LUDV control block of sandwich plate design

Type SX 10

Nominal size 10
Series 1X
Maximum pressure, pump side 250 bar
Maximum pressure, actuator side 300 bar
Inlet flow 80 l/mn
Flow at each directional valve element 50 l/mn

Contents

Special features 1
Functional description, Section 2
Hydraulic Symbol 2
Technical data 3 to 4
Ordering details 5 to 7
Inlet element - Final element 8
Directional valve element 9 to 10
Unit dimensions (in mm) 11 to 13
Assembly possibilities 14
Pipe connections 14

Special features

- Distributes the flow between the directional valve elements according to the requirements, independently of the pressure and available flow.
- Compact sandwich plate design, can be combined so that the control block can meet the requirements of differing machines.
- No shuttle valves.
- Limitation of system maximum pressure via LS pressure relief valve.
- System protection via LS and secondary pressure relief valves.
**Functional description, Section**

The SX 10 directional control block basically consists of one inlet element, a number of directional valve elements and one final element.

The inlet element contains one fixing point and the pipe connection ports P, T, LS, M.

This element also contains all the components required for the system function, namely: a flow control valve for the controlled unloading of the LS line, a LS relief valve for the limitation of the maximum pressure in the system and a pressure compensator.

Each SX directional valve element is composed of a housing (1), a spool (2), two load holding check valves (3) placed inside the spool, a pressure compensator (4), cavities for direct operated pressure relief valves with anti-cavitation function (5), and anti-cavitation check valves or plugs (6).

The final element has two fixing points.

**Hydraulic Symbol**

<table>
<thead>
<tr>
<th>Orifices</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Pump</td>
</tr>
<tr>
<td>A, B</td>
<td>Actuator</td>
</tr>
<tr>
<td>T</td>
<td>Tank</td>
</tr>
<tr>
<td>LS</td>
<td>Load Sensing</td>
</tr>
</tbody>
</table>
### Technical data (For applications outside these parameters, please consult us!)

#### General
<table>
<thead>
<tr>
<th>Design</th>
<th>flangeable (up to 10 directional valve elements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>flow distribution between the directional valve elements proportional to the requirements, independently of the pressure and available flow</td>
</tr>
<tr>
<td>Type</td>
<td>SX 10</td>
</tr>
<tr>
<td>Installation</td>
<td>optional</td>
</tr>
<tr>
<td>Nominal size</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Hydraulic

<table>
<thead>
<tr>
<th>Max. permissible flow</th>
<th>port P l/min</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>port A, B l/min</td>
<td>50</td>
</tr>
<tr>
<td>Standard leakage oil flow on load holding</td>
<td>cm³/min</td>
<td>15 maxi</td>
</tr>
<tr>
<td>(at 100 bar, 36 mm²/s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. operating pressure per connection</td>
<td>bar</td>
<td></td>
</tr>
<tr>
<td>P, M, LS</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>A, B</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

for applications at higher pressure: please consult us.

<table>
<thead>
<tr>
<th>Secondary valves setting pressure tolerances (at 5 l/min)</th>
<th>bar</th>
<th>setting</th>
<th>tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>101 - 170</td>
<td>-5 / +10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>171 - 230</td>
<td>-7 / +13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>231 - 300</td>
<td>-10 / +15</td>
</tr>
</tbody>
</table>

Max. control pressure per connection

<table>
<thead>
<tr>
<th>a, b bar</th>
<th>35</th>
</tr>
</thead>
</table>

we recommend the use of control curve 6 to 25 bar, and inlet pressure (30 bar mini)

| Pressure fluid | mineral oils (HL, HLP) to DIN 51524 \(^1\).
|----------------| HEES fluids to VDMA 24568 as well as fluids to Rexroth catalogue sheet RE 90221: please consult us. |

\(^1\) suitable for NBR seals

<table>
<thead>
<tr>
<th>Pressure fluid temperature range</th>
<th>°C</th>
<th>-20 to +100 inside the block</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Viscosity range</th>
<th>mm²/s</th>
<th>10 to 380</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Maximum permissible degree of contamination authorised for hydraulic fluid, purity degree according to ISO 4406 (c)</th>
<th>Class 20/18/15, therefore we recommend a filter with a minimum retention rate of (\beta_{10} \geq 75)</th>
</tr>
</thead>
</table>
Technical data (For applications outside these parameters, please consult us!)

