

Manual Directional Valve

Model: WMM...



01

- ◆ 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

Function description, sectional drawing

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 32-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.

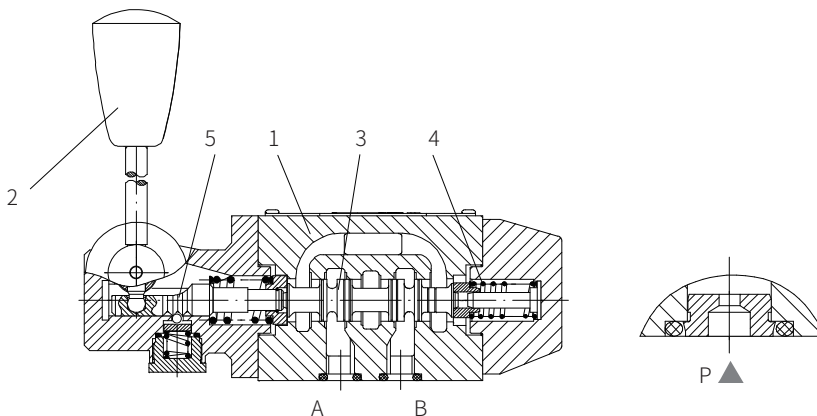
Model WMM.../F

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/

Models and specifications

		WMM			J			*	
3 ways	=3								more information in text
4 ways	=4								sealing material
manual directional valve									No code= NBR seals
size 6	=6								V= FKM seals
size 10	=10								(consult for other seals)
size 16	=16								No code= no plug-in throttle
size 25	=25								B08 ¹⁾ = throttle Ø0.8mm
size 32	=32								B10 ¹⁾ = throttle Ø1.0mm
symbols e.g. C, D, J, E, etc									B12 ¹⁾ = throttle Ø1.2mm
10 to 19 series (for size 10)									No code= without detent, with reset spring
(10 to 19 series installation and connection size unchanged)									F= with detent
50 to 59 series (for size 6, 16, 25)									J= Rekith
(50 to 59 series installation and connection size unchanged)									
60 to 69 series (for size 32)									
(60 to 69 series installation and connection size unchanged)									

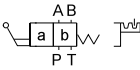
1) Only for size 6 and 10 when the flow >
performance of the valve, effective in
P chamber.

Functional symbols

Transition
function



Spool valve
function



$\text{[Symbol]} = A^{(1)}$
(The T port serves
as the drain port)

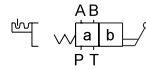
$\text{[Symbol]} = C$

$\text{[Symbol]} = D$

Transition
function



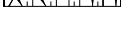
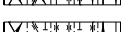
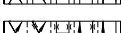
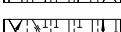
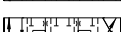
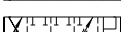
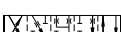
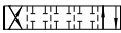
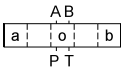
Spool valve
function



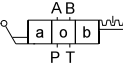
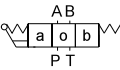
$\text{[Symbol]} = B^{(1)}$
(The T port serves
as the drain port)

$\text{[Symbol]} = Y$

Transition
function



Spool valve
function



$\text{[Symbol]} = E$

$\text{[Symbol]} = F$

$\text{[Symbol]} = G$

$\text{[Symbol]} = H$

$\text{[Symbol]} = J$

$\text{[Symbol]} = L$

$\text{[Symbol]} = M$

$\text{[Symbol]} = P$

$\text{[Symbol]} = Q$

$\text{[Symbol]} = R$

$\text{[Symbol]} = T$

$\text{[Symbol]} = U$

$\text{[Symbol]} = V$

$\text{[Symbol]} = W$

Transition
function



Spool valve
function



$\text{[Symbol]} = EA$

$\text{[Symbol]} = FA$

$\text{[Symbol]} = GA$

$\text{[Symbol]} = HA$

$\text{[Symbol]} = JA$

$\text{[Symbol]} = LA$

$\text{[Symbol]} = MA$

$\text{[Symbol]} = PA$

$\text{[Symbol]} = QA$

$\text{[Symbol]} = RA$

$\text{[Symbol]} = TA$

$\text{[Symbol]} = UA$

$\text{[Symbol]} = VA$

$\text{[Symbol]} = WA$

Transition
function



Spool valve
function



$\text{[Symbol]} = EB$

$\text{[Symbol]} = FB$

$\text{[Symbol]} = GB$

$\text{[Symbol]} = HB$

$\text{[Symbol]} = JB$

$\text{[Symbol]} = LB$

$\text{[Symbol]} = MB$

$\text{[Symbol]} = PB$

$\text{[Symbol]} = QB$

$\text{[Symbol]} = RB$

$\text{[Symbol]} = TB$

$\text{[Symbol]} = UB$

$\text{[Symbol]} = VB$

$\text{[Symbol]} = WB$

Explanation:

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

Technical parametes

Size			6	10	16	25	32
Working pressure	Oil port A, B, P	bar	to 315		to 350		
	Oil port T	bar	to 160	to 150	to 250	to 250	to 250
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		
Fluid			Mineral oil (HL, HLP) ¹⁾ in accordance with DIN 51524; Fast living organisms degraded oil according to VDMA 24568; HETG (Rapeseed oil) ¹⁾ ; HEPG(Polyethyleneglycol) ²⁾ ; HEES (Synthetic Fats) ²⁾				
Oil temperature range		°C	-30 to 80				
Viscosity range		mm²/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

1) For NBR seal and FKM seal.

2) Only for FKM seal.

3) The oil must meet the cleanliness degree requested by the components in the hydraulic system.
Effective oil filtration can prevent failure and increase the service life of the components.

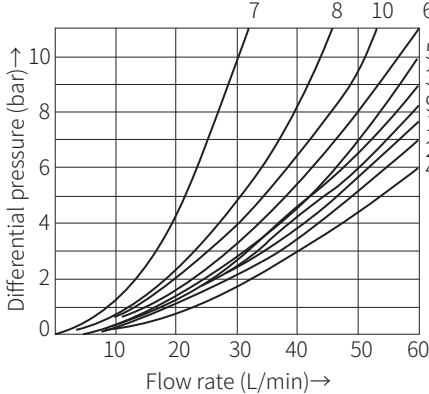
Characteristic curve

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

WMM6 pressure loss curve

7. Symbol "R" in control position A to B

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

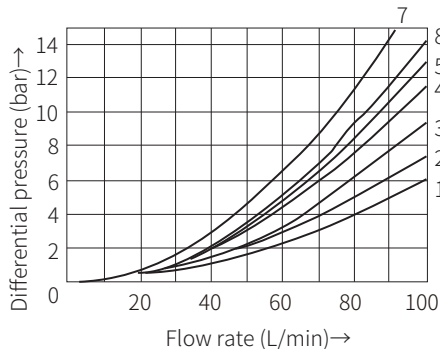


Function symbol	Flow direction			
	P→A	P→B	A→T	B→T
A	3	3	-	-
B	3	3	-	-
C	1	1	3	1
D	5	5	3	3
E	3	3	1	1
F	1	3	1	1
G	6	6	9	9
H	2	4	2	2
J	1	1	2	1
L	3	3	4	9
M	2	4	3	3
P	3	1	1	1
Q	1	1	2	1
R	5	5	4	-
T	10	10	9	9
U	3	3	9	4
V	1	2	1	1
W	1	1	2	2
Y	5	5	3	3

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



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	2	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

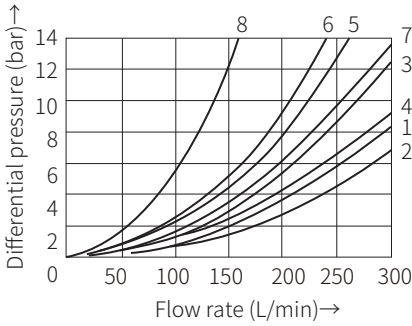
Characteristic curve

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

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

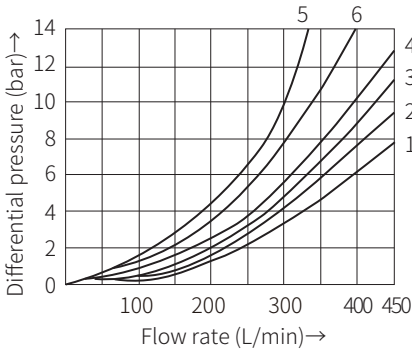


Function symbol	Flow direction			
	P→A	P→B	A→T	B→T
E, D, T	1	1	1	3
F	2	2	3	3
G, T	5	1	3	7
H, C, Q	2	2	3	3
V, Z	2	2	3	3
J, K, L	1	1	3	3
M, W	2	2	4	-
R	2	2	4	-
U	1	1	4	7
S	4	4	4	-

