximum actuating torque	Ncm [lb-in]				-	150 [13.3]	
Actuating force	- without tank pressure, with/without detent N [lbs]				20 [4.5]	-	
	- at a tank pressure of 150 bar [2175 psi] N [lbs]				30 [6.7]	-	

Calculation formula for the actuating force at the roller plunger ( $F_R$ ) in case of tank pressure:

$$F_R = F_{\text{without tank pressure}} + p_T \times 1.4 \text{ N/bar}$$

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



Spool symbols	Flow direction			
	P-A	P-B	A-T	B-T
A	3	3	-	-
B	3	3	-	-
C	1	1	3	1
D	5	5	3	3
E	3	3	1	1
F	1	3	1	1
G	6	6	9	9
H	2	4	2	2
J	1	1	2	1
L	3	3	4	9
M	2	4	3	3
P	3	1	1	1
Q	1	1	2	1
R	5	5	4	-
T	10	10	9	9
U	3	3	9	4
V	1	2	1	1
W	1	1	2	2
Y	5	5	3	3

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

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

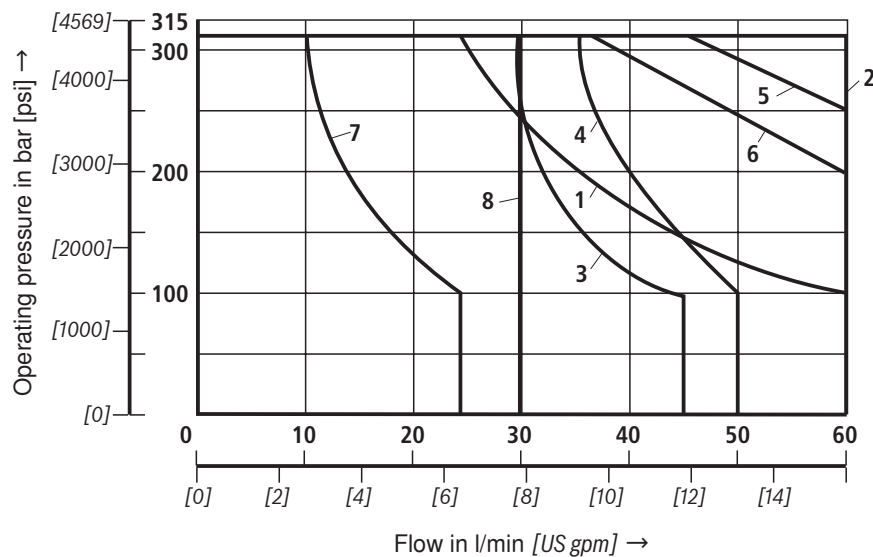
The specified switching power limits are valid for operation with two directions of flow (e.g. from P to A and simultaneous return flow from B to T).

sible switching power limits may be considerably 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.

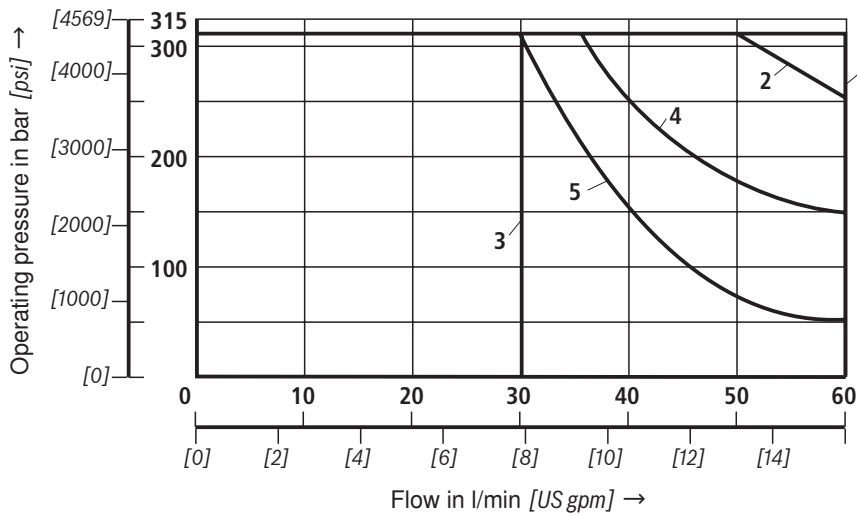
**Type WMR, WMRZ, WMU**



Characteristic curve	Spool symbol
1	A, B
2	C, D, Y, E, E1-, H, M, Q, U, W
3	F, P
4	G
5	J, L
6	R
8	V
7	T

