

**RE 22 331/02.03**

Replaces: 11.02

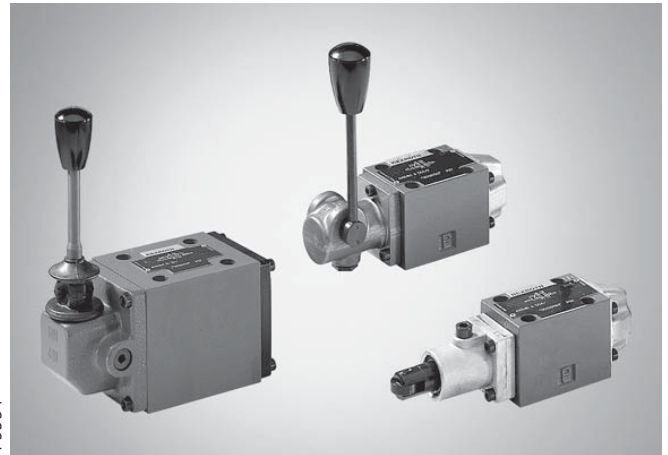
**4/3-, 4/2- and 3/2-way directional valves  
with mechanical, manual and  
fluidic operation**

Nominal size 10

Series 3X

Maximum operating pressure 315 bar

Maximum flow 120 L/min



Mechanical, manual operation

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**Features**

- Direct operated directional spool valves with mechanical, manual or fluidic operation
- Porting pattern to DIN 24 340 Form A, ISO 4401 and CETOP–RP 121 H, subplates to catalogue sheet RE 45 054 (separate order)
- Operating elements:
  - Roller/plunger
  - Hand lever
  - Rotary knob
  - Pneumatic
  - Hydraulic



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## Ordering details

3 actuator ports	= 3			10		3X	/	/		*
4 actuator ports	= 4									
Mechanical, manual operation										
Roller/plunger	= WMR <sup>4)</sup>									
Roller/plunger	= WMU <sup>4)</sup>									
Hand lever	= WMM									
Rotary knob	= WMD									
Rotary knob, lockable	= WMDA <sup>1)</sup>									
Fluidic operation										
Pneumatic	= WN									
(control pressure 1.5 to 6 bar)										
Pneumatic	= WP									
(control pressure 4.5 to 12 bar)										
Hydraulic	= WHD									
Nominal size 10				= 10						
Symbols, e. g. C, E, EA, EB etc. <sup>2)</sup>										
Series 30 to 39						= 3X				
(30 to 39: unchanged installation and connection dimensions)										

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 throttle insert  
 B08<sup>3)</sup> = Throttle Ø 0.8 mm  
 B10<sup>3)</sup> = Throttle Ø 1.0 mm  
 B12<sup>3)</sup> = Throttle Ø 1.2 mm

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

	No. of positions		Valve type							
	2 Pos.	3 Pos.	WMR	WMU	WMM	WMD	WMDA	WN	WP	WHD
No code	●	●	●	●	●	●	●	●	●	●
O	●	●	●	●	●	●	●	●	●	●
F	●	●	●	●	●	●	●	●	●	●
OF	●	●	●	●	●	●	●	●	●	●

● = Available

- Key, Material No. **R900006980** (series 30) or Material No. **R900008158** (from series 31), is included within the scope of supply.
- Symbols and example, see below and page 3.
- Used with flows > performance limit of the valve, effective in the P port.
- Also see page 8

## Symbols

5) Example:  
 ● Spool E with switched position "a" → Ordering detail **..EA..**  
 ● Spool E with switched position "b" → Ordering detail **..EB..**

**Symbols:** fluidic operation

<sup>5)</sup> See page 2 (symbols)

Ordering details		Valve types	
Spool	Detent	WN, WP (pneumatic)	WHD (hydraulic)
A, C, D			
	../O..		
	../OF..		
B, Y			
E, F, G, H, J, L, M, P, Q, R, T, U, V, W	Switched position "a" <sup>5)</sup> = .A		
	Switched position "b" <sup>5)</sup> = .B		

**Symbols:** mechanical, manual operation

<sup>5)</sup> See page 2 (symbols)

Ordering details		Valve types		
Spool	Detent	WMR, WMU (roller/plunger)	WMM (hand lever)	WMD, WMDA (rotary knob)
A, C, D	../F..			
B, Y	../F..			
E, F, G, H, J, L, M, P, Q, R, T, U, V, W	Switched position "a" <sup>5)</sup> = .A			
	Switched position "b" <sup>5)</sup> = .B			
	../F..			