WMM25 pressure loss curve

4. Symbol "L" in A to T

6. Symbol "U" in B to T



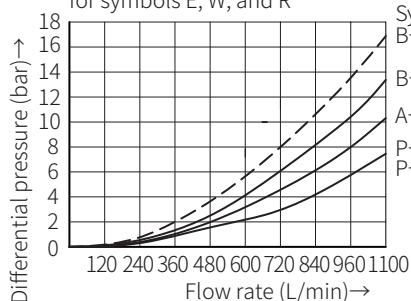
Function symbol	Flow direction			
	P→A	P→B	A→T	B→T
E	2	2	1	4
F	1	2	1	2
G	2	2	2	4
H	2	2	1	3
J	2	2	1	3
L	2	2	1	2
M	2	2	1	4
P	2	2	1	4
Q	2	2	1	4
R	1	2	1	-
T	2	2	2	4
U	2	2	1	4
V	2	2	1	4
W	2	2	1	3

Characteristic curve

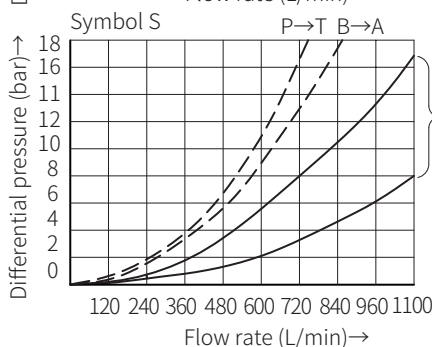
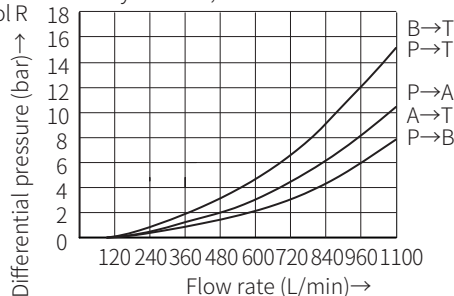
(Measured when using HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

WMM32 pressure loss curve

Δp -Q characteristic curve applicable for symbols E, W, and R



Δp -Q characteristic curve applicable for symbols G, and T

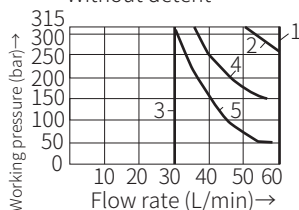


Characteristic curves of other symbols

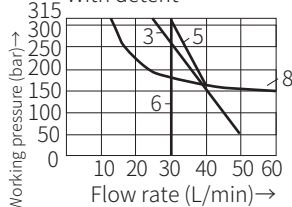
Characteristic limit

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

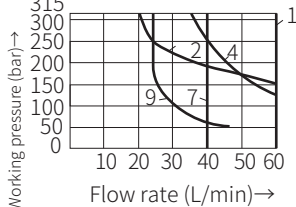


With detent



Characteristic curve	Spool valve symbol	Characteristic curve	Spool valve symbol
Without detent	1	With detent	1
	2		2
	3		3
	4		4
	5		5
			6
			7
			8
			9
			E1, M, H C, D, Y E, J, Q L, U, W A, B G, T F V P R T

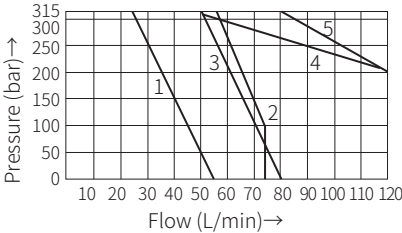
With detent



Characteristic limit

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 q_v L/min, 2 position valve						Permitted flow q_v 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 q_v L/min, 2 position valve						Permitted flow q_v 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

