

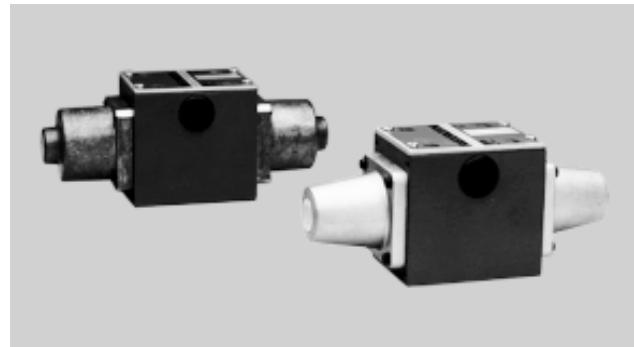
MANNESMANN REXROTH	4/3-, 4/2- and 3/2-Way Directional Valves Mechanical, Manual, Hydraulic or Pneumatic Operation (Series 3X)			RA 22 331/06.97 Replaces: 05.94
	Size 10 (D 05)	...4600 PSI (315 bar)	32 GPM (120 L/min)	

- Direct operated spool type directional control valves
- Available operator options:
 - Roller/plunger
 - Hand lever
 - Rotary hand knob
 - Hydraulic pilot
 - Pneumatic pilot
- Mounts ISO 4401-5, NFPA T3.5.1M R1 and ANSI B93.7 D 05, interface
- For subplates, see data sheet RA 45 054
- 53 standard spool configurations available



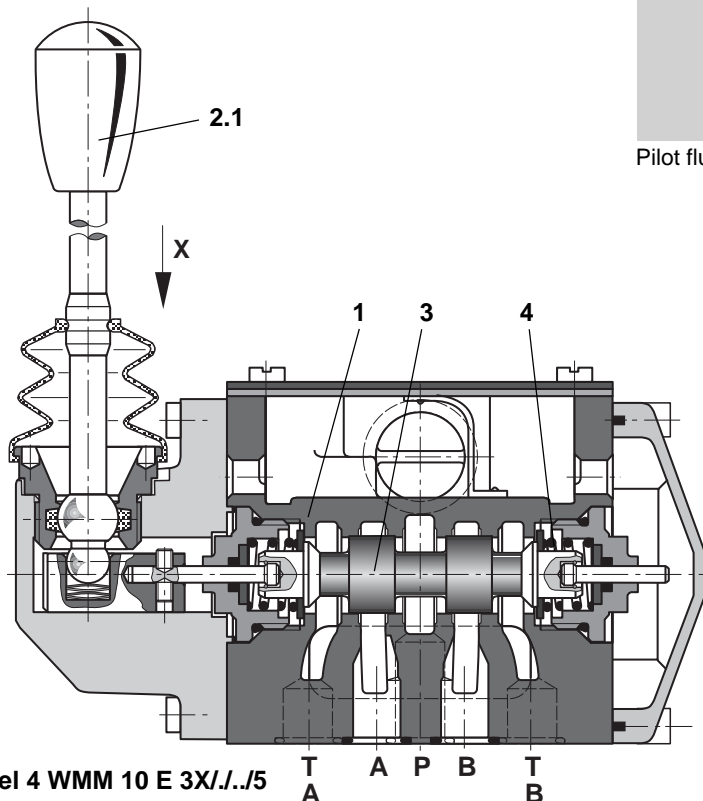
Mechanical and manual operation

Note! The length of the valve mounting bolt in Series 3X/... is 1-1/2" (40 mm) [formerly 2" (50 mm)]

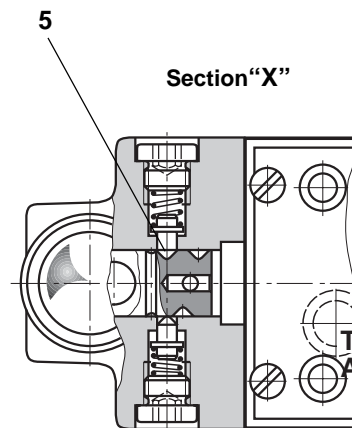


Pilot fluid operation (hydraulic or pneumatic)

Functional description



Model 4 WMM 10 E 3X/./..J5



Model 4 WMM 10 E 3X/F/./..J5 (with detent)

These directional control valves are direct operated spool type valves, which control the start, stop and direction of fluid flow.

They consist of the housing (1), one operating element (2.1) (roller plunger, hand lever, rotary knob, hydraulic, pneumatic) or two operating elements (2.2, next page) (hydraulic, pneumatic), control spool (3) and one or two return springs (4).

In the non-engaged condition, the control spool is held by return spring(s) (4) in the center, or a spring offset, position (or by a detent in the cases of rotary hand knob operation and hydraulic/pneumatic pulse valves).