## Preferred types (readily available)

Type	Material No.
3WMR 10 A3X/	R900589995
4WMR 10 D3X/	R900589916
4WMMU 10 D3X/	R900590253
4WMMU 10 E3X/	R900587208
3WMM 10 A3X/F	R900595634
4WMM 10 D3X/	R900591592
4WMM 10 E3X/	R900589983
4WMM 10 G3X/	R900590222
4WMM 10 H3X/	R900592220
4WMM 10 J3X/	R900586919

Type	Material No.
4WP 10 D3X/	R900593836
4WP 10 G3X/	R900593263
4WP 10 H3X/	R900594341
3WHD 10 A3X/	R900591482
4WHD 10 D3X/	R900590239
4WHD 10 E3X/	R900598445

Further preferred types and standard components can be found in the EPS (Standard Price List).

## Function, section

### With detent (5), versions ..F/.. or ..OF/..

(also see the adjacent table)

Directional valves with rotary knob operation are generally fitted with a detent. Hand lever operated valves are available as 2 or 3 position valves, while hydraulically or pneumatically operated valves are only available with 2-switched positions and a detent. Directional valves with roller/plunger operation are normally supplied without detent. When using operating elements with detent it is possible, depending on the valve type, to fix each switched position.

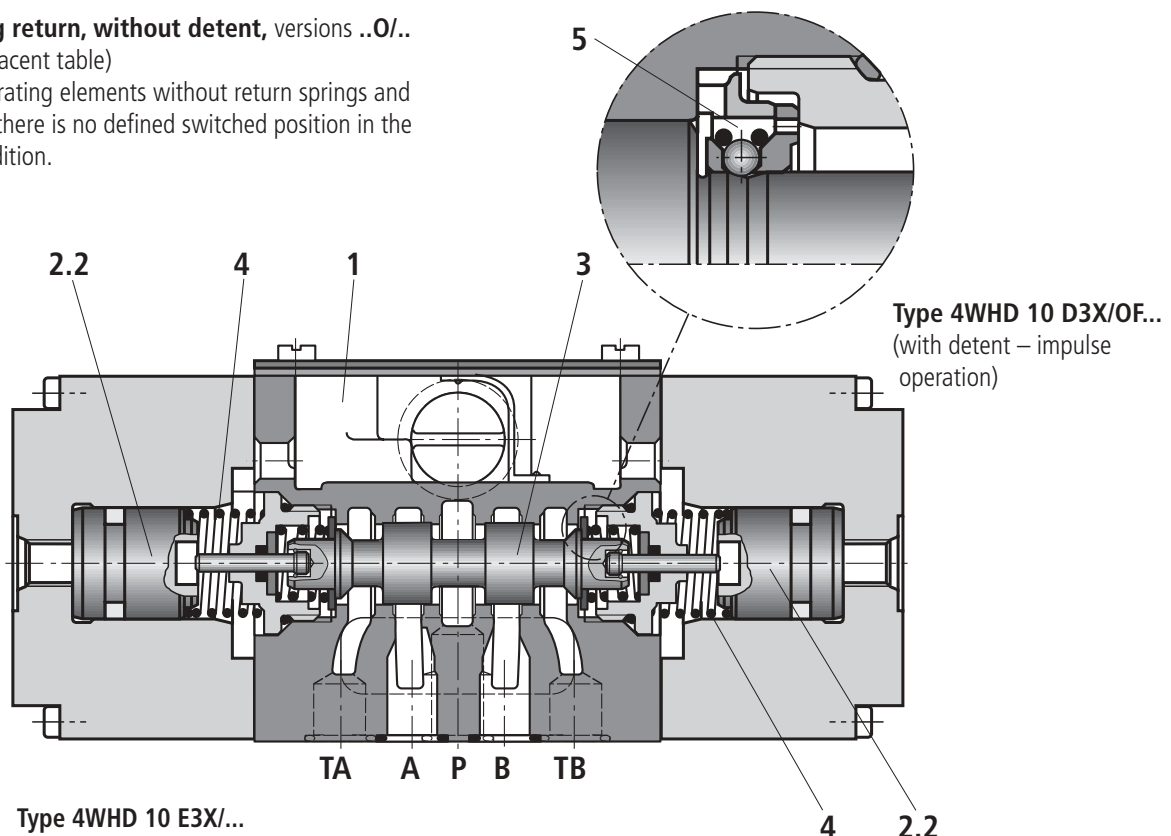
Possible spool positioning mechanism	No. of positions		Valve type								
	2 Pos.	3 Pos.	WMR	WMMU	WMM	WMD	WMDA	WNN	WNP	WHD	
Spring return	●	●	●	●	●				●	●	●
O	●								●	●	●
F	●	●			●	●	●				
OF	●									●	●

