

# Manual Directional Valve

Model: WMM...



- ◆ Size 6, 10, 16, 25, 32
- ◆ Maximum working pressure 350 bar
- ◆ Maximum working flow 1100 L/min

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## Features

- Direct operated directional spool valve with handle
- With reset spring or detent, optional
- Subplate mounting

The WMM manual directional valve is a direct operated directional spool valve which switches the oil circuit by rotating the handle to move the spool axially. It has 3/2-way, 4/2-way, 4/3-way as well as various spool symbols, and it is subplate mounting with optional detent and spring reset.

**Model WMM...**

The valve is composed of valve body (1), handle (2), valve spool (3), one or two reset springs (4), and push rod (5).

The valve spool (3) is held in the middle or initial position by the reset springs (4) in no operation condition. When the handle (2) is pushed to the right or left, the handle pushes the push rod (5) via hinge and controls the valve spool (3) directly to force the spool to move to the required position to obtain the required flow cross-section. When the handle return to the zero position, the control valve spool returns to the normal position by reset spring (4). The switching position of this valve is operated by the handle.

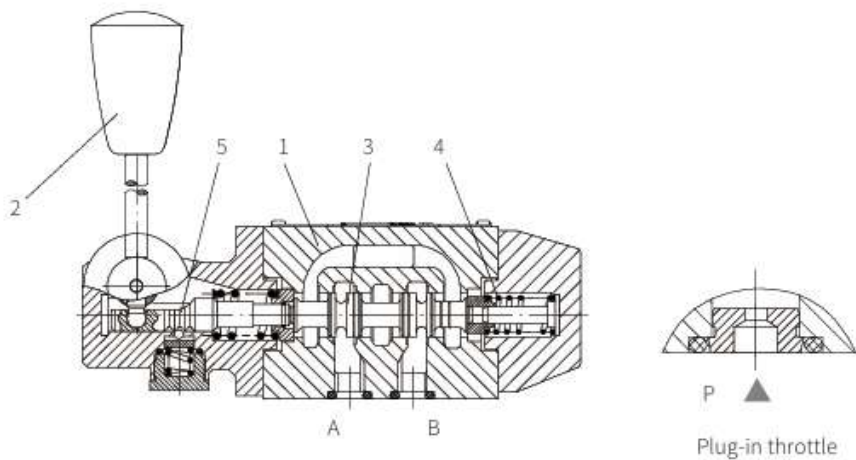
**Model WMM.../F**

The principle is basically the same with WMM.../. But this type valve is a control valve with two or three switching positions and one detent. Therefore, all the switching positions are fixed.

**Plug-in throttle**

Due to working conditions limitations, it may occur that the flow of the valve exceeds the specified flow rate on the valve performance curve during switching process, then the use of a throttle is required. It is installed in the P chamber of the valve or oil circuit.

This type valve has advantages such as small volume, large flow capacity, and good reliability compared with other series of valves. It can be used together with the modular valves in same size, and widely used in engineering machinery, coal mining machinery, chemical machinery, light industry machinery, locomotives and many other industries.



Model 4WMM6...5XJ/

	WMM		J	*	
3 ways =3					more information in text
4 ways =4					
manual directional valve					
size 6 =6					sealing material No code= NBR seals V= FKM seals (consult for other seals)
size 10 =10					
size 16 =16					No code= no plug-in throttle B08 <sup>1)</sup> = throttle Φ0.8mm B10 <sup>1)</sup> = throttle Φ1.0mm B12 <sup>1)</sup> = throttle Φ1.2mm
size 25 =25					
size 32 =32					
symbols e.g. C, D, J, E, etc					
10 to 19 series (for size 10) =1X (10 to 19 series installation and connection size unchanged)					
50 to 59 series (for size 6, 16, 25) =5X (50 to 59 series installation and connection size unchanged)					
60 to 69 series (for size 32) =6X (60 to 69 series installation and connection size unchanged)					
No code= without detent, with reset spring F= with detent					
J= Rekith					

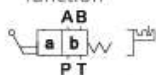
<sup>1)</sup> Only for size 6 and 10 when the flow > performance of the valve, effective in P chamber.