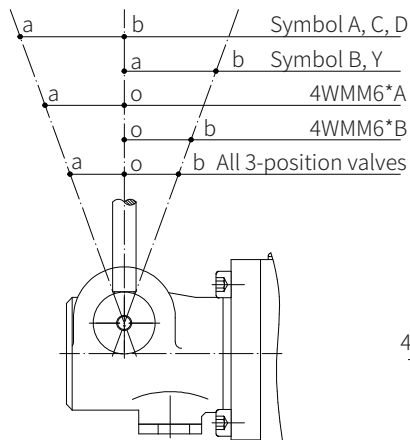
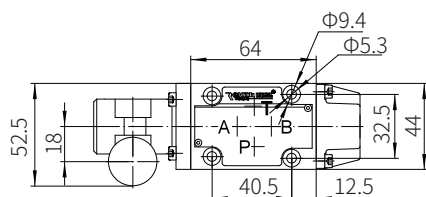
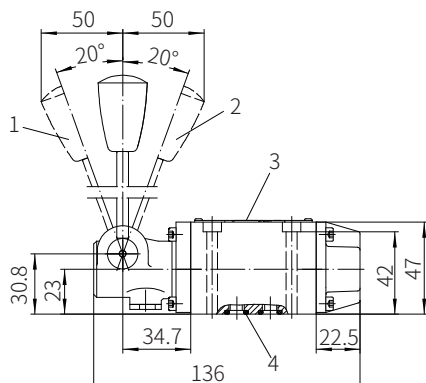
WMM32characteristic limit

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

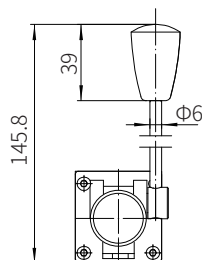
Component size

Size unit: mm

Model 4WMM6...5XJ/...



- 1 Switching position $b \rightarrow a$ and $o \rightarrow a$
- 2 Switching position $a \rightarrow b$ and $o \rightarrow b$
- 3 Name plate
- 4 O-ring 9.25x1.78 (for oil port A, B, P, T)


 $\square 0.01/100\text{mm}$

0.8



Required surface finishing of mating components

Valve fixing screw

M5x50-10.9 grade GB/T70.1-2000

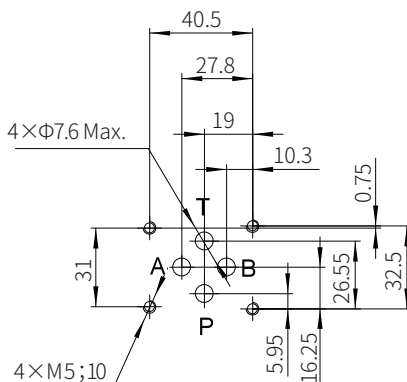
 Tightening torque $M_A = 7.8\text{Nm}$

 It must be ordered separately if connection subplate is needed.
 Subplate model:

G341/01 (G1/4"); G341/02 (M14x1.5)

G342/01 (G3/8"); G342/02 (M18x1.5)

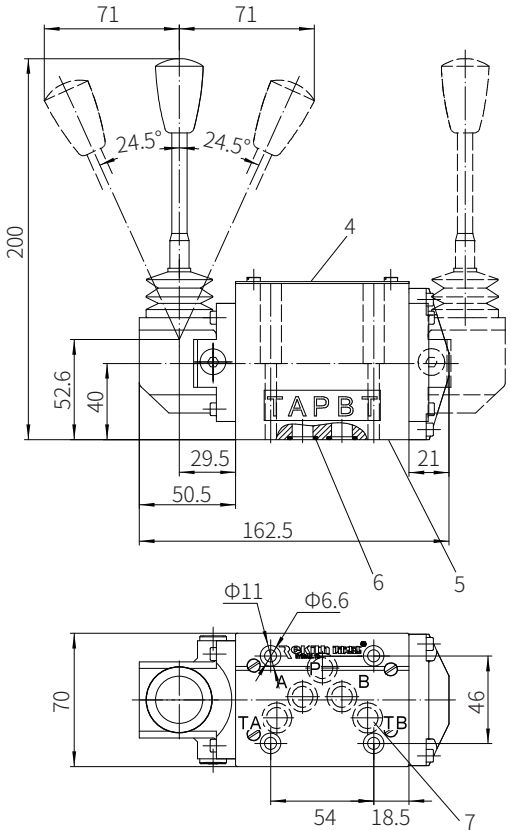
G502/01 (G1/2"); G502/02 (M22x1.5)



Component size

Size unit: mm

Model 4WMM10...1XJ/F...