● = Available

### Without spring return, without detent, versions ..O/..

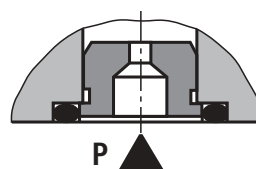
(also see the adjacent table)

When using operating elements without return springs and without detent, there is no defined switched position in the unoperated condition.

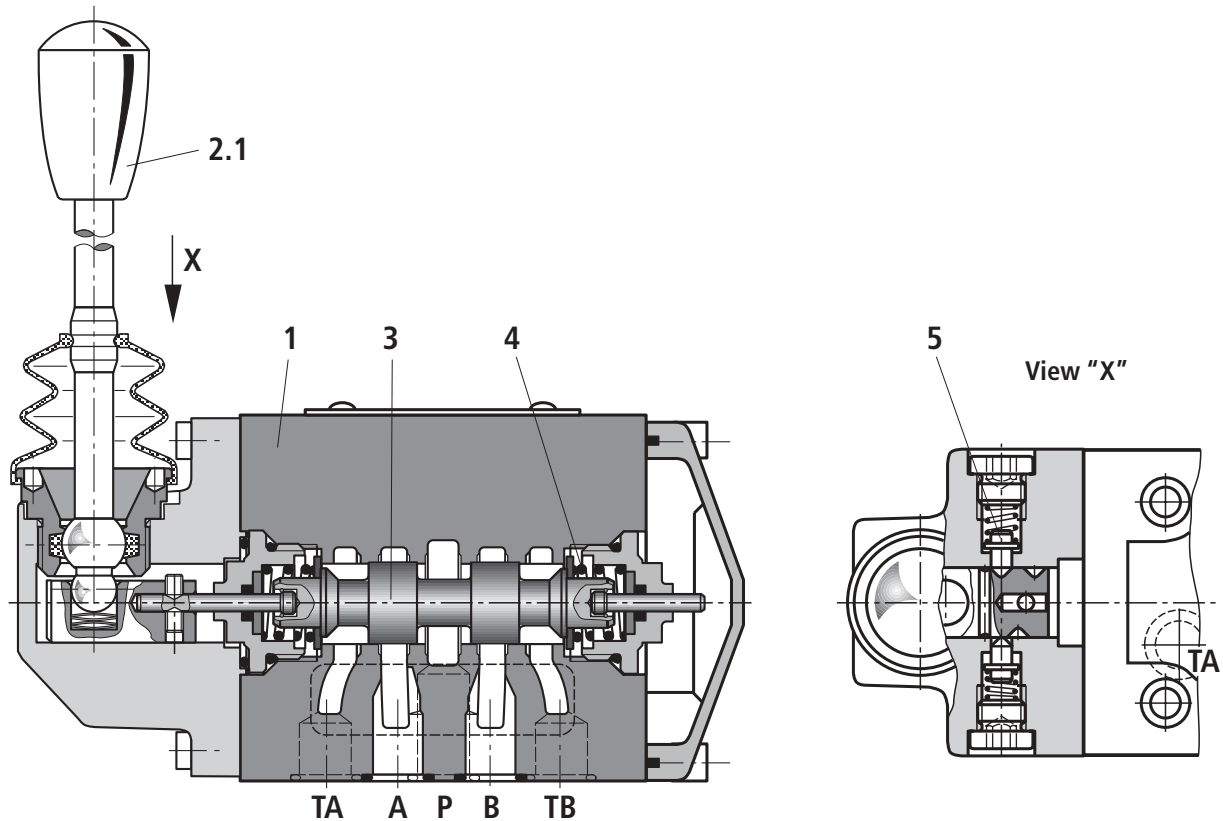


### Throttle insert

Use of the throttle insert is necessary when operating conditions are such that during the switching process, larger flows can occur than the performance limits of the valve will allow. It is fitted in the P channel of the directional valve.



## Function, section



Type 4WMM 10 E3X/...

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

Directional valves control the start, stop and direction of an oil flow. These valves basically consist of the housing (1), an operating element (2.1) (roller/plunger, hand lever, rotary knob) or two operating elements (2.2) (hydraulic, pneumatic operating cylinders – see page 4), the control spool (3) as well as one or two return springs (4).

In the unoperated condition the control spool (3) is held in the neutral or start position by the return springs (4) – by a detent in the case of rotary knob operation – in the central or initial position (with the exception of impulse valves with hydraulic or pneumatic operation).

The control spool (3) is pushed into the required switched position by means of the operating elements.

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

### General

Valve type		WMR WMU	WMM	WMD WMDA	WN	WP	WHD
Installation		Optional					