Control spool (3) moves to the required position via operating element(s) (2.1) (2.2).

Functional description

With detent (5), Model ..F/.. or ..OF/..

(see table, for possible combinations)

Directional valves with rotary hand knob operation (WMD) are supplied with detent. Hand lever operated valves (WMM) are available as 2- or 3-position valves with detent, hydraulic or pneumatic piloted valves are available as 2-position with detent. Directional valves with roller/plunger (WMR, U) operation are available only without detent. An operating element with detent, holds the control spool in the last shifted position so that a continuous force or pilot signal is not required.

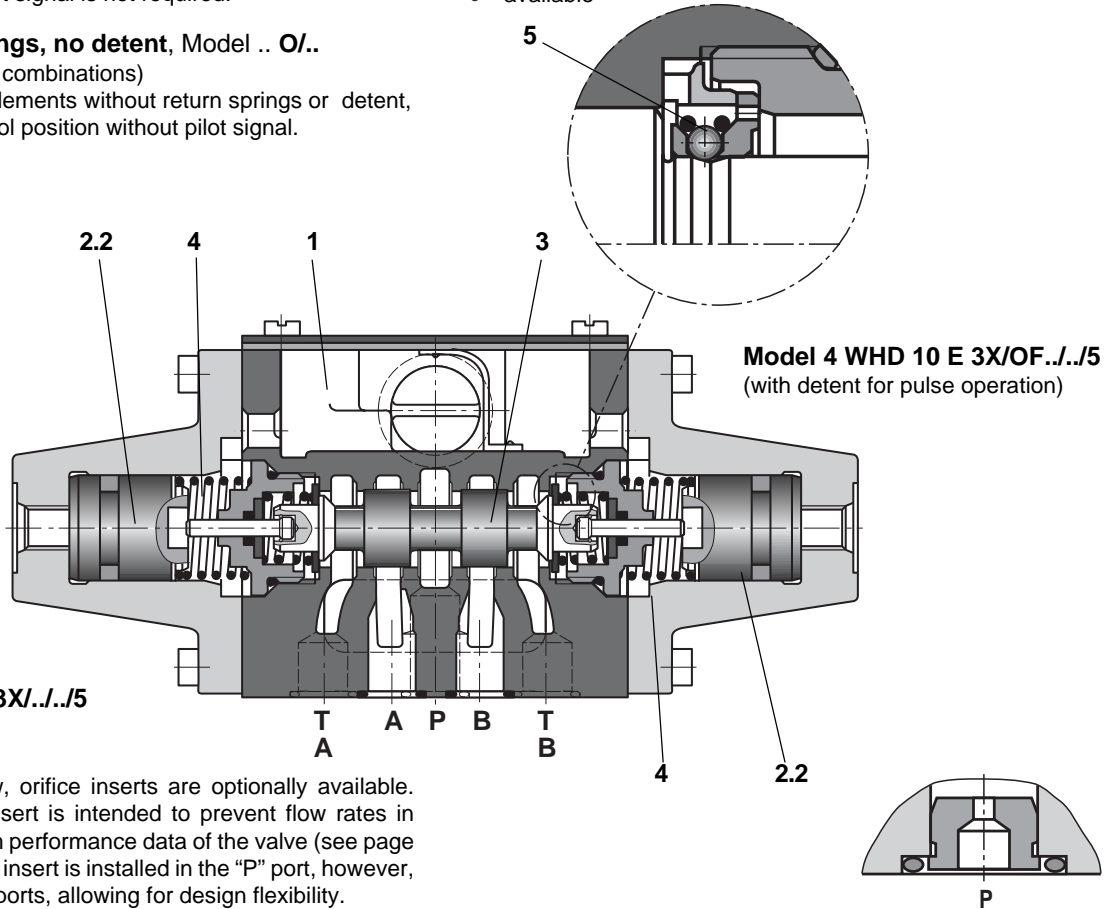
Possible position & operator combinations	No. of positions		Valve Model								
	2 Pos.	3 Pos.	WMR	WMU	WMM	WMD	WMDA	WN	WP	WHD	
Spring return	•	•	•	•	•				•	•	•
O	•								•	•	•
F	•	•			•	•	•				
OF	•								•	•	•

• = available

Without return springs, no detent, Model .. O/..

(see table, for possible combinations)

When using operator elements without return springs or detent, there is no defined spool position without pilot signal.



Model 4 WHD 10 E 3X/././5

Orifice Inserts

To limit maximum flow, orifice inserts are optionally available. Primarily, the orifice insert is intended to prevent flow rates in excess of the maximum performance data of the valve (see page 3). For this purpose the insert is installed in the "P" port, however, will fit any of the valve ports, allowing for design flexibility.

