

## Contact Details

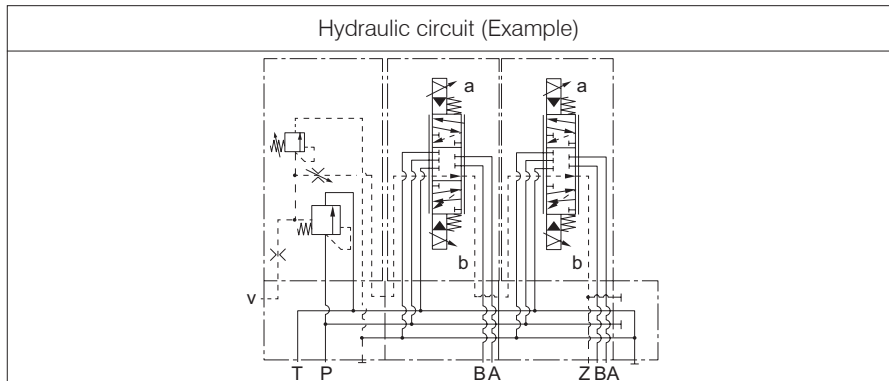
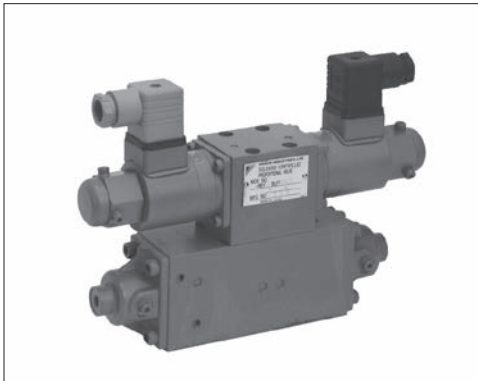
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# Solenoid Operated Proportional Directional Control Valve (with Pressure Compensation, Multiple Valve Series)



## Features

- These stacking type control valves show pressure compensated type proportional flow rate characteristics and control the flow rate in proportion to electrical current regardless of the load volume.
- Combining the valve with a variable displacement pump enables construction of a power match circuit that outputs the required pressure/flow rate.
- Enables individual flow rate control at ports A and B.
- This product combines an inlet valve block and solenoid operated proportional directional control valves, in that order, by mounting each valve block on a manifold block. There are separate manifold blocks and sub-blocks for each valve block, and up to 8 valve blocks can be connected according to requirements and clamped together with an end block using through bolts. (Block-build system)

## Nomenclature

This valve is a stacking type valve adopting the block-build system. The valves can be delivered set up to meet customer requirements.

When placing an order, split the product into valve blocks as follows and specify the model code of each valve block.

- Inlet valve block (MUV, MDM) or connection plate (AN)
- Sub-block for inlet valve block (A\*\*UV, A\*\*DM)
- First directional control valve (MEV)
- Sub-block for first directional control valve (A\*\*EV)
- Second directional control valve (MEV)
- Sub-block for second directional control valve (A\*\*EV)
- ... ..
- End plate (AP)

When two or more valves with the same model code are included, state the model codes of the individual valves as shown above.

### • Inlet valve block

MUV    \*\*    A    L    \*\*    \*\*  
 1       2       3       4       5       6

#### 1 Model No.

MUV: Bypass type pressure compensation valve  
 MDM: Reduction type pressure compensation valve

#### 2 Port size (nominal diameter)

12: ½  
 16: ¾  
 20: 1  
 25: 1¼  
 32: 1½

#### 3 Mount type

A: Sub-block type

MDM    \*\*    A    L    \*\*    N  
 1       2       3       4       5       7

#### 4 Maximum operating pressure

L: 21 MPa {210 kgf/cm<sup>2</sup>}

#### 5 Unloading pressure

(Pressure compensation structure differential pressure)