- 1 Switching position a
- 2 Switching position b
- 3 Switching position o, a and b
- 4 Name plate
- 5 Valve connection surface
- 6 O-ring 12x2 (for oil port A, B, P, T)
- 7 When using control block, port TB serve as assistant return port

Valve fixing screw

M6x40-10.9 grade GB/T70.1-2000

Tightening torque $M_A=13.7\text{Nm}$

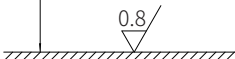
It must be ordered separately if connection subplate is needed.
Subplate model:

G66/01 (G3/8"); G66/02 (M18x1.5)

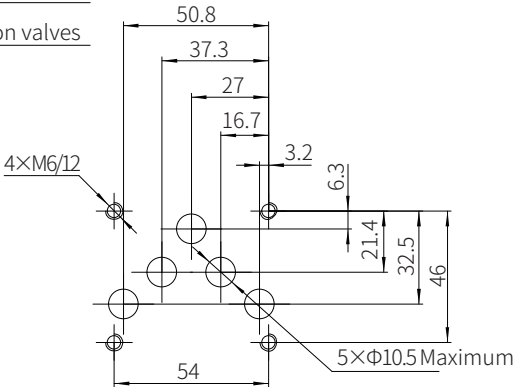
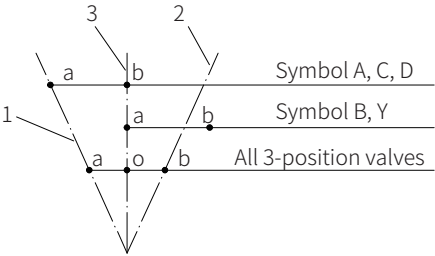
G67/01 (G1/2"); G67/02 (M22x1.5)

G534/01 (G3/4"); G534/02 (M27x2)

$\square 0.01/100\text{mm}$

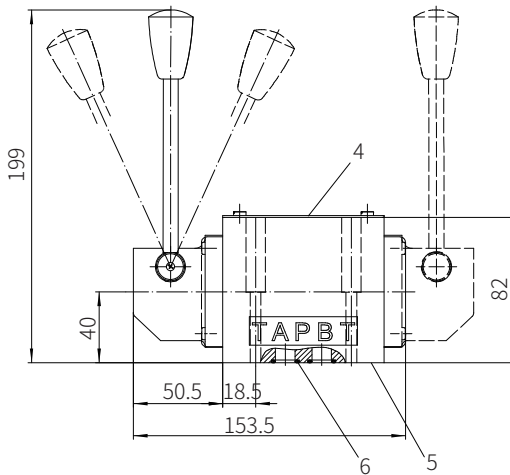


Required surface finishing of mating components

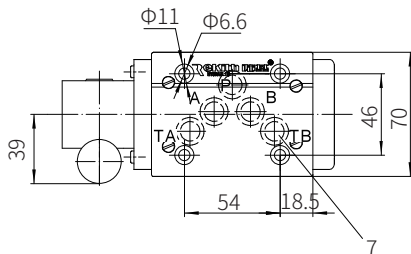


Component size
Size unit: mm

Model 4WMM10...1XJ/...



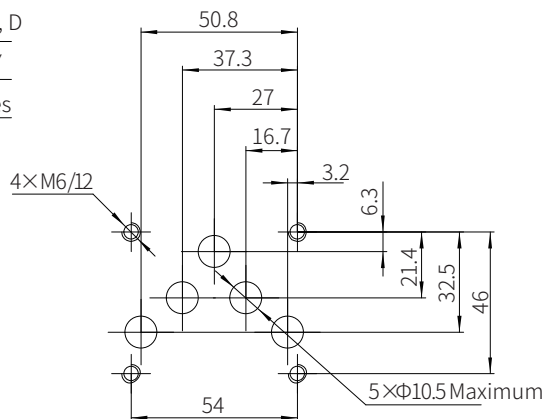
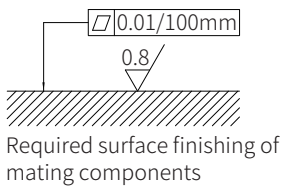
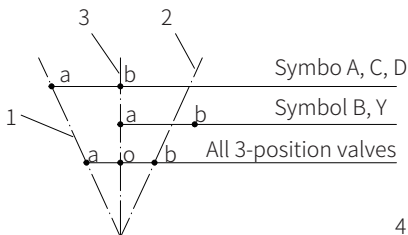
- 1 Switching position a
- 2 Switching position b
- 3 Switching position o, a and b
- 4 Name plate
- 5 Valve connection surface
- 6 O-ring 12x2 (for oil port A, B, P, T)
- 7 When using control block, port TB serve as assistant return port