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

Valve model		WMR WMU	WMM	WMD WMDA	WN	WP	WHD*
Installation position		optional					
Pilot pressure	psi (bar)				22...87 (1.5 ... 6)	65...175 (4.5...12)	72...870/72...2300 (5...60)/(5...160)
Pilot volume	in ³ (cm ³)				0.757 (12.4)	0.234 (3.83)	0.234 (3.83)
Switching time	ON				10 ... 35	10 ... 25	15 ... 30
	OFF				20... 45	10 ... 25	15 ... 30
Operating force	- with detent	lb-ft (N)	12...17 (16...23)	22 (30)			
	- with spring return	lb-ft (N)	15...20 (20...27)				
	- 2 position valve	lb-ft (N)	52...103 (70...140)				
	- 3 position valve	lb-ft (N)	52...129 (70...175)				
Weight/Valve with:	- mechanic, manual oper.	lbs (kg)	7.3 (3.3)8.4 (3.8)	8.2 (3.7)			
	(approx.) - 1 fluid operator	lbs (kg)			6.6 (3.0)	6.6 (3.0)	6.6 (3.0)
	- 2 fluid operators	lbs (kg)			7.3 (3.3)	7.3 (3.3)	7.3 (3.3)

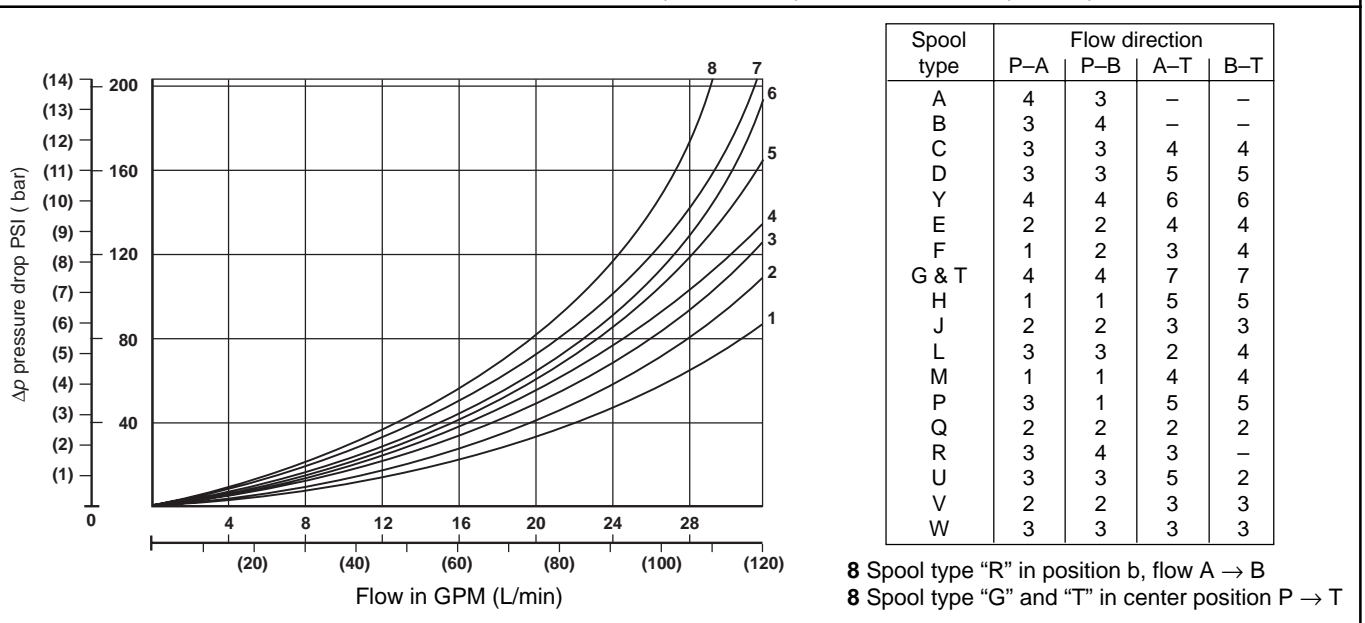
* Series 4WHD...30/ = 71 psi...870 psi, Series 4WHD...31/ = 72 psi...2300 psi pilot

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

Hydraulic

Maximum operating pressure Ports A, B, P	PSI (bar)	4600 (315)
Port T	PSI (bar)	2320 (160) (For spool types A and B, port T must be use a drain port, if the operating pressure exceeds 2320 PSI (160 bar) .
Maximum flow	GPM (L/min)	32 (120)
Flow area for spool V	in ² (mm ²)	0.017 (11) (A/B → T); 0.016 (10.3) (P → A/B)
(in center for spool W	in ² (mm ²)	0.004 (2.5) (A/B → T)
position "0"): for spool Q	in ² (mm ²)	0.009 (5.5) (A/B → T)
Hydraulic fluids		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)
Fluid temperature range	°F (°C)	NBR seals; - 22 ... 176°F (- 30 ... 80°C) FPM seals; - 4 ... 176°F (- 20 ... 80°C)
Viscosity range	SUS (mm ² /s)	35 ... 2320 (2.8 ... 500)
Maximum degree of fluid contamination		Class 18/15 according to ISO 4406. Therefore, we recommend a filter with a retention rate of $\beta_{10} \geq 75$.