3: Differential pressure of 0.3 MPa {3 kgf/cm<sup>2</sup>}

6: Differential pressure of 0.6 MPa {6 kgf/cm<sup>2</sup>}

#### 6 Option code

S: Pressure adjusting screw type  
 H: Pressure adjusting handle type

#### 7 Option code

N: Without pilot relief valve

## Nomenclature

### ● Directional control valve block

MEV ※※ B L F F ※ ※ ※ ※ ※ - ※ ※ ※ ※ ※ ※

1 2 3 4 5 6 7 8 9 10 11 12 13

- 1 Model No.**  
MEV: Solenoid operated proportional directional control valve
- 2 Port size (nominal diameter)**  
12: ½  
16: ¾  
20: 1  
25: 1¼  
32: 1½
- 3 Mount type**  
B: Gasket mount type
- 4 Maximum operating pressure**  
L: 21 MPa {210 kgf/cm<sup>2</sup>}
- 5 Return spring function**  
F: Spring center type, spring offset type
- 6 Flow rate adjustment structure**  
F: For proportional control

- 7 Spool differential pressure code**  
3: Differential pressure of 0.3 MPa {3 kgf/cm<sup>2</sup>}  
6: Differential pressure of 0.6 MPa {6 kgf/cm<sup>2</sup>}
- 8 Spool type (See the spool type table)**
- 9 Rated flow rate (See the specification table)**
- 10 Pilot code**  
No designation: Internal pilot type  
X2: With external pilot port X2 \*<sup>1</sup>
- 11 Drainage code**  
No designation: Internal drain type  
T3: With external drainage port T3
- 12 Solenoid code**  
No designation: DC 24 V solenoid  
N: DC 12 V solenoid
- 13 Option code**  
No designation: Without maximum flow rate adjusting screw  
H: With maximum flow rate adjusting screw

Note: \*<sup>1</sup> For use in combination with an unload pressure code of 3 (differential pressure of 0.3 MPa) on a reduction type pressure compensation valve (MDM) or bypass type pressure compensation valve (MUV), select specifications with external pilot port (X2) and use with external pilot pressure.

### ● Sub-block

A ※※ ※※ - ※※

1 2 3 4

- 1 Model No.**  
A: Sub-block
- 2 Port size (nominal diameter)**  
12: ½  
16: ¾  
20: 1  
25: 1¼  
32: 1½

- 3 Mounting valve block**  
EV: For MEV  
UV: For MUV  
DM: For MDM
- 4 Special type**  
No designation: Standard  
Y1: With external auxiliary pressure control port Y1  
<Applicable to mounting valve block code EV>  
Z: With external drainage port for external unloading  
<Applicable to mounting valve block code EV>  
R: For variable displacement pump control  
<Applicable to mounting valve block code UV>

### ● End plate

AP ※※

1 2

- 1 Model No.**  
AP: End plate
- 2 Port size (nominal diameter)**  
12: ½  
16: ¾  
20: 1  
25: 1¼  
32: 1½

### ● Connection plate

AN ※※

1 2

- 1 Model No.**  
AN: Connection plate
- 2 Port size (nominal diameter)**  
12: ½  
16: ¾  
20: 1  
25: 1¼  
32: 1½

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## Specifications

Port size	Nominal diameter	Maximum operating pressure MPa {kgf/cm <sup>2</sup> }	Rated flow rate L/min			T port permissible back pressure MPa {kgf/cm <sup>2</sup> }	Relief valve/unload valve	
			Q1	Q2	QMAX		Pressure adjustment range MPa {kgf/cm <sup>2</sup> }	Unloading pressure MPa {kgf/cm <sup>2</sup> }
12	1/2	21 {210}	25	50	75	2.5 {25} (With internal drain) 7.0 {70} (With external drain type)	3rd pattern: 0.3 to 21 {3 to 210} 6th pattern: 0.6 to 21 {6 to 210}	3rd pattern: 0.3 {3} 6th pattern: 0.6 {6}
16	3/4		50	100	130			
20	1		80	160	200			
25	1 1/4		125	250	300			
32	1 1/2		200	400	500			

Port size	Pilot pressure MPa {kgf/cm <sup>2</sup> }	Pilot drainage volume cm <sup>3</sup>	Current at start of flow (nominal) mA		Current at maximum flow (nominal) mA		Coil resistance (20°C) Ω
			DC 24 V solenoid	DC 12 V solenoid	DC 24 V solenoid	DC 12 V solenoid	
12	1.2 to 21 {12 to 210} (Difference from drain back pressure)	1.4	300	600	700	1400	DC 24 V solenoid 26 DC 12 V solenoid 6.5
16		3.1					
20		5.9					
25		9.9					
32		15.4					

Note: ○ See the spring selection table for the relationships among the rated flow rate, number of directional control valve series, and inlet valve block spring.

