Manual Proportional Directional Control Valve
(with Pressure Compensation, Multiple Valve Series)

Features

- These stacking type multiple control valves are equipped with the bypass type pressure compensation function and have proportional flow rate characteristics.
- The pump pressure can be changed according to variation of the load pressure that causes the excess flow to go to the tank.
- Enables individual flow rate control at ports A and B.
- Up to 8 valves can be connected in a series and there are 11 directional control valve symbols.
- These valves have the directional control valve neutral unload function and a built-in relief valve.

Nomenclature

These are stacking type manual multi-control valves. The valves can be delivered set up to meet customer requirements. When placing an order, specify the model codes in the order that the valves are to be combined.

- Inlet valve block (MUV) or connection plate (AN)
- First directional control valve block
- Second directional control valve block
- ... ...
- 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

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Port size (nominal diameter)</th>
<th>Mount type</th>
<th>Maximum operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUV</td>
<td>12: ½</td>
<td>K: Stacking type</td>
<td>L: 21 MPa (210 kgf/cm²)</td>
</tr>
<tr>
<td></td>
<td>16: ¾</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20: 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25: 1¼</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32: 1½</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unloading pressure

(Pressure compensation structure differential pressure)

3: 0.3 MPa (3 kgf/cm²)
6: 0.6 MPa (6 kgf/cm²) *1

Option code I

S: Pressure adjusting screw type (standard)
H: Pressure adjusting handle type

Option code II

No designation: Standard
R: For variable displacement pump control

Note: *1 Used when a large flow passes through the directional control valve or when many series of valves are used. See the spring selection table for details.
Nomenclature

- Directional control valve block

\[ \text{MHV} \times \times \times \times \times \times \times \times \times \times \times \]

1. **Model No.**
   MHV: Manual proportional directional control valve

2. **Port size (nominal diameter)**
   - 12: \(\frac{1}{2}\)
   - 16: \(\frac{3}{4}\)
   - 20: 1
   - 25: \(\frac{5}{4}\)
   - 32: \(\frac{3}{2}\)

3. **Mount type**
   - K: Stacking type

4. **Maximum operating pressure**
   - L: 21 MPa \(\{210 \text{ kgf/cm}^2\}\)

5. **Return spring function**
   - F: Spring center type, spring offset type,
   - R: No-spring type (with detent)
   - O: No-spring type (without detent)
   - S: No-spring type (with braking structure)

Note: *2 Designate this code only when connecting to a connection plate (model code: AN\textsuperscript{KK}). When no code is designated, the differential pressure at the inlet valve block applies.

*3 When different rated flow rates are required for ports A and B, designate the code for port A first, then the code for port B. Example: 50-100 (option)

*4 The specifications with the maximum flow rate adjusting screw cannot be selected for the no-spring type (with braking structure).

For the delivery terms for spool type other than A and C and port sizes 25 and 32, consult Daikin separately.

- End plate

\[ \text{AP} \times \times \times \times \]

1. **Model No.**
   AP: End plate

2. **Port size (nominal diameter)**
   - 12: \(\frac{1}{2}\)
   - 16: \(\frac{3}{4}\)
   - 20: 1
   - 25: \(\frac{5}{4}\)
   - 32: \(\frac{3}{2}\)

3. **Mount type**
   - K: Stacking type

4. **Option code**
   - No designation: Standard
   - T: With isolated tank port T1
   - Z: With external drainage port Z for unloading

- Connection plate

\[ \text{AN} \times \times \times \times \]

1. **Model No.**
   AN: Connection plate

2. **Port size (nominal diameter)**
   - 12: \(\frac{1}{2}\)
   - 16: \(\frac{3}{4}\)
   - 20: 1
   - 25: \(\frac{5}{4}\)
   - 32: \(\frac{3}{2}\)

3. **Mount type**
   - K: Stacking type

4. **Option code**
   - No designation: Standard
   - T: With isolated tank port T1
   - Z: With external drainage port Z for unloading

Specifications

<table>
<thead>
<tr>
<th>Port size (nominal diameter)</th>
<th>Maximum operating pressure MPa (kgf/cm(^2))</th>
<th>Rated flow rate L/min</th>
<th>Port T Permissible back pressure MPa (kgf/cm(^2))</th>
<th>Relief valve/unload valve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Q1 25</td>
<td>Q2 50</td>
<td>QMAX 75</td>
</tr>
<tr>
<td>12  (\frac{1}{2})</td>
<td>21 (210)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16  (\frac{3}{4})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20  1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25  (\frac{5}{4})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32  (\frac{3}{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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### Spool type table