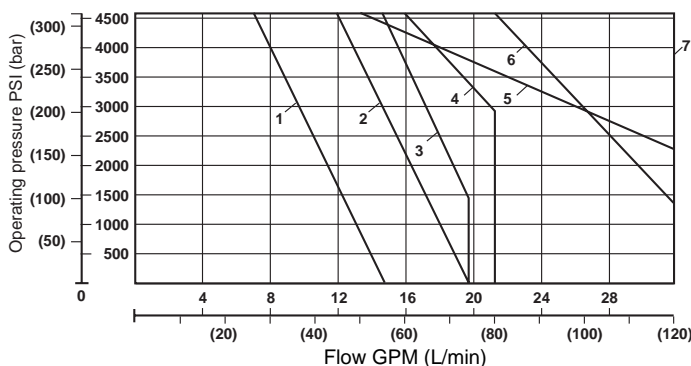
Performance limits, measured at $\nu = 190$ SUS (41 mm²/s) and $t = 122$ F (50 °C)



Performance limits, measured at $\nu = 190$ SUS (41 mm²/s) and $t = 122$ F (50 °C)

Because of silting, the shifting function of the valves is dependent upon filtration. To obtain the maximum flow values shown, full filtration of $\leq 25 \mu\text{m}$ is recommended. The flow forces acting within the valve also influenced performance. In 4-way valves, the data

provided is for applications with 2 directions of flow (flow from P to A and an equal, simultaneous return flow from B to T) (see table). If only one direction of flow is required, for example, when a 4-way valve has one port plugged, or unbalanced flows with large rod cylinders, the permissible flow in critical cases can be considerably lower. The A or B spool (3-way) can be used as an approximation of the limited flow performance.



Curve	Spool type
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

Ordering code

3 service ports = 3
 4 service ports = 4

Roller/plunger } see = WMR
 Roller/plunger } page 5 = WMU
 Hand lever = WMM
 Rotary hand knob = WMD
 Lockable rotary hand knob ¹⁾ = WMDA
 Pneumatic piloted
 22 ... 87 PSI (1.5 ... 6 bar) = WN
 65 ... 175 PSI (4.5 ... 12 bar) = WP
 Hydraulic operated = WHD
 ISO size 5, NFPA/ANSI D 05 interface = 10

Spool type ex. C, E, etc.; ³⁾
 for possible spool configurations, see below

Valves with both operators (3-position spool) = no design.
 WN, WP, WHD models with 3-position spools and
 Operator "a" side only = A
 Operator "b" side only = B

Series 30 to 39 = 3X
 (30 to 39; externally interchangeable)

¹⁾ Key (part number RR00 006 980), included
²⁾ Orifices inserts, used when flow volume exceeds the power limit of the valve. Installation in "P" port.

Symbol	WMR	WMU	WMM	WMD	WMDA	WN	WP	WHD
①								
②								
③								
④								

Further details to be written in clear text

12 = SAE threaded connections (WN, WP, WHD only)

no code = NBR seals for petroleum oils (HM, HL, HLP)

V = FPM seals for phosphate ester fluids (HFD-R)

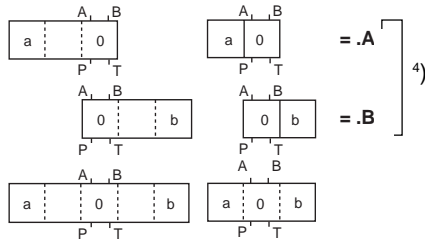
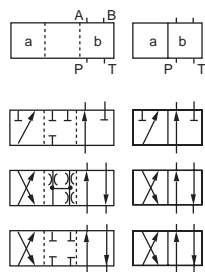
no code = without orifice insert
 *B08 = orifice 0.031 in (0.8 mm) dia.²⁾
 *B10 = orifice 0.039 in (1.0 mm) dia.²⁾
 *B12 = orifice 0.047 in (1.2 mm) dia.²⁾

no code = with spring return
 O = without spring return
 F = with detent
 OF = without spring return, with detent