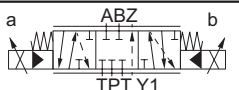
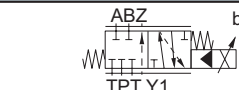
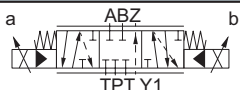
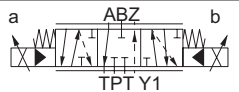
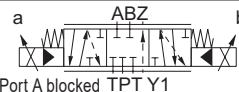
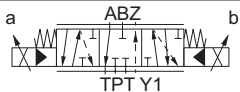

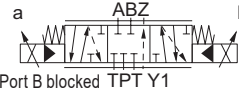
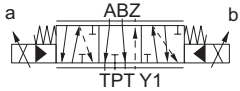
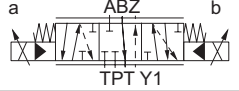
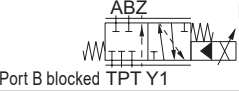
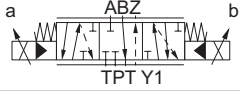
## Spring selection table/unloading (differential pressure)

Number of directional control valve series		1		2		3		4		5		6		7		8	
Rated flow rate	Q1	3	6	3	6	3	6	3	6	3	6	3	6	3	6	3	6
	Q2	3	6	3	6	3	6	6	6	6	6	-	-	-	-	-	-
	QMAX	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: 3: Spring for differential pressure of 0.3 MPa {3 kgf/cm<sup>2</sup>}

6: Spring for differential pressure of 0.6 MPa {6 kgf/cm<sup>2</sup>}

## 8: Spool type table

Spool type	JIS graphic symbols for hydraulic system	Spool type	JIS graphic symbols for hydraulic system	Spool type	JIS graphic symbols for hydraulic system
Meter-in control		Meter-in control		Meter-out control	
A		F		P	
B		K	 Port A blocked TPT Y1	Q	
C		L	 Port B blocked TPT Y1	R	
D		O	 Port B blocked TPT Y1	S	

Note: With spool types B, C and D, the passage area from port A/B to port T becomes 20% of the standard rated area at the neutral position, and the flow rate to port T is reduced accordingly. 100% of the rated area is secured at the switching position.

For spool K, port A is blocked with a sub-block, and for spools L and O, port B is blocked with a sub-block.

## 12: Solenoid code and applicable driver model code

Solenoid code	Solenoid	Coil resistance (20°C) Ω	Applicable driver	
			Model code	Power supply voltage
No designation	DC 24 V solenoid	26	KC-6-10	AC 100, 200, 220 V (Common for 50 and 60 Hz)
N	DC 12 V solenoid	6.5	ZH-6-10	DC 24 V

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## Mass (kg)

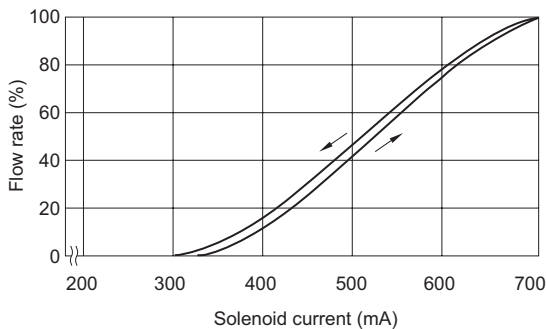
Model No.	Port size					Model No.	Port size				
	12	16	20	25	32		12	16	20	25	32
MUV	2.7	4.2	8	12.8	21	A-UV/DM	1.8	2.4	3.5	8	9.5
MDM	2.7	4.2	8.5	14	21.6	A-EV	1.3	2.4	4.5	6.0	9.0
MEV	4.9	6.6	10.5	17	22	AP	1.4	1.7	3	6	9.5
						AN	1	1.3	2.2	3.9	5.3