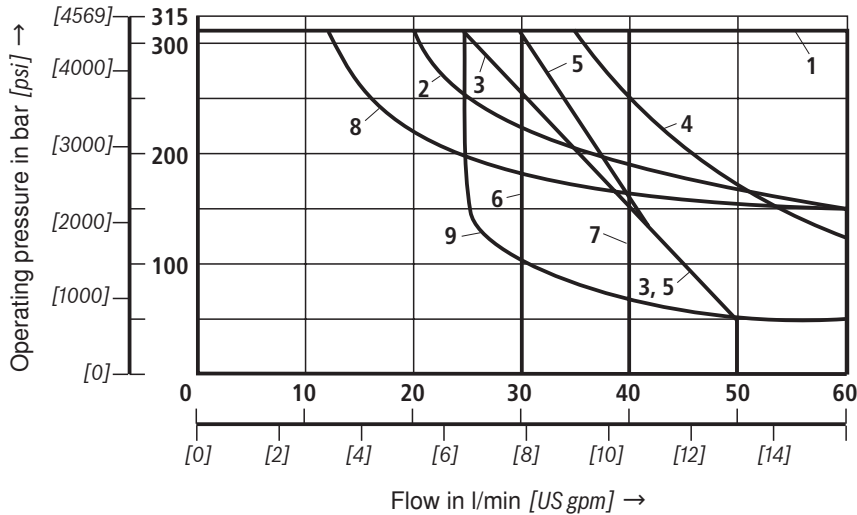
**Performance limits** (measured with HLP46,  $\vartheta_{oil} = 40 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$  [104 °F ± 9 °F])

**Type WMM - spring return**



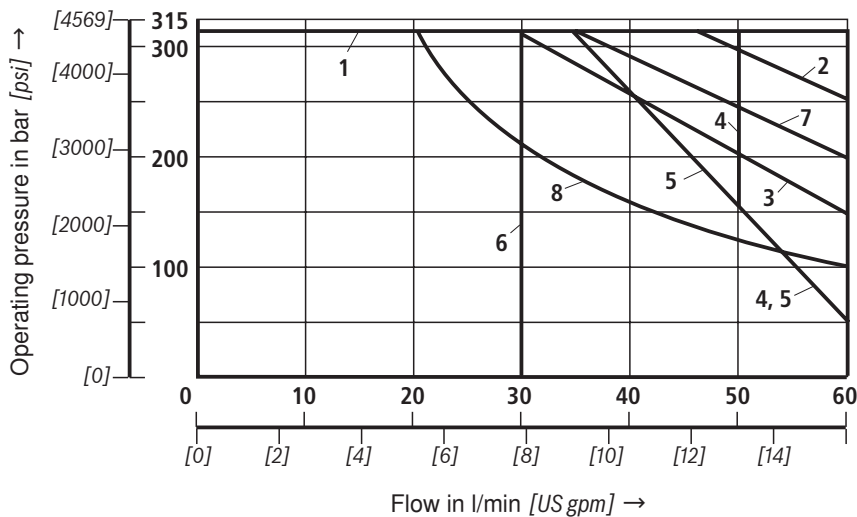
Characteristic curve	Spool symbol
1	E, E1-, M, J, L, Q, U, W, C, D, Y, G, H, R
2	A, B
3	V
4	F, P
5	T

**Type WMM - with detent**



Characteristic curve	Spool symbol
1	E1-, M, H, C, D, Y
2	E, J, Q, L, U, W
3	A, B
4	G, T
5	F
6	V
7	P
8	R
9	T