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

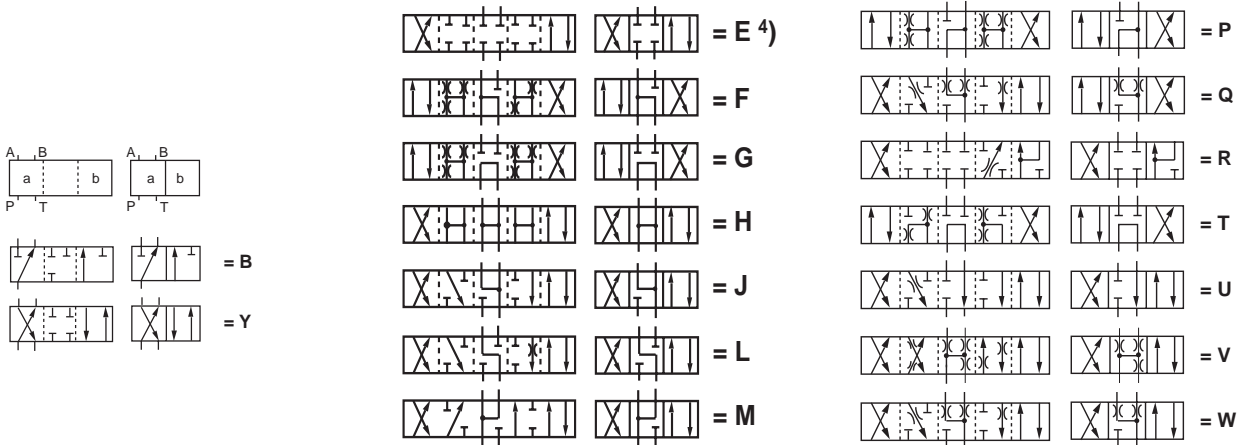
• = available

Symbol



³⁾ Note:
 When ordering a spool with only two positions "o" & "a" or "o & b", specify the desired position a or b after the spool code.
 Example: Spool E with spool position "a"
 Ordering Code 4 WMM10EA-3X/12

* Example: 4 WMM10E-3X/B12 = 1.2 mm orifice in "P" port



Symbols: hydraulic operation

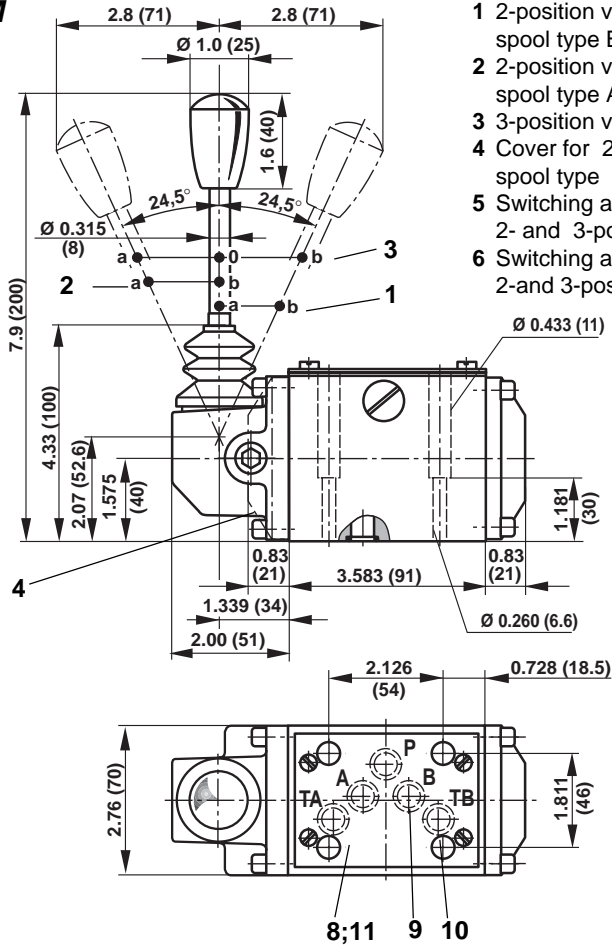
Ordering code		Valve type	
Spool	Detent	WN, WP (pneumatic)	WHD (hydraulic)
A, C, D			
	..I/O..		
	..JOF..		
B, Y			
E, F, G, H, J, L, M, P, Q, R, T, U, V, W	position "a" 4) = .A		
	position "b" 4) = .B		

Symbols: mechanical, manual operation

Ordering code		Valve type		
Spool	Detent	WMR, WMU (Roller operated)	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	position "a" 4) = .A			
	position "b" 4) = .B			
	..F..			