## Handling

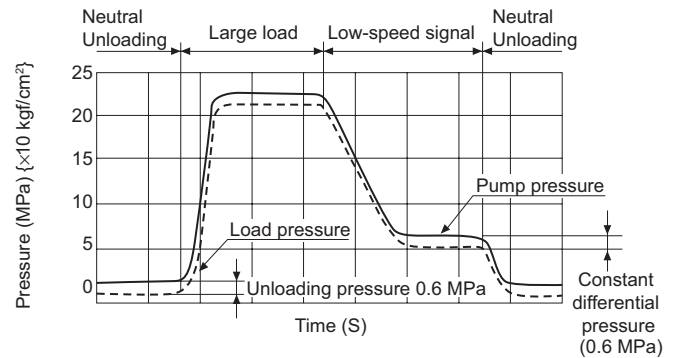
- Use parallel thread joints since the use of taper thread joints may distort the valve and cause malfunctions.
- When setting the maximum pressure at the start of operation, fully open the relief valve's adjusting screw. Adjust the pressure only while the actuator is stopped at the stroke end or the load is the maximum. Clockwise rotation of the pressure adjusting screw increases the pressure. The pressure changes by 10 MPa {100 kgf/cm<sup>2</sup>} per revolution of the adjusting screw.  
Since the pump is unloaded when the directional control valve is at the neutral position, it is not necessary to fully open the relief valve when starting the pump once the relief valve has been set.
- Directly connect the piping to the tank without merging it with other piping. If it is merged with other piping, use larger pipes.
- A pilot pressure of 1.2 MPa {12 kgf/cm<sup>2</sup>} is required to achieve a full stroke of the valve.  
In an application where the load is small and the pump pressure does not rise up to 1.2 MPa {12 kgf/cm<sup>2</sup>}, select an external pilot model and provide the required pilot pressure.
- Since this valve incorporates a pressure compensation valve with meter-in control, a back pressure valve such as a counter balance valve needs to be inserted between the outlet port of the actuator and this valve if a negative load will be applied.
- This valve can incorporate only one pressure compensation valve. Therefore, when two directional control valves are used, the pressure compensation function operates only for the directional control valve closer to the inlet valve.

## Performance curves

Input current - Flow rate characteristics



Pressure characteristics



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## Accessories for solenoid operated propor-tional directional control valves

Model No.	Port size	Hexagon socket head cap bolt	Number	Tightening torque (N·m) (kgf·cm)
MEV	12	M6×25	4	12 to 15 {120 to 150}
	16	M8×35		25 to 30 {250 to 300}
	20	M10×50		48 to 63 {480 to 630}
	25	M8×50	8	25 to 30 {250 to 300}
	32	M10×45		48 to 63 {480 to 630}
MUV/MDM	12	M6×25	4	12 to 15 {120 to 150}
	16	M8×35		25 to 30 {250 to 300}
	20	M10×50		48 to 63 {480 to 630}
	25	M8×50	6	25 to 30 {250 to 300}
	32	M10×45		48 to 63 {480 to 630}
AN	12	M6×15	4	12 to 15 {120 to 150}
	16	M8×15		25 to 30 {250 to 300}
	20	M10×25		48 to 63 {480 to 630}
	25	M8×25	6	25 to 30 {250 to 300}
	32	M10×25		48 to 63 {480 to 630}

## Model code for auxiliary products

**KLP** - ☒ ☒ ☒ ☒ - ☒  
1    2 3 4 5    6

### 1 Model No.

KLP: Pilot valve (solenoid operated proportional valve)