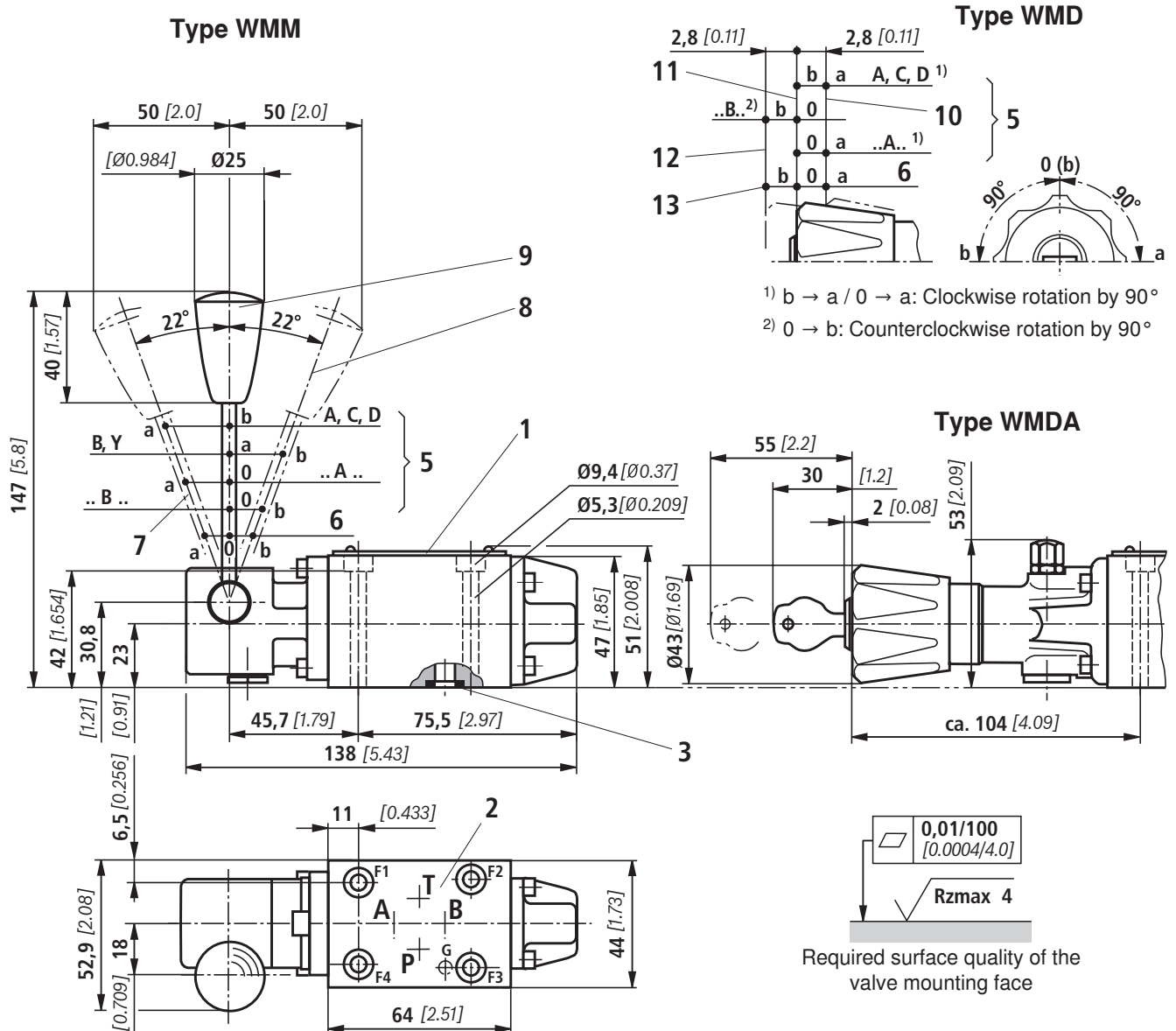
**Type WMD, WMDA**



Characteristic curve	Spool symbol
1	E, E1-, M, H, C, D, Y, Q, U, W
2	J, L
3	A, B
4	G, P
5	F
6	V
7	R
8	T