Control pressure	bar				1.5 to 6	4.5 to 12	5 to 160
Control volume	cm <sup>3</sup>				12.4	3.83	3.83
Switching time	ON				10 to 35	10 to 25	15 to 30
	OFF				20 to 45	10 to 25	15 to 30
Actuating force	– With detent		16 to 23	30			
	– With spring return		20 to 27				
	– 2 switching positions	70 to 140					
	– 3 switching positions	70 to 175					
Weight Valve with:	– Mechanical, manual operation	kg	3.3	3.8	3.7		
	– 1 operating cylinder	kg				3.0	3.0
	– 2 operating cylinders	kg				3.3	3.3

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

### General

Installation		Optional
Ambient temperature range	°C	- 30 to + 80 (NBR seals) - 20 to + 80 (FKM seals)

### Hydraulic

Operating pressure, max.	Ports A, B, P	bar	Up to 315
	Port T	bar	Up to 160 With symbols A and B, port T must be used as a drain port where the operating pressure exceeds 160 bar.
Flow, max.		L/min	Up to 120
Flow cross-section (switched position 0):	With symbol V	mm <sup>2</sup>	11 (A/B → T); 10.3 (P → A/B)
	With symbol W	mm <sup>2</sup>	2.5 (A/B → T)
	With symbol Q	mm <sup>2</sup>	5.5 (A/B → T)
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524 <sup>1)</sup> ; Fast bio-degradable pressure fluid to VDMA 24 568 (also see RE 90 221); HETG (rape seed oil) <sup>1)</sup> ; HEPG (polyglycols) <sup>2)</sup> ; HEES (synthetic ester) <sup>2)</sup> ; Other pressure fluids on request
Pressure fluid temperature range		°C	- 30 to + 80 (with NBR seals) - 20 to + 80 (with FKM seals)
Viscosity range		mm <sup>2</sup> /s	2.8 to 500
ISO code cleanliness class			Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15 <sup>3)</sup>