### 2 Solenoid code

S: Single solenoid

W: Double solenoid

### 3 Pilot code

No designation: Internal pilot type

X: External pilot

### 4 Drainage code

No designation: Internal drain type

T: External drain type

### 5 Solenoid code

No designation: DC 24 V solenoid

N: DC 12 V solenoid

### 6 Option code

No designation: Standard

S: With throttle screw

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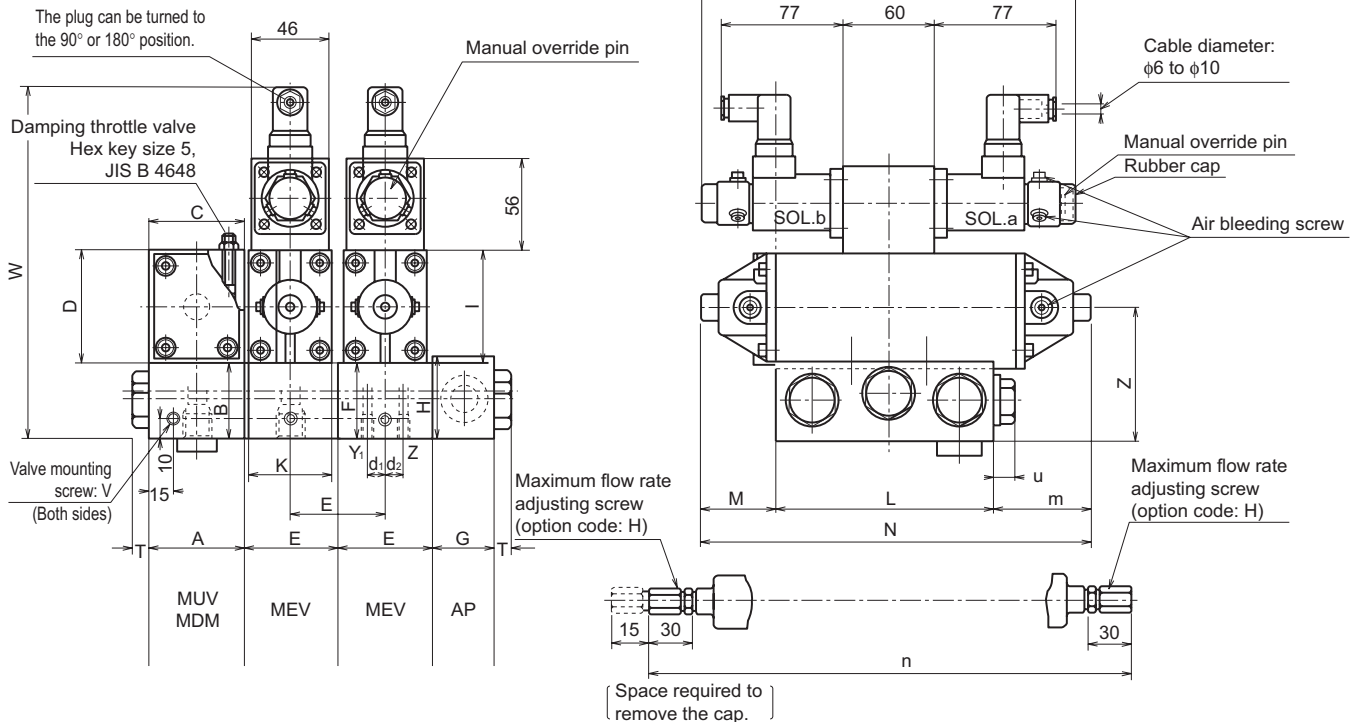
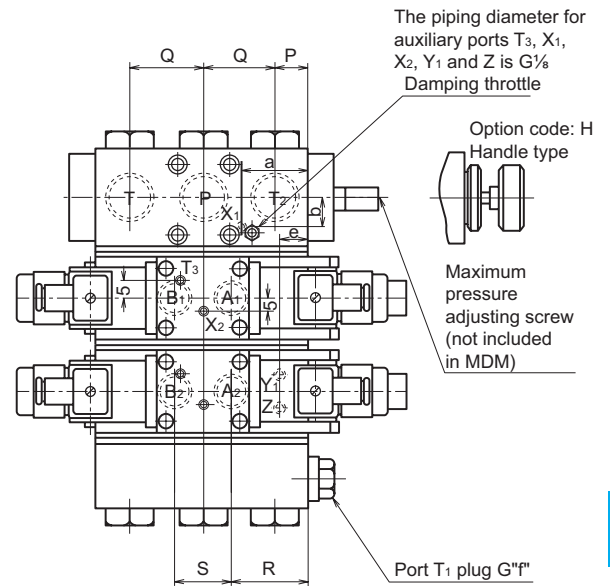
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## External dimension diagram