**Mechanical**

<table>
<thead>
<tr>
<th>Weight</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet element</td>
<td>5</td>
</tr>
<tr>
<td>Directional valve element</td>
<td>2.1</td>
</tr>
<tr>
<td>Blanking plate</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spool return force</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. permissible actuation force on the spool (for 1 million cycles)</td>
<td></td>
</tr>
<tr>
<td>- axial</td>
<td>N</td>
</tr>
<tr>
<td>- radial</td>
<td>N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage temperature</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40 to +60</td>
</tr>
</tbody>
</table>

**Installation guidelines**

<table>
<thead>
<tr>
<th>Pipe connections</th>
<th>Tightening torque for the pipe connections Nm</th>
<th>P, P2</th>
<th>T, T3</th>
<th>M, LS, T1</th>
<th>A, B, T2</th>
<th>a, b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>50</td>
<td>20</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended fixing</th>
<th>at 3 locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flatness of the mounting surface</td>
<td>mm 0.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting of system pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The hydraulic circuit may not generate any uncontrolled leak flow in the LS line via the LS pressure relief valve</td>
</tr>
</tbody>
</table>

Do not direct the jet of a pressure washing unit directly at the unit
Ordering details: SX 10 directional control block

Number or directional valve spools
1 to 10
Medium pressure = L
series 10 to 19
(10 to 19, unchanged installation and connection dimensions)

Inlet element
Closed Center with flushing valve = S
Open Center = P

1) Max. pressure in bar, measured at M, adjustable via the LS pressure relief valve

Seals
M = NBR seals

Attention!
The compatibility of the seals and pressure fluid has to be taken into account

Connection threads
01 = Pipe threads to standard ISO 228/1
A, B, T2 = G 3/8
p, P2, T, T3 = G 1/2
M, LS, T1 = G 1/4
a, b = G 1/4

Further details in clear text

Final element
L = Blanking plate
LT = Blanking plate with outlet T3

Ordering details: see page 6

set with a Δp of 15 bar between M and LS
## Ordering details: additional details for the directional valve element (page 5)

### Secondary valves

<table>
<thead>
<tr>
<th>H.:0*</th>
<th>direct actuated pressure relief valve with anti-cavitation function</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>pressure value in bar</td>
</tr>
<tr>
<td>E</td>
<td>anti-cavitation check valve</td>
</tr>
<tr>
<td>Q</td>
<td>plug</td>
</tr>
</tbody>
</table>

### Operation orientation

<table>
<thead>
<tr>
<th>No code</th>
<th>Operation orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No code</td>
<td>without mechanical operator (H200)</td>
</tr>
<tr>
<td>A</td>
<td>mechanical operator on connection side A</td>
</tr>
<tr>
<td>B</td>
<td>mechanical operator on connection side B</td>
</tr>
</tbody>
</table>

### Type of operation

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>3 positions spool return via a spring</td>
</tr>
<tr>
<td>E2</td>
<td>4 positions spool return via a spring</td>
</tr>
<tr>
<td>Z1</td>
<td>mechanical operator with tongue (Ø 6)</td>
</tr>
<tr>
<td>H 200</td>
<td>hydraulic operator, spool return via a spring</td>
</tr>
<tr>
<td>H 230</td>
<td>hydraulic operator, spool return via a spring, stroke limitation on connection sides A and B</td>
</tr>
</tbody>
</table>

### Flow at connection ports

<table>
<thead>
<tr>
<th>Port A</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>050</td>
<td>flow at connection port A in l/min</td>
</tr>
<tr>
<td>050</td>
<td>flow at connection port B in l/min</td>
</tr>
</tbody>
</table>

### Directional valve spools

- EA
- JA
- QA
- WA
Ordering details: separate element

Inlet element

```
SX 10  1X / .0  M *
```

see ordering details page 5
see ordering details of inlet element page 5

Directional valve element

```
SX 10  1X / .0  .0 M *
```

see ordering details pages 5 and 6
see ordering details of directional valve element pages 5 and 6