Unit dimensions: dimensions in inches (millimeters)

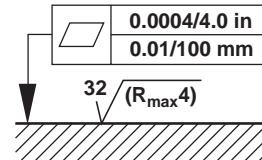
WMM



- 1 2-position valves
spool type B, Y, EB...
- 2 2-position valves
spool type A, C, D, EA...
- 3 3-position valves
- 4 Cover for 2-position valves
spool type B, Y, EA, EB...
- 5 Switching angle 90° left for
2- and 3-position valves
- 6 Switching angle 90° right for
2- and 3-position valves

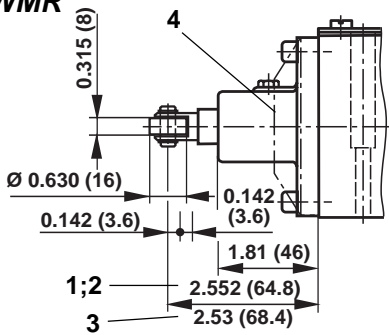
- 7 Space required to remove key
- 8 Nameplate
- 9 5) O-Rings 12 mm x 2 mm
R-Ring 13 mm x 1.6 mm x 2.0 mm
- 10 Additional T-port TB can be used if
re-quired in drilled blocks, except in
conjunction with pressure reducing
sand-wich valves Model ZDR 10 D.
(RA 26 585).
- 11 Porting pattern to ISO 4401-5,
NFPA/ANSI B 93.7 **D 05**
Subplates (see RA 45 054)
G 66/05 (3/8" NPT),
G 66/12 (SAE-6; 9/16-18),
G 67/05 (1/2" NPT),
G 646/12 (SAE-10; 7/8-14),
G 534/05 (3/4" NPT),
G 534/12 (SAE-12; 1-1/16-12)
Valve mounting bolts
4) 1/4-20 UNC x 1-1/2" (M6 x 40
mm) socket head cap screws (SAE
grade 8 or better)
Tightening torque 11.4 lb-ft (15.5 Nm)
Subplate and valve mounting bolts
must be ordered separately

With 2 position valves, spool types B & Y, the hand lever is mounted on the B side of valve.

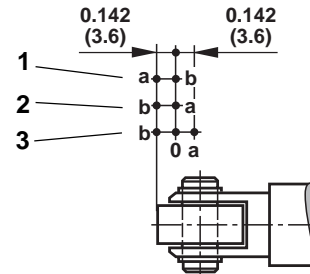
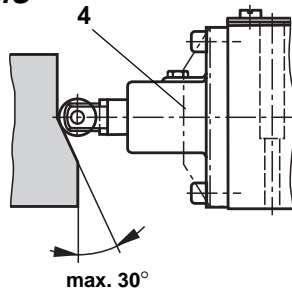


Required surface finish of interface when mounting the valve without our subplate

WMR

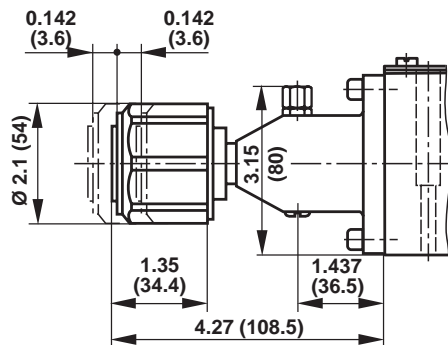


WMU

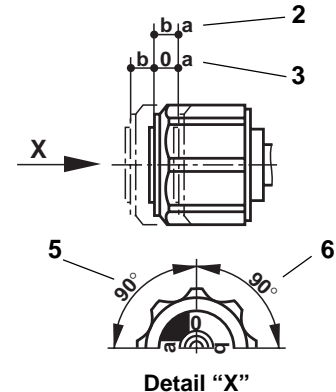
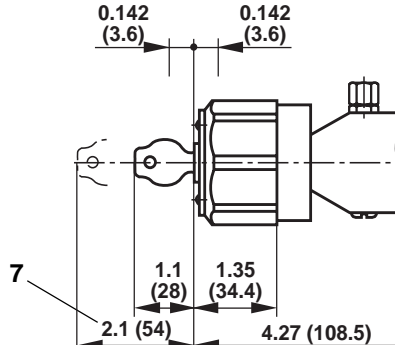


With 2 position valves, spool types B & Y, the Roller/plunger is mounted on the B side of valve.