<table>
<thead>
<tr>
<th>Spool type</th>
<th>JIS graphic symbols for hydraulic system</th>
<th>Spool type</th>
<th>JIS graphic symbols for hydraulic system</th>
<th>Spool type</th>
<th>JIS graphic symbols for hydraulic system</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><img src="image1" alt="JIS graphic symbols" /></td>
<td>E</td>
<td><img src="image2" alt="JIS graphic symbols" /></td>
<td>M</td>
<td><img src="image3" alt="JIS graphic symbols" /></td>
</tr>
<tr>
<td>B</td>
<td><img src="image4" alt="JIS graphic symbols" /></td>
<td>F</td>
<td><img src="image5" alt="JIS graphic symbols" /></td>
<td>N</td>
<td><img src="image6" alt="JIS graphic symbols" /></td>
</tr>
<tr>
<td>C</td>
<td><img src="image7" alt="JIS graphic symbols" /></td>
<td>K</td>
<td><img src="image8" alt="JIS graphic symbols" /></td>
<td>O</td>
<td><img src="image9" alt="JIS graphic symbols" /></td>
</tr>
<tr>
<td>D</td>
<td><img src="image10" alt="JIS graphic symbols" /></td>
<td>L</td>
<td><img src="image11" alt="JIS graphic symbols" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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. ○ With spool types E, M and N, the passage area becomes 70% of the standard rated area and the flow rate is reduced accordingly. The pump does not unload at any operation position of the valve.

### Mass (kg)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Port size</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUV</td>
<td></td>
<td>2.4</td>
<td>4.3</td>
<td>8</td>
<td>12.5</td>
<td>21</td>
</tr>
<tr>
<td>MHV</td>
<td></td>
<td>2.8</td>
<td>3.9</td>
<td>7</td>
<td>13</td>
<td>16.5</td>
</tr>
<tr>
<td>AP</td>
<td></td>
<td>1</td>
<td>1.7</td>
<td>3</td>
<td>5.4</td>
<td>7</td>
</tr>
<tr>
<td>AN</td>
<td></td>
<td>0.9</td>
<td>1.6</td>
<td>3</td>
<td>5.3</td>
<td>7</td>
</tr>
</tbody>
</table>

### 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/cm²} 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.
- When connecting ports A and B to a cylinder, connect the head side of the cylinder to port B since the pressure drop is smaller in the B → T flow. When the flow rate exceeds rated flow rate Q2 or when many series of valves are used, use an end plate with isolated tank port T1 (model code: AP××K-T).
- Directly connect the piping to the tank without merging it with other piping. If it is merged with other piping, use larger pipes.
- 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

Lever angle - Flow rate characteristics

Pressure characteristics

- Neutral Unloading
- Large load
- Small load
- Neutral Unloading
- Load pressure
- Unloading pressure 0.3 or 0.6 MPa
- Pump pressure
- Constant differential pressure (0.3 or 0.6 MPa)

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External dimension diagram

<table>
<thead>
<tr>
<th>Port size</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping diameter G thread</td>
<td>(\frac{3}{8})</td>
<td>(\frac{3}{4})</td>
<td>1</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{2})</td>
</tr>
<tr>
<td>Spool stroke</td>
<td>(2 \times 8)</td>
<td>(2 \times 10)</td>
<td>(2 \times 12)</td>
<td>(2 \times 14)</td>
<td>(2 \times 16)</td>
</tr>
</tbody>
</table>