Final element

```
SX 10  1X M *
```

see ordering details page 5
see ordering details of final element page 5

Ordering example - complete block SX10

Desired execution: 3 directional valve elements

Inlet element: Open Center,
Max. pressure = 200 bar

3 directional valve elements:

- 1st and 2nd elements:
  - Spool symbol = EA
  - Flow in A = 50 l/min, Flow in B = 50 l/min
  - Mechanical operator with tongue on connection side A, spool return via a spring
  - Secondary valve in A = direct operated pressure relief valve with anti-cavitation function set at 250 bar
  - Secondary valve in B = plug

- 3rd element:
  - Spool symbol = JA
  - Flow in A = 50 l/min, Flow in B = 50 l/min
  - Hydraulic operator, spool return via a spring
  - Secondary valves in A and B = anti-cavitation check valve

Final element: Blanking plat

Ordering details:

```
inlet element
3  SX 10  L  1X  P  200  EA  50  ;  50  A2Z1  A  H250  Q
```

```
1st directional valve element
EA  50  ;  50  A2Z1  A  H250  Q
```

```
2nd directional valve element
EA  50  ;  50  A2Z1  A  H250  Q
```

```
3rd directional valve element
JA  50  ;  50  H200  E  E  L  M  01
```

final element
Inlet element

Closed center with flushing valve
Ordering detail

Open center
Ordering detail

Final element

Blanking plate
Ordering detail

Blanking plate with outlet T3
Ordering detail
Directional valve element

Representation of the SX directional valve element
Simplified symbol used to illustrate SX directional control circuits

Spool variations
Ordering detail

EA...-...: Symbol EA

JA...-...: Symbol JA

QA...-...: Symbol QA

WA...-...: Symbol WA

Type of operator

Mechanical operator with tongue on connection side A, spool return via a spring 3 positions
Ordering detail A2Z1A

Mechanical operator with tongue on connection side B, spool return via a spring 4 positions
Codification E2Z1B
Directional valve element

Hydraulic operator, spool return via a spring
Ordering detail
H200

Hydraulic operator with adjustable stop pins, spool return via a spring
Ordering detail
H230

Secondary valves
Direct operated pressure relief valve with anti-cavitation function (on connection side A); plug (on connection side B)
Ordering detail
H...Q

Anti-cavitation check valve (on connection side A); plug (on connection side B)
Ordering detail
EQ
Unit dimensions (in mm)

1. Inlet element
2. Directional valve element
3. Blanking plate
4. Cover for hydraulic operator
5. Stroke limitation and hydraulic connection
6. Mechanical operator with tongue
7. Cover for spring return arrangement
8. LS flow control valve (tightening torque = 20 ± 10% Nm)
9. LS pressure relief valve (tightening torque = 45 ± 10% Nm)
10. Secondary pressure relief valve (tightening torque = 30 to 35 Nm)
11. 3 tie rods (nuts tightening torque = 20 ± 10% Nm)
Unit dimensions (in mm)

Inlet element

Mechanical or manual operators, spool return via a spring

Spool return via a spring
3 positions
Ordering detail
A2

Manual operators
Ordering detail
Z1
Tongue thickness
6 mm

4 positions
Ordering detail
E2
Unit dimensions (in mm)

Hydraulic operator, spool return via a spring
Ordering detail
H200

Hydraulic operator with adjustable stop pin, spool return via a spring
Ordering detail
H230

Final element
Blanking plate
Ordering detail
L

Blanking plate with outlet T3
Ordering detail
LT
Assembly possibilities

1. Inlet element
2. Directional valve element
3. Blanking plate L
4. Cover for hydraulic operator H200
5. Cover for hydraulic operator H230
6. Mechanical operator with tongue type Z1
7. Spring return arrangement type A2
8. LS flow control valve
9. LS pressure relief valve
10. Secondary pressure relief valve
11. Plug for individual pressure compensator
12. Plug
13. Seals plate

Pipe connections

<table>
<thead>
<tr>
<th>ports</th>
<th>d1</th>
<th>Ød2</th>
<th>t1</th>
<th>t2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, T2</td>
<td>G 3/8</td>
<td>-</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>P, P2, T, T3</td>
<td>G 1/2</td>
<td>34</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>M, LS, T1, a, b</td>
<td>G 1/4</td>
<td>25</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>