WMD

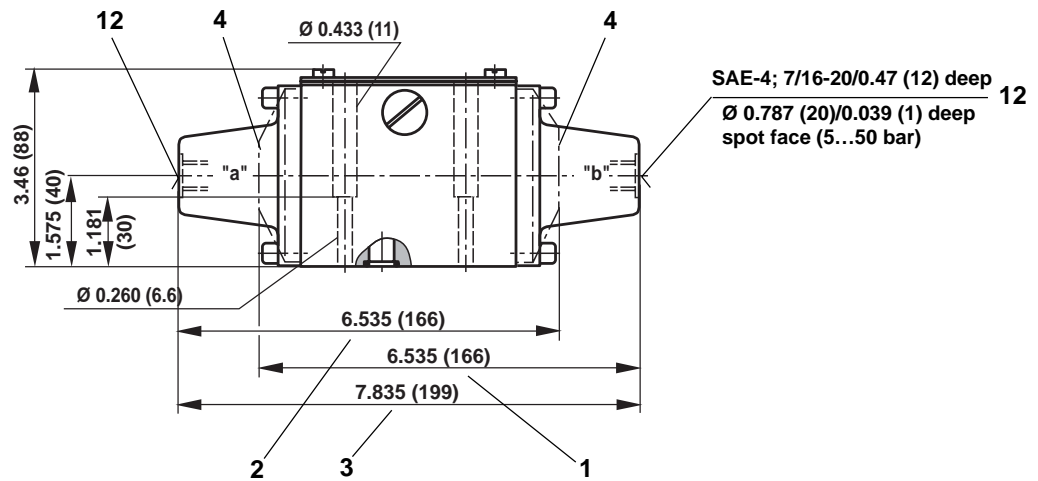


WMDA

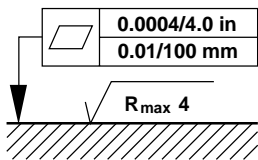
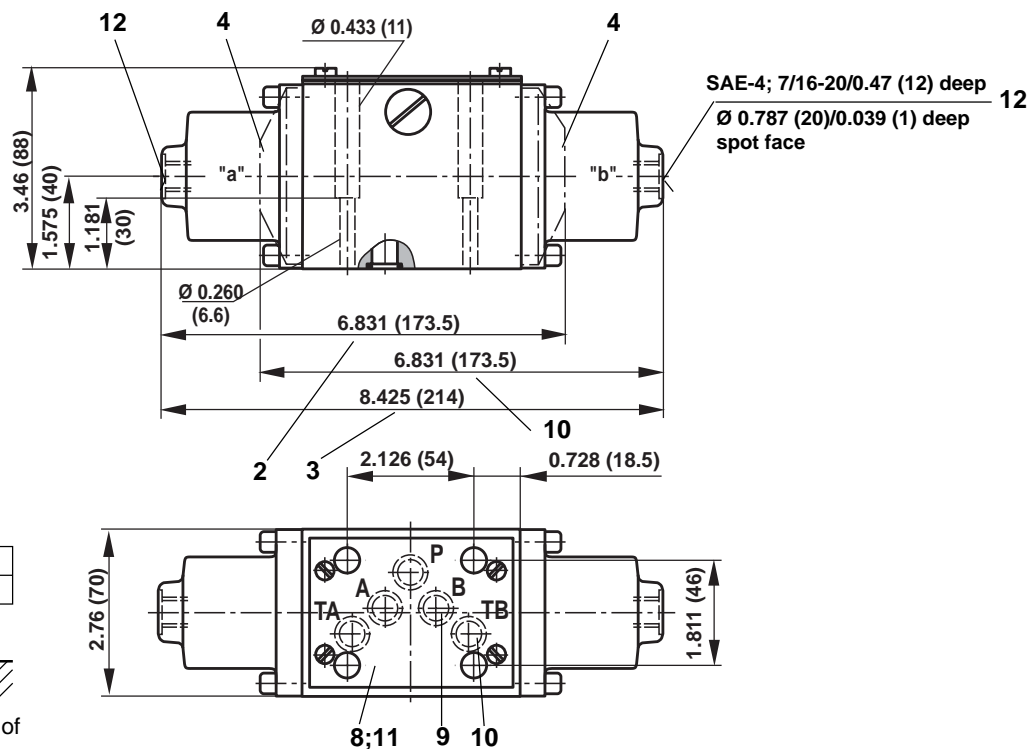


Unit dimensions: dimensions in inches (millimeters)