## Functional symbols

Transition function



Spool valve function



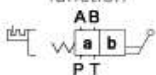
=A<sup>(1)</sup>  
(The T port serves as the drain port)



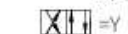
Transition function



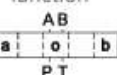
Spool valve function



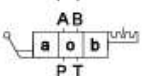
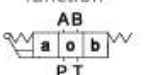
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(The T port serves as the drain port)



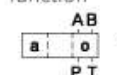
Transition function



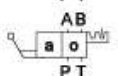
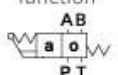
Spool valve function



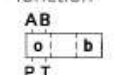
Transition function



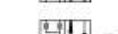
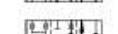
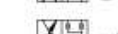
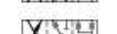
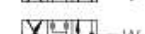
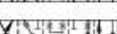
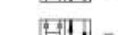
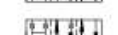
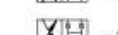
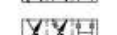
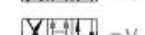
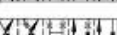
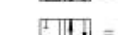
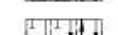
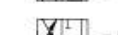
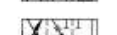
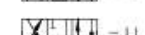
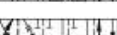
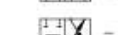
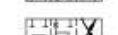
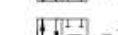
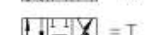
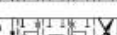
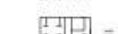
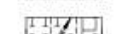
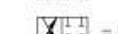
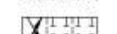
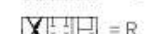
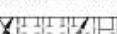
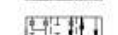
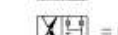
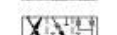
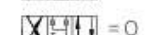
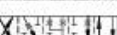
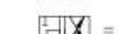
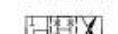
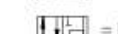
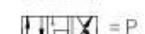
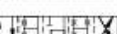
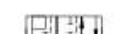
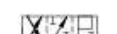
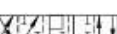
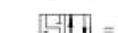
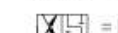
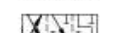
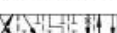
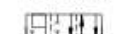
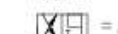
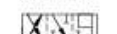
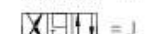
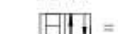
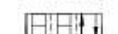
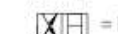
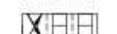
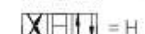
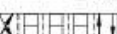
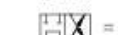
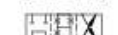
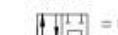
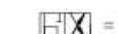
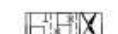
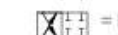
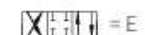
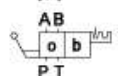
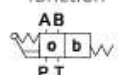
Spool valve function



Transition function



Spool valve function



Explanation:

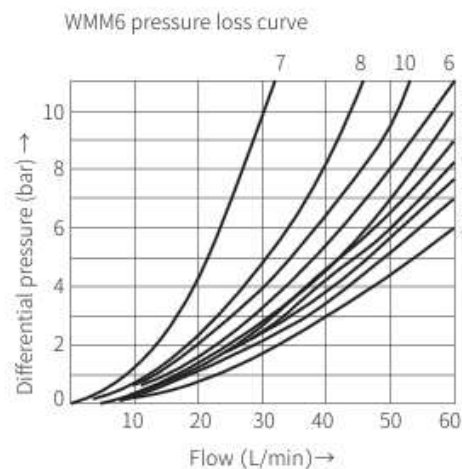
(1) Symbol A and B only for size 6 and 10

## Technical parameters

Size	6	10	16	25	32
Working pressure	Oil port A, B, P (bar) to 315		Oil port T (bar) to 350		
Flow	(L/min) to 60	to 100	to 300	to 450	to 1100
Flow cross-section (middle position)	Q-type, 6% of nominal cross-section W-type, 3% of nominal cross-section		Q, V-type, 16% of nominal cross-section W-type, 3% of nominal cross-section		
Medium	Mineral oil(HL,HLP) in accordance with DIN 51524; fast living organisms Degraded oil according to VDMA 24568; HETG(Rapeseed oil); HEPG(Polyethylene glycol); HEES(synthetic ester);				
Oil temperature range	(-30 to +80 °C)				
Viscosity range	(mm <sup>2</sup> /s) 2.8 to +500				
Weight	(kg) about 1.4	about 3.3	about 8	about 17	about 45
Operating force	(N) Without return pressure about 20 Without return pressure about 30 (at 150 bar)	With detent: about 16 to 23 Without detent: about 20 to 27	about 75	about 120	about 170