Port size	12	16	20	25	32
Piping diameter G thread	1/2	3/4	1	1 1/4	1 1/2
Spool stroke	2 x 8	2 x 10	2 x 12	2 x 14	2 x 16
A	60	60	70	86	100
B	46	46	55	68	76
C	60	55	68	76	90
D	46	70	86	100	120
E	50	60	70	86	100
F	40	46	55	68	76
G	40	40	46	55	68
H	50	50	60	70	86
I	60	70	86	100	120
K	46	55	68	76	90
L	110	140	170	200	235
M	38	48	54	57	64
N	202	254	298	337	391
P	17	22	25	30	33.5
Q	38	48	60	70	84
R	36	46	55	65	75.5
S	38	48	60	70	84
T	10	12	14.5	16.5	17.5
V	M6 x 8	M6 x 8	M8 x 10	M8 x 10	M8 x 10
W	201.5	217.5	242.5	269.5	297.5
Z	70	81	98	118	136
a	36	46	55	65	75.5
b	22	19	25	27	31
d1	11	11	14.5	18	21
d2	9.5	9.5	17	18.5	21.5
e	8	8	8	9	9
f	3/8"	3/8"	1/2"	3/4"	1"
u	16	18	20	23	28
m	54	66	74	80	92
n	265	317	361	401	455



Note: 1. Energization of SOL.a generates flow P → B.  
2. The figure shows the 2-series valve.

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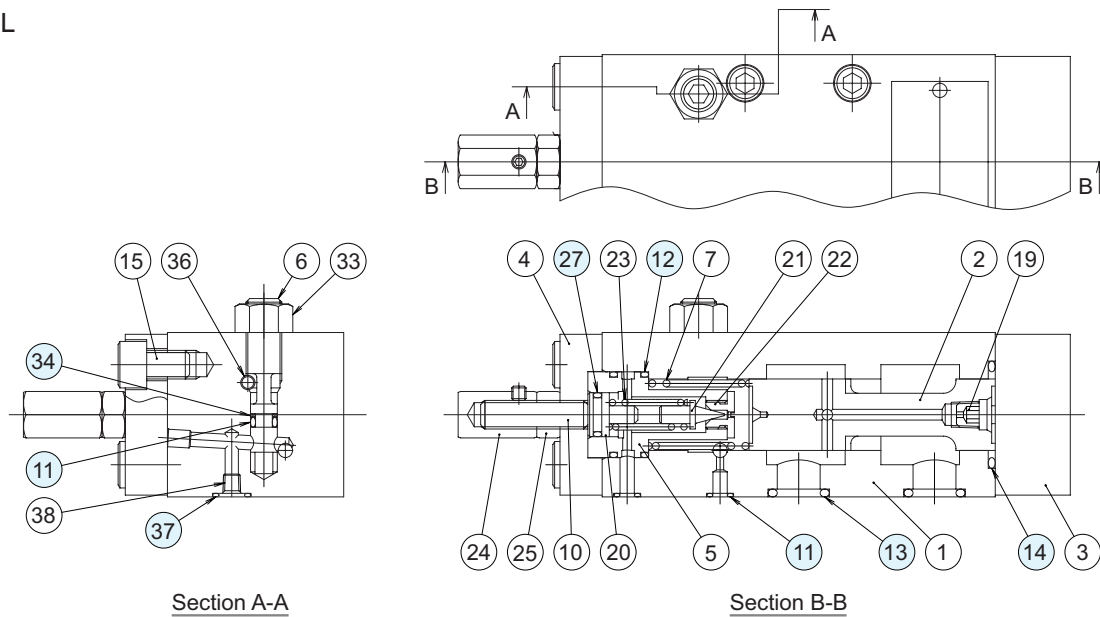
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## Sectional structural diagram