WP/WHD...30/



WN



Required surface finish of mating piece

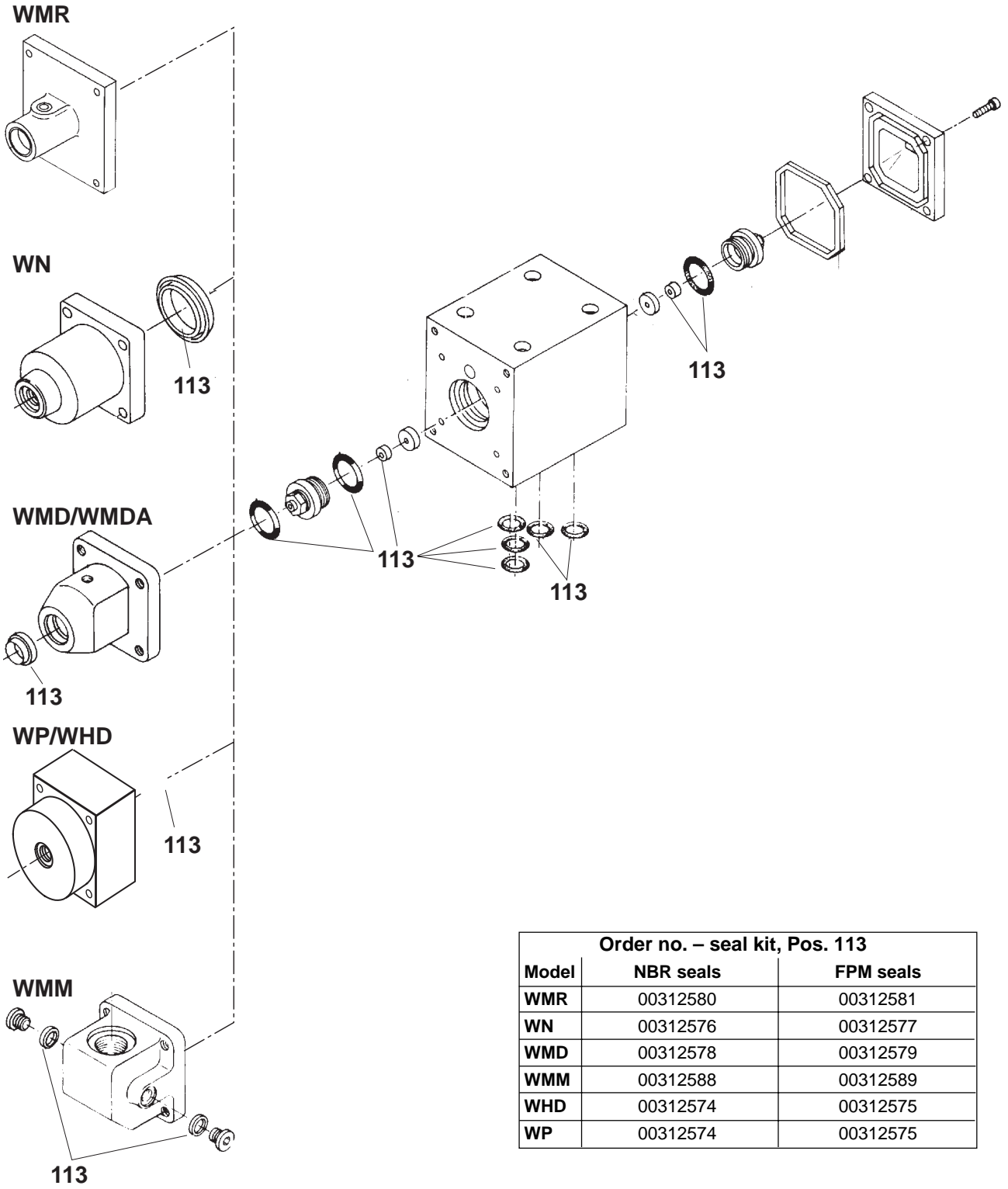
- 1 2-position valves spool type B, Y, EB...
- 2 2-position valves spool type A, C, D, EA...
- 3 3-position valves
- 4 Cover for 2-position valves spool type B, Y, EA, EB...
- 5 Switching angle 90° right for 2- and 3-position valves
- 6 Switching angle 90° right for 2-and 3-position valves

- 7 Space required to remove key
- 8 Nameplate
- 9 5) O-Rings 12 mm x 2 mm
- 10 Additional T-port TB can be used if required in drilled blocks, except in conjunction with pressure reducing sand-wich valves Model ZDR 10 D. (RA 26 585).
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Subplates (see RA 45 054)
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 G 534/05 (3/4" NPT),
 G 534/12 (SAE-12; 1-1/16-12)
Valve mounting bolts
 4) 1/4-20 UNC x 1-1/2" (M6 x 40 mm) socket head cap screws (SAE grade 8 or better)
 Tightening torque 11.4 lb-ft (15.5 Nm)
 Subplate and valve mounting bolts must be ordered separately

- 12 Pilot connection port

Ordering code: available seals



Order no. – seal kit, Pos. 113		
Model	NBR seals	FPM seals
WMR	00312580	00312581
WN	00312576	00312577
WMD	00312578	00312579
WMM	00312588	00312589
WHD	00312574	00312575
WP	00312574	00312575



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