## Flow control valve

**Type 3FRM 10, 16...L2X**

Sizes 10 and 16  
Up to 315 bar  
Up to 160 L/min

### Contents

<table>
<thead>
<tr>
<th>Feature</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function and configurations</td>
<td>02</td>
</tr>
<tr>
<td>Ordering code</td>
<td>03</td>
</tr>
<tr>
<td>Symbols</td>
<td>03</td>
</tr>
<tr>
<td>Technical data</td>
<td>04</td>
</tr>
<tr>
<td>Characteristic curves</td>
<td>04</td>
</tr>
<tr>
<td>Unit dimensions</td>
<td>05</td>
</tr>
</tbody>
</table>

### Features

- For subplate mounting  
- Mechanical actuation  
- Pressure relief valve  
  (overload protection), optional  
- Start-up jump reduction  
- Bleed port for free circulation, optional
The flow control valve type 3FRM is a 3-way flow control valve. It is used for maintaining a set constant flow, independent of changes in pressure and temperature. The valve basically consists of a housing (1), an orifice bush (2), a pressure compensator (3) and an adjustment type (4).

The flow from channel A to B is throttled at the throttling point (5). The throttle cross-section is set by mechanically turning the curved bolt (6) over the adjustment type (4). An upstream pressure compensator (3) is included to keep the flow at the throttling point (5) constant independent of temperature and pressure.

The pressure compensator limits excessive flow via an additional line to the reservoir. Consequently, these valves may be used on the supply line only!

In the case of 3-way flow control valves (as opposed to 2-way flow control valves), the measurement and control orifices are not connected in series, but in parallel. Temperature independence is achieved thanks to the orifice design of the throttling point.

The differential between working pressure and operating pressure is limited to the pressure drop of the metering orifice, whereas for 2-way flow control valves, the hydraulic pump always has to produce the pressure set on the pressure relief valve. For this reason, the power loss of a 3-way flow control valve is smaller, resulting in better plant efficiency and less heat generation.

The flow control valves can be realized optionally with or without bleed port (for free circulation) and with or without pressure relief valve (overload protection).
Symbols

Type 3FRM ...

Type 3FRM ...DX...

Type 3FRM ...X...

Type 3FRM ...D...

Ordering code for flow control valve

3FR M L2X *

3-way flow control valve

Mechanical actuation

Nominal size 10 =10
Nominal size 16 =16

Series L20 to L29 =L2X

(L20 to L29: unchanged installation and connection dimensions)

Flow range A to B, linear

-Size 10:
Up to 10 l/min =10L
Up to 16 l/min =16L
Up to 25 l/min =25L
Up to 50 l/min =50L

-Size 16:
Up to 60 l/min =60L
Up to 100 l/min =100L
Up to 160 l/min =160L

Further details in clear text

No code = NBR seals
V = FKM seals

No code = Without bleed port
X = With bleed port

No code = Without pressure relief valve
D = With pressure relief valve
**Technical data**

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Mineral oil; Phosphate ester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid temperature range °C</td>
<td>-30 to +80 (NBR seal)</td>
</tr>
<tr>
<td></td>
<td>-20 to +80 (FKM seal)</td>
</tr>
<tr>
<td>Viscosity range mm²/s</td>
<td>2.8–380</td>
</tr>
<tr>
<td>Degree of contamination</td>
<td>Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Maximum working pressure bar</th>
<th>10</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum pressure differential bar</td>
<td>3 ... 7</td>
<td>5 ... 12</td>
</tr>
<tr>
<td></td>
<td>Maximum flow L/min</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Flow control</td>
<td>Thermally stable (-20 ... +80 °C)</td>
<td>%</td>
<td>±2 (qv max)</td>
</tr>
<tr>
<td></td>
<td>Pressure stable (up to Δp = 315 bar)</td>
<td>%</td>
<td>±2 (qv max)</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>3.3</td>
<td>7</td>
</tr>
</tbody>
</table>

**Characteristic curves** (Measured at θoil = 40°C ± 5°C, using HLP46)

- **Size 10**
  - Flow (L/min) vs. Scale sections
  - Flow control (A → B)

- **Size 16**
  - Flow (L/min) vs. Scale sections
  - Flow control (A → B)
Unit dimensions: (Dimensions in mm)

1. Space required to remove the key
2. Adjustment type, rotary knob security lock (all positions can be locked), rotation range $300^\circ = 10$ scale sections, $M_\theta \approx 0.7$ Nm
3. Name plate
4. Identical seal rings for ports A and B
5.1 Bleed port X (Size 10)
5.2 Bleed port X (Size 16)
6. Porting pattern (similar to ISO 6263)

Valve mounting screws
Size 10: $4 \times$ ISO 4762 - M8 x 50, tightening torque $M_\alpha = 30$ Nm ± 10 %.
Size 16: $4 \times$ ISO 4762 - M10 x 80, tightening torque $M_\alpha = 60$ Nm ± 10 %.

Required surface quality of the valve contact surface

<table>
<thead>
<tr>
<th>Size</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
<th>B6</th>
<th>B7</th>
<th>B8</th>
<th>B9</th>
<th>ΦD1</th>
<th>ΦD2</th>
<th>ΦD3</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>101.5</td>
<td>47</td>
<td>9.5</td>
<td>9.5</td>
<td>11.9</td>
<td>23.8</td>
<td>74.6</td>
<td>82.5</td>
<td>27</td>
<td>9</td>
<td>15</td>
<td>7.5</td>
<td>X, A, B, T, T1</td>
</tr>
<tr>
<td>16</td>
<td>123.5</td>
<td>60</td>
<td>11</td>
<td>12.5</td>
<td>95.1</td>
<td>28.6</td>
<td>88.8</td>
<td>101.5</td>
<td>76</td>
<td>11</td>
<td>18</td>
<td>7.5</td>
<td>max 6.3, max 14.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
<th>L7</th>
<th>L8</th>
<th>L9max</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>123</td>
<td>95</td>
<td>39.5</td>
<td>51</td>
<td>60</td>
<td>95</td>
<td>3.2</td>
<td>11.9</td>
<td>9.5</td>
<td>38</td>
<td>57.2</td>
<td>76</td>
<td>18.8</td>
<td>21.3</td>
<td>T1, T9max, T12</td>
</tr>
<tr>
<td>16</td>
<td>145</td>
<td>117</td>
<td>58</td>
<td>72</td>
<td>82</td>
<td>123.5</td>
<td>0.8</td>
<td>-</td>
<td>11</td>
<td>50.75</td>
<td>77.8</td>
<td>101.5</td>
<td>23.8</td>
<td>29.5</td>
<td>13</td>
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</tbody>
</table>
Flow control valve | Type 3FRM10, 16...L2X

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