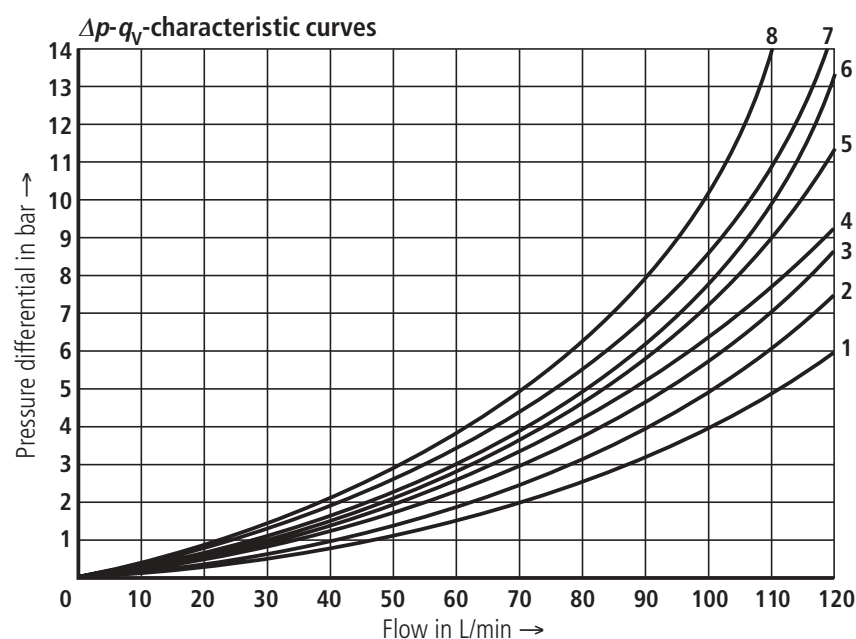
<sup>1)</sup> Suitable for NBR **and** FKM seals

<sup>2)</sup> **Only** suitable for FKM seals

<sup>3)</sup> 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.

## Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40 \text{ °C} \pm 5 \text{ °C}$ )



Symbols	Flow direction			
	P-A	P-B	A-T	B-T
A	4	3	-	-
B	3	4	-	-
C	3	3	4	4
D	3	3	5	5
Y	4	4	6	6
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

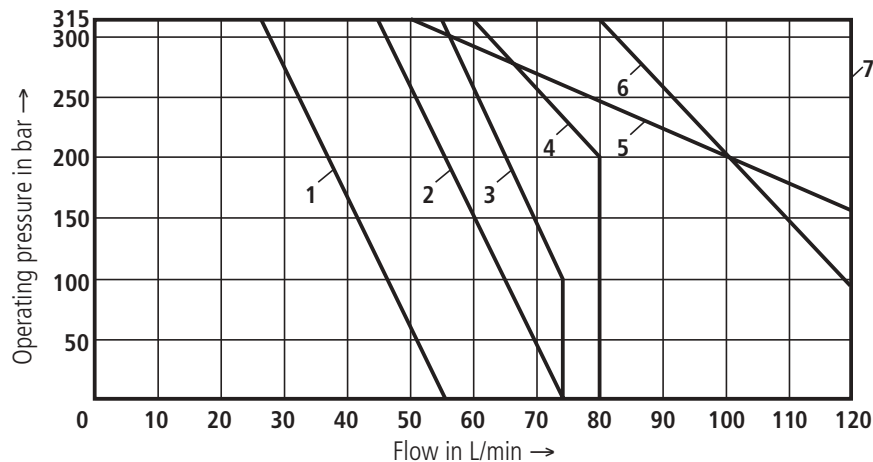
**8** Symbol "R" in switched position (B→A)

**8** Symbols "G" and "T" in mid position (P→T)

## Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ )

The 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).