## Characteristic curve

(Measured when using HLP46,  $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$ )



Function symbol	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. Symbol "R" in control position A to B

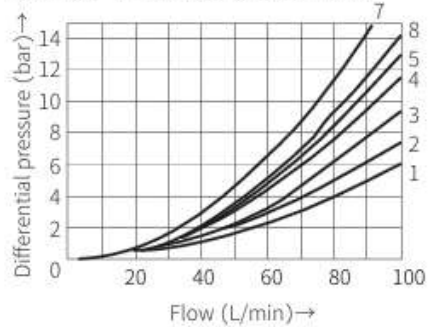
8. Symbols "G" and "T" in the middle position P to T

## Characteristic curve

(Measured when using HLP46,  $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$ )

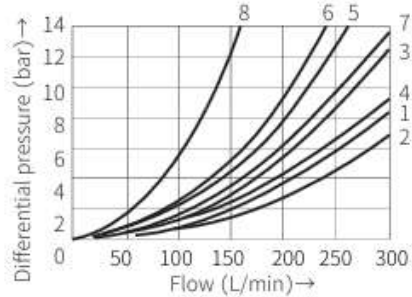
### WMM10 pressure loss curve

- 4. Symbols "G" and "T" in the middle position P to T
- 7. Symbol "R" in control position A to B



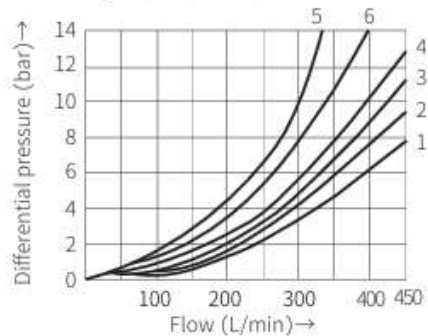
### WMM16 pressure loss curve

- 6. Symbols "G" and "T" in the middle position P to T
- 8. Symbol "S" in switching position P to T



### WMM25 pressure loss curve

- 4. Symbol "L" in A to T
- 6. Symbol "U" in B to T



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

Function symbol	Flow direction			
	P→A	P→B	A→T	B→T
E, D, T	1	1	1	3
F	2	2	3	3
G, T	5	1	3	7
H, C, Q	2	2	3	3
V, Z	2	2	3	3
J, K, L	1	1	3	3
M, W	2	2	4	-
R	2	2	4	-
U	1	1	4	7
S	4	4	4	-

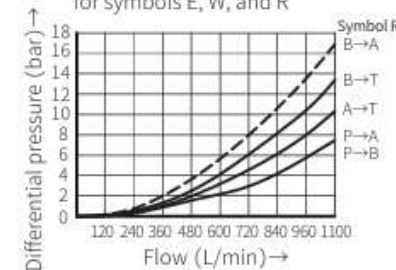
Function symbol	Flow direction			
	P→A	P→B	A→T	B→T
E	2	2	1	4
F	1	2	1	2
G	2	2	2	4
H	2	2	1	3
J	2	2	1	3
L	2	2	1	2
M	2	2	1	4
P	2	2	1	4
Q	2	2	1	4
R	1	2	1	-
T	2	2	2	4
U	2	2	1	4
V	2	2	1	4
W	2	2	1	3

## Characteristic curve

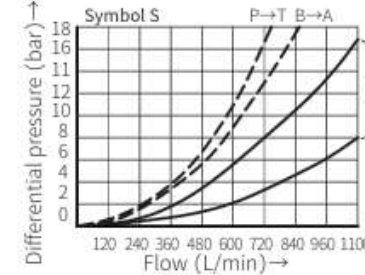
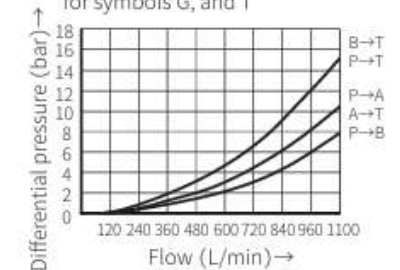
(Measured when using HLP46,  $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$ )