Valve fixing screw
 M6x40-10.9 grade GB/T70.1-2000
 Tightening torque $M_A = 13.7 \text{ Nm}$

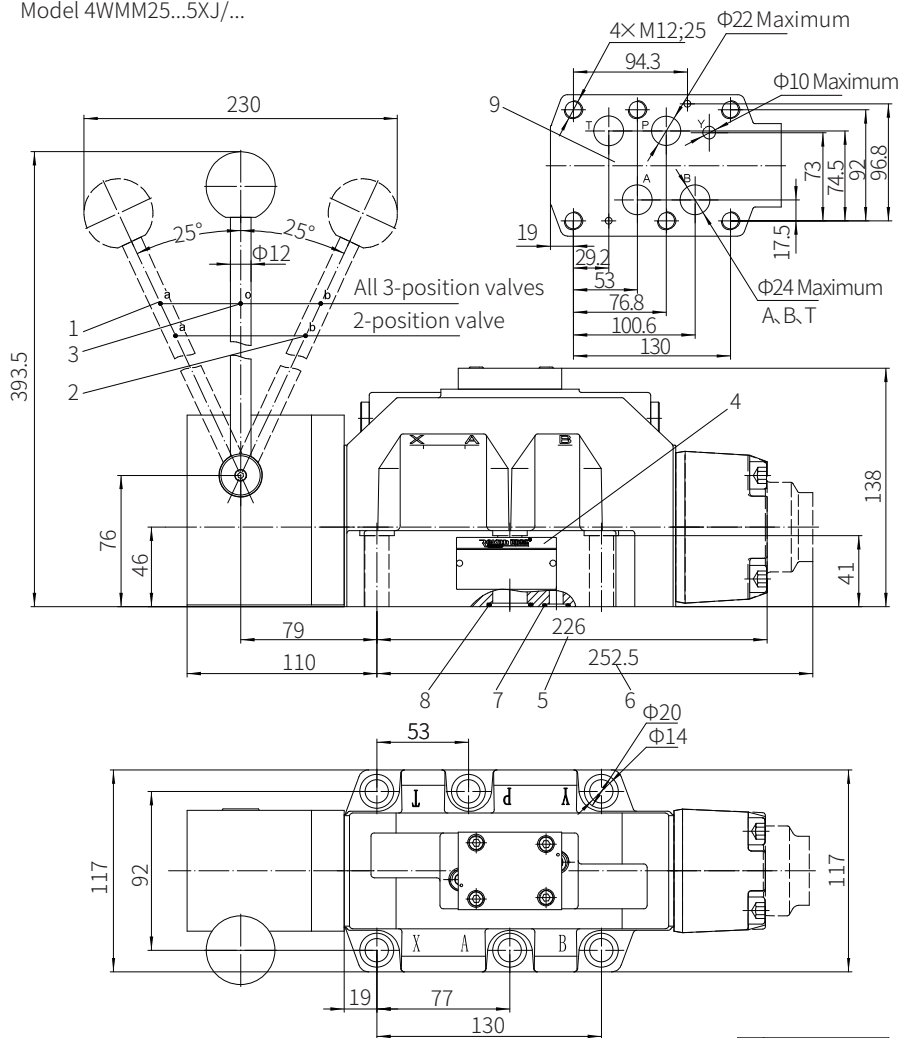
It must be ordered separately if connection subplate is needed.
 Subplate model:

G66/01 (G3/8"); G66/02 (M18x1.5)
 G67/01 (G1/2"); G67/02 (M22x1.5)
 G534/01 (G3/4"); G534/02 (M27x2)



Component size
Size unit: mm

Model 4WMM25...5XJ/...