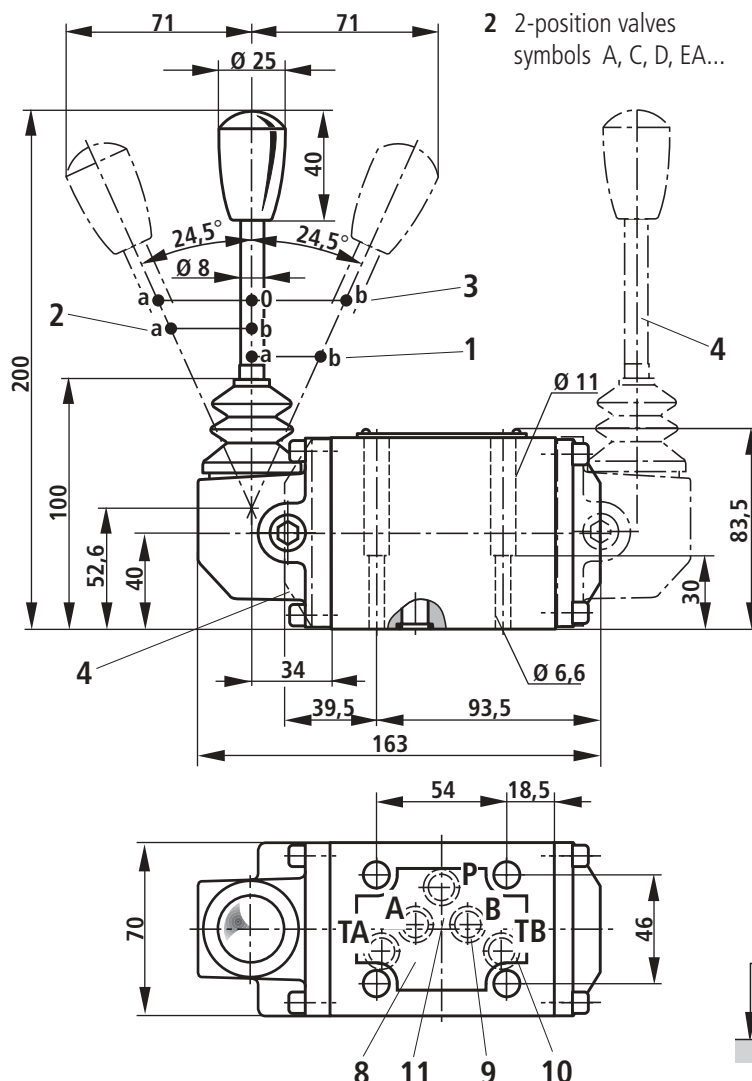
Due to the flow forces occurring within the valve, the permissible performance limit for one direction of flow, (e.g. from P to A and port B is blocked), may be considerably reduced! (Please consult us in such cases).



Char. curve	Symbols
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)

### WMM



- 1 2-position valves symbols B, Y, EB...
- 2 2-position valves symbols A, C, D, EA...

- 3 3-position valves
- 4 Cover or hand lever for 2 position valves, symbols B, Y, EB...
- 5 Angle of operation 90° anti-clockwise for 3-position valves
- 6 Angle of operation 90° clockwise for 2- and 3-position valves
- 7 Space required to remove the key
- 8 Name plate
- 9 Identical seal rings for A, B, P, TA, TB
- 10 The additional T connection (TB) can also be optionally used in special manifold blocks, but not in conjunction with pressure reducing valves type ZDR 10 D.. (RE 26 585).
- 11 Porting pattern to DIN 24 340 Form A, ISO 4401 and CETOP-RP 121 H.

#### Subplates

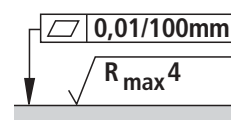
- G 66/01 (G 3/8),
- G 67/01 (G 1/2),
- G 534/01 (G 3/4)

to catalogue sheet RE 45 054 and

#### Valve fixing screws

M6 x 40 DIN 912-10.9,  
 $M_A = 15,5\text{ Nm}$ , must be ordered separately.