## Unit dimensions (dimensions in mm [inch])



- 1 Nameplate
- 2 Porting pattern according to DIN 24340 form A (without locating hole), ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (with locating hole for locating pin ISO 8752-3x8-St, material no. **R900005694**, separate order)
- 3 Identical seal rings for ports A, B, P, and T
- 5 2 position valve
- 6 3 position valve

### Type WMM

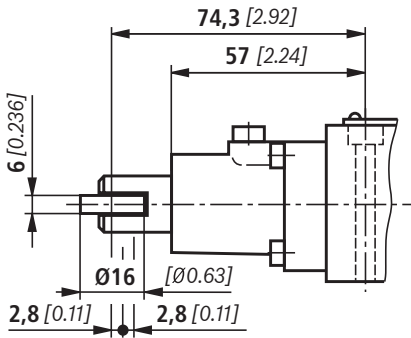
- 7 Spool position "a"
- 8 Spool position "b"
- 9 Spool position "0", "a" and "b" (a and b for 2 position valves)

### Type WMD, WMDA

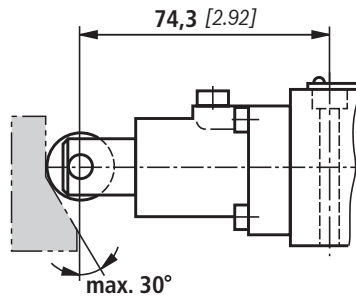
- 10 Spool position "a"
- 11 Spool position "0" and "b" (b for 2 position valves)
- 12 Spool position "b"
- 13 Switching angle 90° to the right and 90° to the left for 3 position valves

Unit dimensions (dimensions in mm [inch])