MUV\*\*AL



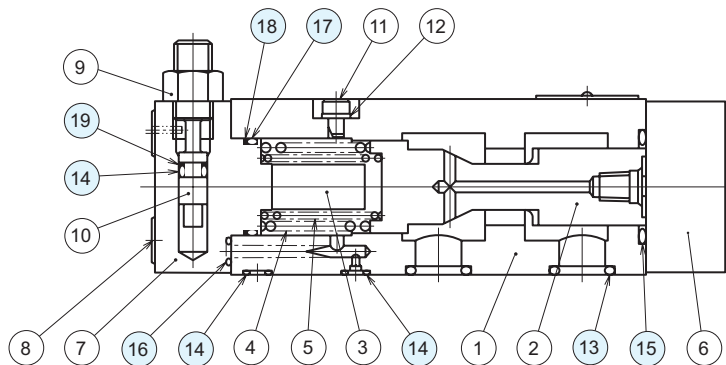
Section A-A

Section B-B

### Sealing part table

Part No.	Name	Quantity	Part model					Part specifications
			MUV12	MUV16	MUV20	MUV25	MUV32	
11	O-ring	3	AS568-008	AS568-008	AS568-008	AS568-008	AS568-008	NBR, Hs90
12	O-ring	2	AS568-019	AS568-019	AS568-023	AS568-122	AS568-126	NBR, Hs90
13	O-ring	2	AS568-112	AS568-115	AS568-118	AS568-121	AS568-125	NBR, Hs90
14	O-ring	1	AS568-120	AS568-120	AS568-122	AS568-128	AS568-130	NBR, Hs90
27	O-ring	1	AS568-012	AS568-012	AS568-012	AS568-012	AS568-012	NBR, Hs70
34	Backup ring	1	For AS568-008	For AS568-008	For AS568-008	For AS568-008	For AS568-008	Bias cut
37	O-ring	1	AS568-011	AS568-011	AS568-011	AS568-011	AS568-011	NBR, Hs90