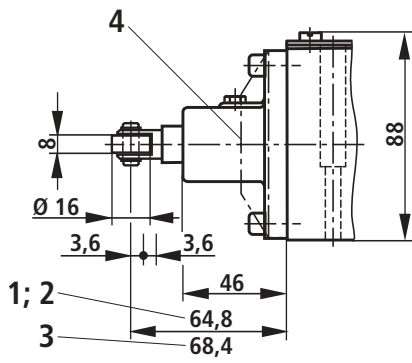
**In 2-position valves, (symbols B and Y) the hand lever is mounted on the end nearest to port B.**



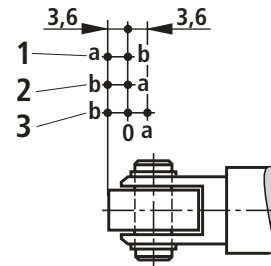
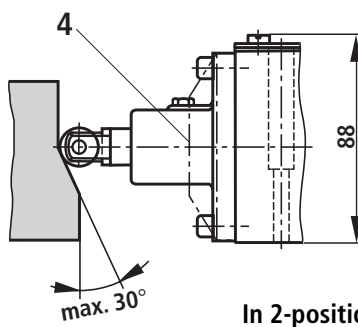
Required surface finish of the mating piece

Unit dimensions (dimensions in mm)

WMR

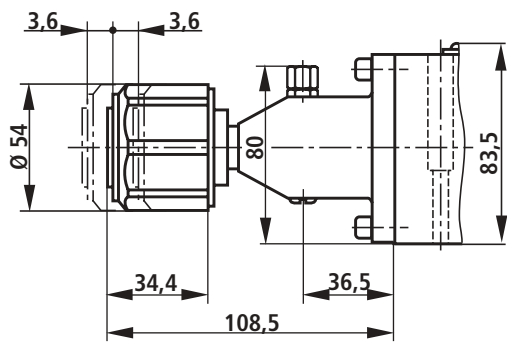


WMU

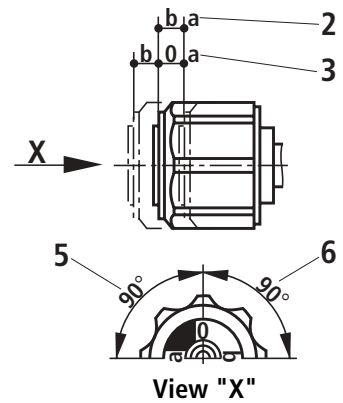
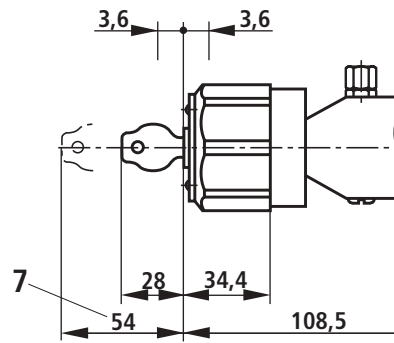


In 2-position valves (symbols B and Y) the hand lever is mounted on the end nearest to port B.