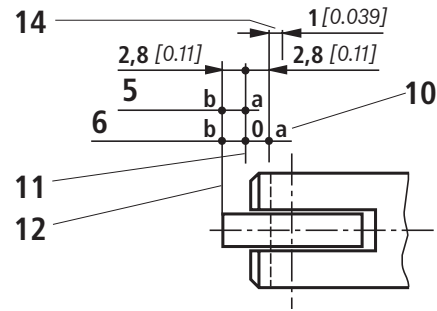
Type WMR



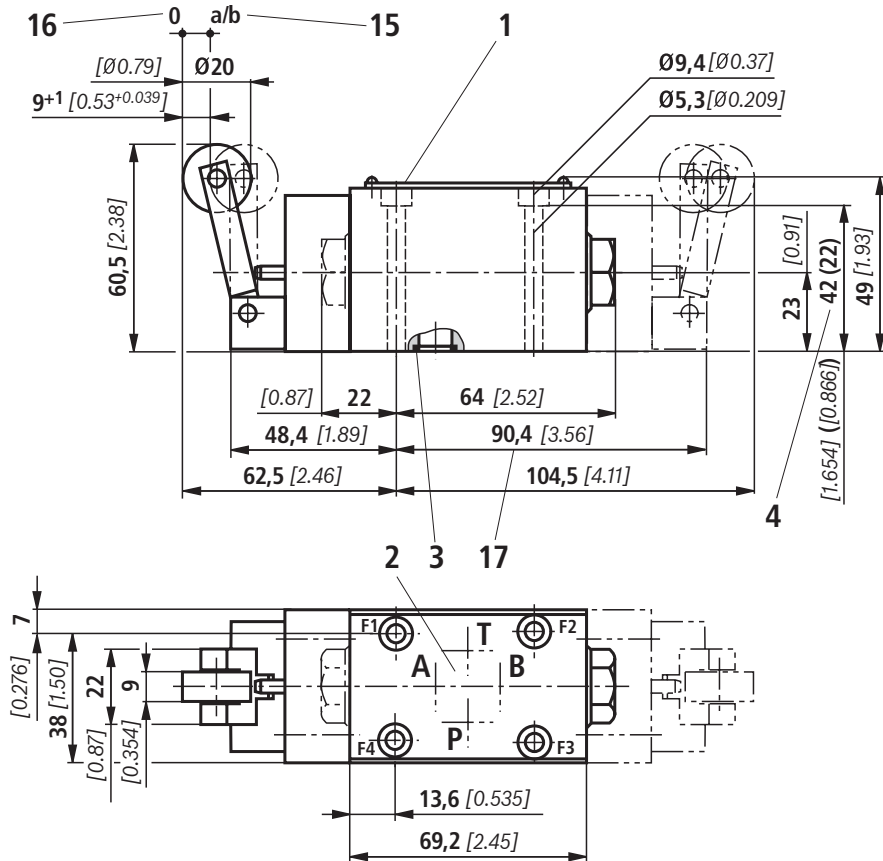
Type WMU



Type WMR, WMU



Type WMRZ



Type WMR, WMRZ, WMU

- 5 2 position valve
  - 6 3 position valve
  - 10 Spool position "a"
  - 11 Spool position "0" and "b" (b for 2 position valves)
  - 12 Spool position "b"
  - 14 Excessive stroke, cannot be used as working stroke
  - 15 Spool position "a" or "b"
  - 16 Spool position "0"
  - 17 Actuation on side B (depending on the piston)
- 1 Nameplate
  - 2 Porting pattern according to DIN 24340 form A (without locating hole), ISO 4401-03-02-0-05 and NFPA T3.5.1 R2-2002 D03 (with locating hole for locating pin ISO 8752-3x8-St, material no. R900005694, separate order)
  - 3 Identical seal rings for ports A, B, P, and T
  - 4 Alternative clamping length ( ): 22 mm (only type WMRZ)

Subplates and valve mounting screws see page 11.

## Unit dimensions

**Subplates** according to data sheet 45052  
(separate order)

(without locating hole)	G 341/01 (G1/4)
	G 342/01 (G3/8)
	G 502/01 (G1/2)
(with locating hole)	G 341/60 (G1/4)
	G 342/60 (G3/8)
	G 502/60 (G1/2)
	G 341/12 (SAE-6) <sup>1)</sup>
	G 342/12 (SAE-8) <sup>1)</sup>
	G 502/12 (SAE-10) <sup>1)</sup>

<sup>1)</sup> On request

**Valve mounting screws** (separate order)

– Clamping length 42 mm:

**4 cylinder bolts, metric**

**ISO 4762 - M5 x 50 - 10.9-fZn-240h-L**

(friction coefficient  $\mu_{\text{total}} = 0.09$  to 0.14);

Tightening torque  $M_A = 7$  Nm [5.2 ft-lbs]  $\pm 10$  %;

Material no. **R913000064**

or

**4 cylinder bolts**

**ISO 4762 - M5 x 50 - 10.9** (own procurement)

(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);

Tightening torque  $M_A = 8.1$  Nm [6 ft-lbs]  $\pm 10$  %

**4 hexagon socket head cap screw UNC**

**10-24 UNC x 2" ASTM-A574**

(friction coefficient  $\mu_{\text{total}} = 0.19$  to 0.24);

Tightening torque  $M_A = 11$  Nm [8.2 ft-lbs]  $\pm 15$  %,

(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);

Tightening torque  $M_A = 8$  Nm [5.9 ft-lbs]  $\pm 10$  %;

Material no. **R978800693**

– Clamping length 22 mm:

**4 cylinder bolts, metric**

**ISO 4762 - M5 x 30 - 10.9-fZn-240h-L**

(friction coefficient  $\mu_{\text{total}} = 0.09$  to 0.14);

Tightening torque  $M_A = 7$  Nm [5.2 ft-lbs]  $\pm 10$  %;

Material no. **R913000316**

or

**4 cylinder bolts**

**ISO 4762 - M5 x 30 - 10.9** (own procurement)

(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);

Tightening torque  $M_A = 8.1$  Nm [6 ft-lbs]  $\pm 10$  %

**4 cylinder bolts UNC**

**10-24 UNC x 1 1/4"**

(friction coefficient  $\mu_{\text{total}} = 0.19$  to 0.24);

Tightening torque  $M_A = 11$  Nm [8.2 ft-lbs]  $\pm 15$  %,

(friction coefficient  $\mu_{\text{total}} = 0.12$  to 0.17);

Tightening torque  $M_A = 8$  Nm [5.9 ft-lbs]  $\pm 10$  %;

Material no. **R978802879**

## Notes

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