MDM\*\*AL

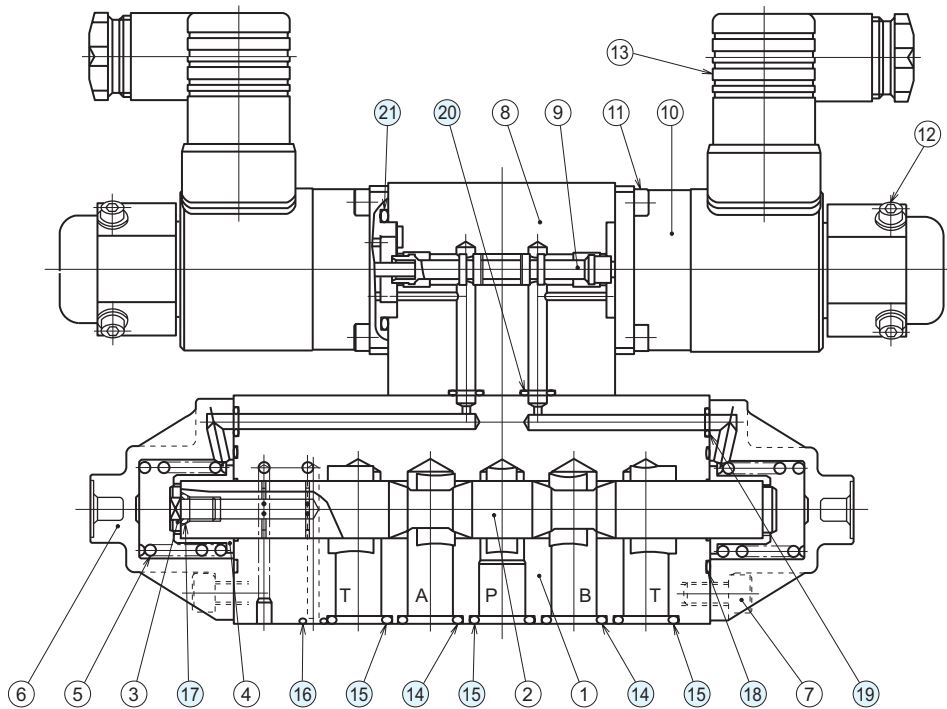


### Sealing part table

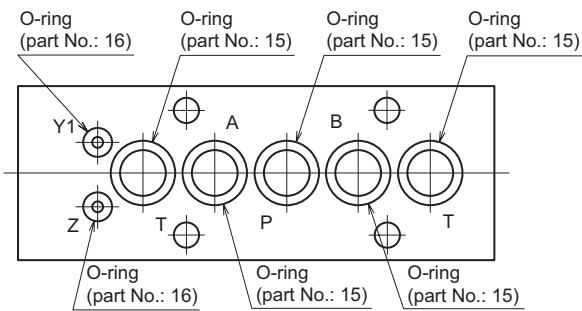
Part No.	Name	Quantity	Part model					Part specifications
			MDM12	MDM16	MDM20	MDM25	MDM32	
13	O-ring	2	AS568-112	AS568-115	AS568-118	AS568-121	AS568-125	NBR, Hs90
14	O-ring	5 (MDM12) 4 (MDM16 to 32)	AS568-008	AS568-008	AS568-008	AS568-008	AS568-008	NBR, Hs90
15	O-ring	1	AS568-120	AS568-120	AS568-122	AS568-128	AS568-130	NBR, Hs90
16	O-ring	1 (MDM12) 2 (MDM16 to 32)	AS568-010	AS568-010	AS568-010	AS568-011	AS568-011	NBR, Hs90
17	O-ring	1	AS568-020	AS568-026	AS568-129	AS568-134	AS568-227	NBR, Hs90
18	Backup ring	1	For AS568-020	For AS568-026	For AS568-129	For AS568-134	For AS568-227	Bias cut
19	Backup ring	1	For AS568-008	For AS568-008	For AS568-008	For AS568-008	For AS568-008	Bias cut

## Sectional structural diagram

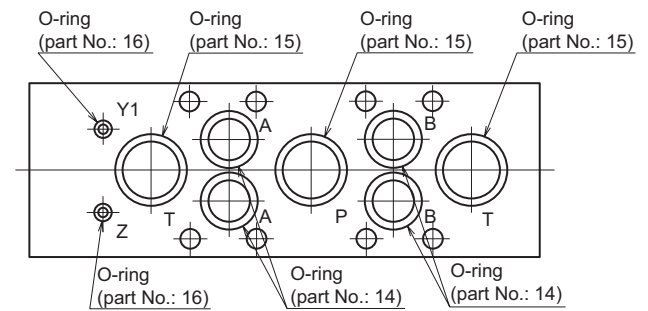
MEV12, 16 and 20



● With MEV12, 16 and 20



● MEV25 and 32



Sealing part table

Part No.	Name	Quantity	Part model					Part specifications
			MEV12	MEV16	MEV20	MEV25	MEV32	
14	O-ring	4	—	—	—	AS568-117	AS568-120	NBR, Hs90
15	O-ring	5 (MEV12 to 20) 3 (MEV25, 32)	AS568-112	AS568-115	AS568-118	AS568-121	AS568-125	NBR, Hs90
16	O-ring	2	AS568-008	AS568-008	AS568-008	AS568-008	AS568-008	NBR, Hs90
17	O-ring	1	1B P5	1B P7	1B P10A	1B P10A	1B P12	JIS B 2401
18	O-ring	2	AS568-025	AS568-128	AS568-136	AS568-228	AS568-231	NBR, Hs90
19	O-ring	2	AS568-008	AS568-008	AS568-008	AS568-009	AS568-009	NBR, Hs90
20	O-ring	4	AS568-010	AS568-010	AS568-010	AS568-010	AS568-010	NBR, Hs90
21	O-ring	2	AS568-121	AS568-121	AS568-121	AS568-121	AS568-121	NBR, Hs90