\[ \begin{array}{c|cccc}
\alpha & 30.5^\circ & 38^\circ & 46^\circ & 35.5^\circ \quad 41^\circ \\
A & 110 & 140 & 170 & 200 & 235 \\
B & 46 & 55 & 68 & 76 & 90 \\
C & 60 & 70 & 86 & 100 & 120 \\
D & 5 & 6 & 8 & 9 & 9 \\
E & 165 & 210 & 260 & 322 & 390 \\
E1 & 150 & 190 & 235 & 292 & 355 \\
F & 20 & 25 & 32.5 & 46 & 60 \\
H & 7.5 & 9.5 & 11.5 & 13.5 & 15.5 \\
I & 0.5 & 0.5 & 0 & 1 & 1.5 \\
I1 & 7.5 & 10 & 12.5 & 15 & 17.5 \\
I2 & 8.5 & 10 & 12.5 & 15 & 17.5 \\
K & 11.8 & 15 & 20 & 25 & 30 \\
L & 230.5 & 270 & 324 & 376 & 434 \\
N & 36.5 & 39 & 43 & 55 & 59 \\
N1 & 17 & 18 & 20 & 30 & 30 \\
P & 36 & 46 & 55 & 65 & 75.5 \\
Q & 18.5 & 23.5 & 25 & 33 & 33 \\
R & 224 & 243 & 243 & 268 & 268 \\
R1 & 8 & 10 & 10 & 12 & 12 \\
R2 & 25 & 35 & 35 & 35 & 35 \\
S & 23 & 27.5 & 34 & 38 & 45 \\
S1 & 29 & 35 & 42 & 48 & 50 \\
T & 17.5 & 22 & 25 & 35 & 38.5 \\
U & 37.5 & 48 & 60 & 65 & 79 \\
V & 36 & 46 & 55 & 65 & 75.5 \\
W & 38 & 48 & 60 & 70 & 84 \\
X1 & 20 & 25 & 30 & 40 & 45 \\
X2 & 11.5 & 11.5 & 14.5 & 16.5 & 18.5 \\
X3 & 26 & 39 & 48 & 50 & 52 \\
X4 & 20 & 27.5 & 34 & 38 & 45 \\
Z & 7.5 & 3.5 & -2.5 & 10 & 0 \\
Z2 & -14 & 9.5 & 16 & 19 & 23 \\
Z3 & 8 & 8 & 8 & 9 & 9 \\
Y & 6 & 8 & 10 & 12.5 & 16 \\
\(a\) & \(\frac{3}{4}\) & \(\frac{3}{8}\) & \(\frac{1}{2}\) & \(\frac{1}{2}\) & 1 \\\n\(d\) & 20 & 20 & 20 & 30 & 30 \\
\(t\) & M8 & M10 & M10 & M12 & M12 \\
\end{array} \]

Handle position
I: P → B, A → T
II: Neutral position
III: P → A, B → T

Note:
1. This diagram shows a valve with an MUV inlet valve block and a 3-valve series.
2. The specifications given here are subject to change for the purposes of improvement.
3. The handle may interfere with piping joints so due care is required.
**Sectional structural diagram**

**Sealing part table**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Name</th>
<th>Quantity</th>
<th>MUV12</th>
<th>MUV16</th>
<th>MUV20</th>
<th>MUV25</th>
<th>MUV32</th>
<th>Part specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>O-ring</td>
<td>1</td>
<td>AS568-120</td>
<td>AS568-120</td>
<td>AS568-122</td>
<td>AS568-128</td>
<td>AS568-130</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>20</td>
<td>O-ring</td>
<td>1</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-010</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>21</td>
<td>O-ring</td>
<td>2</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>22</td>
<td>O-ring</td>
<td>2</td>
<td>AS568-019</td>
<td>AS568-019</td>
<td>AS568-023</td>
<td>AS568-122</td>
<td>AS568-126</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>23</td>
<td>O-ring</td>
<td>1</td>
<td>AS568-012</td>
<td>AS568-012</td>
<td>AS568-012</td>
<td>AS568-012</td>
<td>AS568-012</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>24</td>
<td>Backup ring</td>
<td>1</td>
<td>For AS568-008</td>
<td>For AS568-008</td>
<td>For AS568-008</td>
<td>For AS568-008</td>
<td>For AS568-008</td>
<td>Bias cut</td>
</tr>
</tbody>
</table>

**Sealing part table**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Name</th>
<th>Quantity</th>
<th>MHV12</th>
<th>MHV16</th>
<th>MHV20</th>
<th>MHV25</th>
<th>MHV32</th>
<th>Part specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>O-ring</td>
<td>3</td>
<td>AS568-112</td>
<td>AS568-115</td>
<td>AS568-118</td>
<td>AS568-121</td>
<td>AS568-125</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>19</td>
<td>O-ring</td>
<td>1</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>21</td>
<td>O-ring</td>
<td>2</td>
<td>AS568-114</td>
<td>AS568-114</td>
<td>AS568-114</td>
<td>AS568-213</td>
<td>AS568-213</td>
<td>NBR, Hs70</td>
</tr>
</tbody>
</table>

**Sealing part table**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Name</th>
<th>Quantity</th>
<th>AP12</th>
<th>AP16</th>
<th>AP20</th>
<th>AP25</th>
<th>AP32</th>
<th>Part specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>202</td>
<td>O-ring</td>
<td>3</td>
<td>AS568-112</td>
<td>AS568-115</td>
<td>AS568-118</td>
<td>AS568-121</td>
<td>AS568-125</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>204</td>
<td>O-ring</td>
<td>1</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>AS568-008</td>
<td>NBR, Hs90</td>
</tr>
<tr>
<td>246</td>
<td>Sealing washer</td>
<td>1</td>
<td>SWP-1/4</td>
<td>SWP-3/8</td>
<td>SWP-1/2</td>
<td>SWP-3/4</td>
<td>SWP-1</td>
<td></td>
</tr>
</tbody>
</table>