### WMM32 pressure loss curve

$\Delta p$ -Q characteristic curve applicable for symbols E, W, and R



$\Delta p$ -Q characteristic curve applicable for symbols G, and T



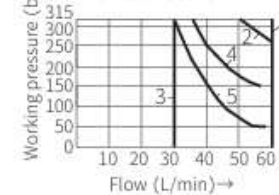
Characteristic curves of other symbols

## Characteristic limit

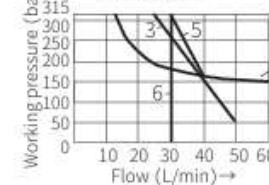
Due to blockage, the switching function of the valve is related to filtration. In order to obtain the specified maximum flow, it is recommended to use a 20um full-flow filtration. The various forces acting on the valve also affect the flow characteristics.

For a four-way valve, the specified flow data is valid for normal operation with two flow directions (i.e. from P to A and return flow from B to T at the same time)(see table). If only one direction of flow is needed, e.g. when the four-way valve with chamber A or B blocked is used as three-way valve, the maximum flow rate will greatly decrease in severe cases.

### WMM6 characteristic limit Without detent

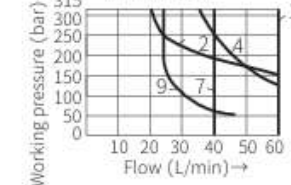


### WMM6 characteristic limit With detent



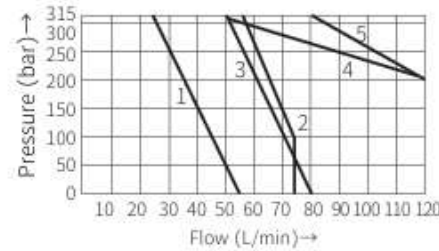
Characteristic curve	Spool valve symbol	Characteristic curve	Spool valve symbol
Without detent	1	With detent	1
	2		2
	3		3
	4		4
	5		5
Without detent	6	With detent	6
	7		7
	8		8
	9		9
	10		10

### WMM6 characteristic limit With detent



WMM10 characteristic limit

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



WMM16 characteristic limit

Permitted flow qv L/min, 2-position valve						Permitted flow qv L/min, 3-position valve					
Function symbol	Working pressure P bar					Function symbol	Working pressure P bar				
	70	140	210	280	315		70	140	210	280	315
Spring reset						Spring reset					
C	300	300	300	260	220	E, H, J, L, M, Q, R, U, W	300	300	300	300	300
D	300	300	210	190	160	F, P	300	300	210	190	170
K	300	300	200	150	130	G, S, T	300	300	220	210	180
Z	300	240	190	170	150	V	300	260	200	180	170
With detent						With detent					
C, D, K, Z	300	300	300	300	300	E, H, J, L, M, Q, R, U, W	300	300	300	300	300
						F, P	300	300	280	230	230
						G, S, T	300	300	230	230	230
						V	300	300	250	230	230

WMM25 characteristic limit

Permitted flow qv L/min, 2-position valve						Permitted flow qv L/min, 3-position valve					
Function symbol	Working pressure P bar					Function symbol	Working pressure P bar				
	70	140	210	280	315		70	140	210	280	315
Spring reset						Spring reset					
C	450	300	250	200	180	E, J, L, M, Q, R, U, W	450	450	450	450	450
D	350	300	275	250	200	F	450	250	200	135	110
K	200	150	140	130	120	G, T	450	330	290	230	180
Z	300	270	240	220	200	H	450	450	400	400	350
						P	450	310	240	215	150
						V	450	310	280	270	200
With detent						With detent					
C, D, K, Z	450	450	450	450	450	E, F, G, H, J, L, M, P, Q, R, T, U, W	450	450	450	450	450
						V	450	450	400	350	300

WMM32 characteristic limit

2-position and 3-position valves with spring reset					
Flow L/min Function symbol	Under pressure of ... (bar)				
	70	140	210	280	315
E, J, L, M, Q, R, V, U, W	1100	1050	860	750	680
F, G, H, S, T C, D, K, Z	650	450	370	320	280
2-position and 3-position valves with detent					
All symbols	1100	1050	860	750	680