WMD



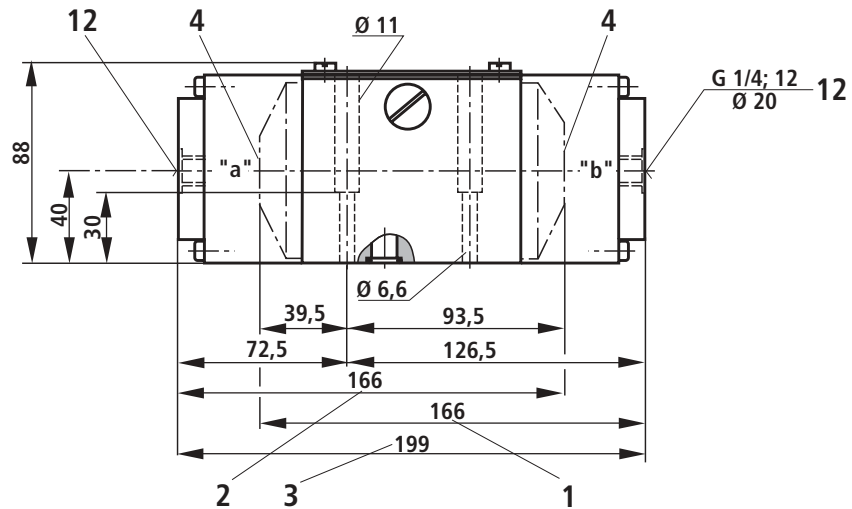
WMDA



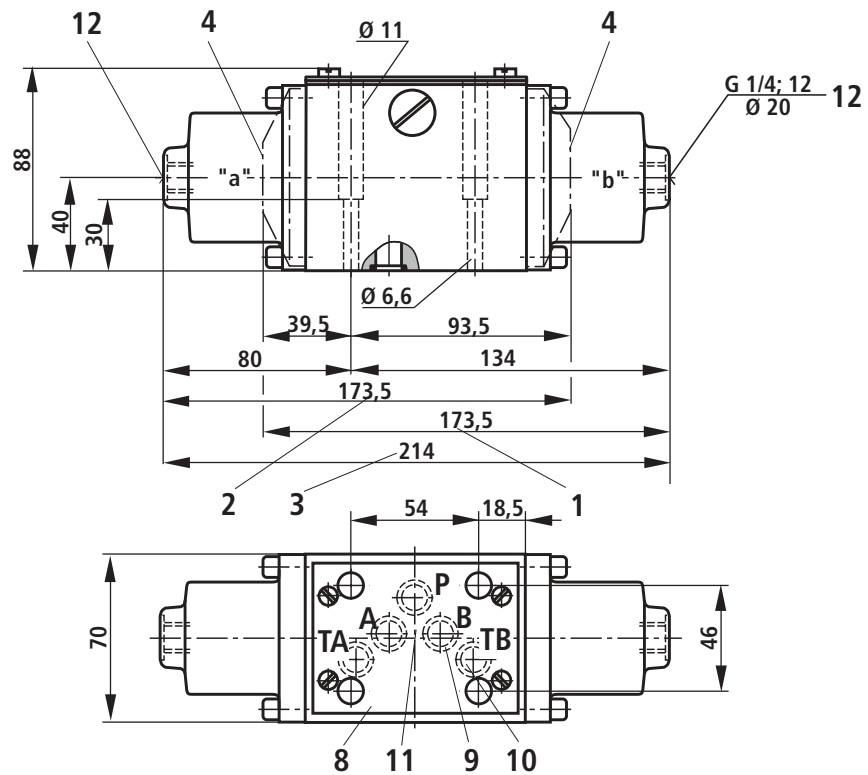


**Unit dimensions** (dimensions in mm)

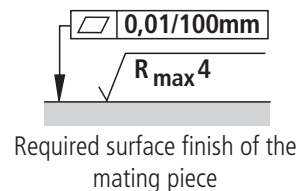
**WP/WHD**



**WN**



- 1 2-position valves  
symbols B, Y, EB...
- 2 2-position valves  
symbols A, C, D, EA...
- 3 3-position valves
- 4 Cover for valves with one  
operating element  
(2-position valves)
- 8 Name plate
- 9 Identical seal ring for ports A, B, P, TA, TB  
(valve with throttle insert: O-ring)
- 10 The additional T connection (TB) can  
also be optionally used in special manifold  
blocks, but not in conjunction with pressure  
reducing valves type ZDR 10 D..  
(RE 26 585).



- 11 Porting pattern to DIN 24 340 Form A,  
ISO 4401 and CETOP-RP 121 H.

**Subplates** G 66/01 (G 3/8),  
G 67/01 (G 1/2),  
G 534/01 (G 3/4)

to catalogue sheet RE 45 054 and

**Valve fixing screws**  
M6 x 40 DIN 912-10.9,  
MA = 15.5 Nm, must be ordered separately.

- 12 Pilot port

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