Valve fixing screw

6-M12x60-10.9 grade GB/T70.1-2000

Tightening torque $M_A = 90\text{Nm}$

1 Switching position a

2 Switching position b

3 Switching position o

4 Name plate

5 Size of 3-position valve

6 Size of 2-position valve

7 O-ring 19x3 (for oil port X, Y)

8 O-ring 27x3 (for oil port P, A, B, T)

9 Valve mounting surface

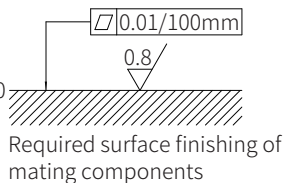
 It must be ordered separately if
 connection subplate is needed.

Subplate model:

G151/01(G1"); G151/02 (M33x2)

G154/01(G1-1/4"); G154/02 (M42x2)

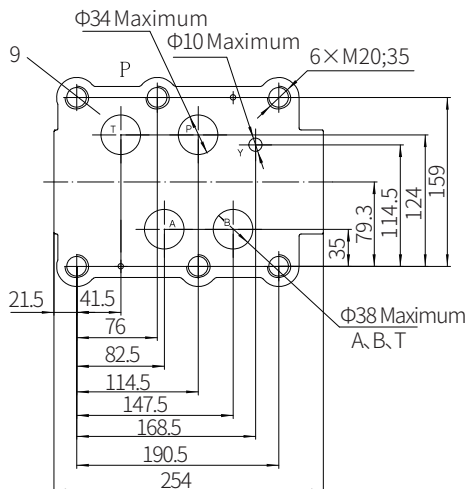
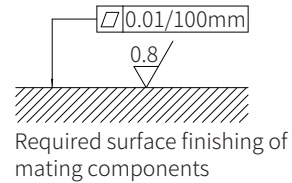
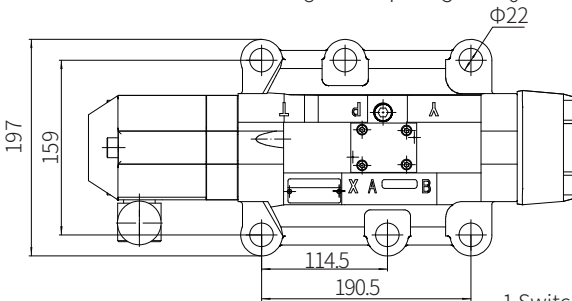
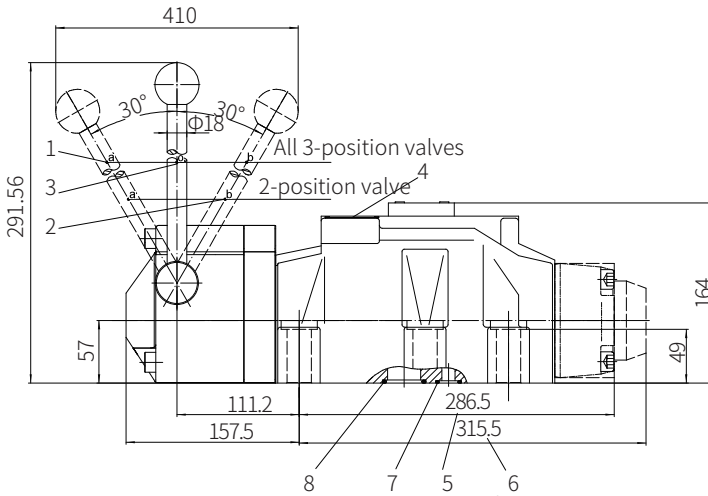
G156/01(G1-1/2"); G156/02 (M48x2)



Component size

Size unit: mm

Model 4WMM32...6XJ/...



- 1 Switching position a
- 2 Switching position b
- 3 Switching position o
- 4 Name plate
- 5 Size of 3-position valve
- 6 Size of 2-position valve
- 7 O-ring 19x3(for oil port X, Y)
- 8 O-ring 42x3(for oil port P, A, B, T)
- 9 Valve mounting surface

Valve fixing screw

6-M20x80-10.9 grade GB/T70.1-2000

 Tightening torque $M_A \approx 373 \text{ Nm}$

It must be ordered separately if connection subplate is needed.

Subplate model:

G157/01 (G1-1/2") ; G157/02 (M48x2)