

## 2-way Logic Cartridge Valves Directional Function

Model: LC...7XJ(logic cartridge valves)

LFA...7XJ(control cover)



- ◆ Size 16/63
- ◆ Maximum working pressure 420 bar
- ◆ Maximum working flow 3000 L/min

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### Features

- Valve poppet with or without damping nose
- 2 area ratios
- 4 types of springs
- 4 stroke limitations
- Control cover with integrated seat valve
- Control cover with integrated shuttle valve
- Control cover for set-up of directional spool valves with or without installed shuttle valve
- Control cover for set-up of directional seat valves with or without installed shuttle valve

The 2-way logic cartridge valves are designed as components for integrated blocks. The main valve component with oil ports A and B is installed into the control block in a receiving hole standardized according to DIN ISO 7368 and closed with a cover. In most cases, the control cover is the connection between the control side of the main valve component and the pilot valve.

By control with respective pilot control valves, the main valve component can be applied for pressure, directional and throttle functions or a combination of these functions. The special economical structural designs can be achieved by matching the size of various flows of the valves and the actuators. If the main valve component can undertake more than one function, the special economical structure can be achieved.

### Directional function

The 2-way logic cartridge valves generally consist of control cover (1) and cartridge element (2). The control cover contains control holes, optional stroke limitation according to function, hydraulic control directional seat valve or shuttle valve. In addition, the directional spool valve or directional seat valve can be installed onto the control cover. The cartridge element mainly includes valve sleeve (3), adjustment ring (4) (only applicable to size 32), seat valve (5), optional damping (7) and reset spring (8).

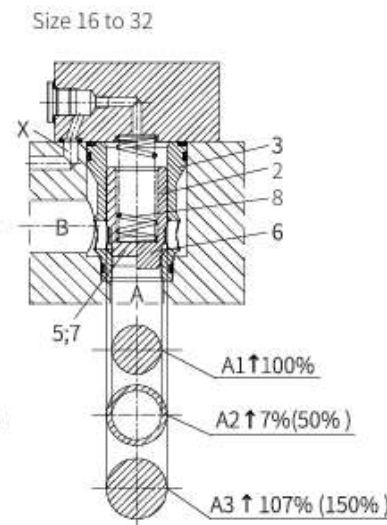
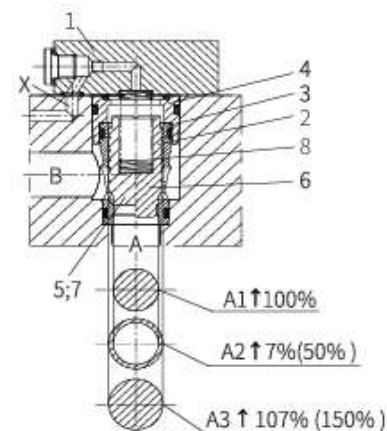
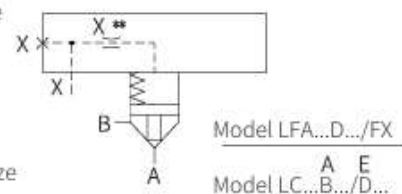
### Function

The function of 2-way logic cartridge valves depends on the pressure. Therefore, there are three important pressure-bearing areas A1, A2, A3 for actuation of the valve. The area of the valve seat A1 is taken as 100%. Depending on the type, the annulus area A2 is 7% or 50% of the area A1. Therefore, the area ratio A1:A2 is either 14.3:1 or 2:1. The area A3 is equal to A1+A2. Due to the different area ratios A1:A2, the annulus area A2 is also different. The area A3 may be 107% or 150% when 100% area at seat A1.

### Basic application

The areas A1 and A2 are operated in the opening direction. The area A3 and the spring are operated in the closing direction. The effective direction generated by the combination of the opening and closing directions determines the position of the spool of the 2-way logic cartridge valve.

The oil can flow from A to B or B to A through the 2-way logic cartridge valve. When the area A3 is compressed by the pilot oil of channel B or external pilot oil supply, the channel A is closed without leakage."



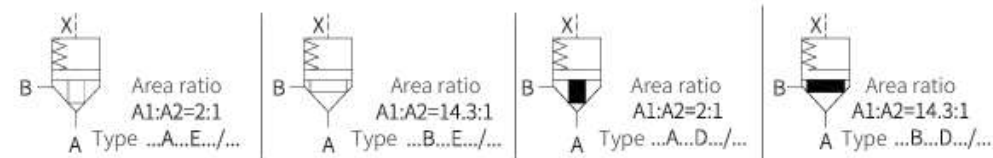
## Logic cartridge valves models and specifications

|                                        |     |  |  |  |  |     |   |                                                                                     |
|----------------------------------------|-----|--|--|--|--|-----|---|-------------------------------------------------------------------------------------|
| LC                                     |     |  |  |  |  | TX  | J |                                                                                     |
| logic cartridge valve                  |     |  |  |  |  |     |   | sealing material<br>No code= NBR seals<br>V= FKM seals<br>(consult for other seals) |
| size 16                                | =16 |  |  |  |  | J=  |   | Rekith                                                                              |
| size 25                                | =25 |  |  |  |  |     |   |                                                                                     |
| size 32                                | =32 |  |  |  |  |     |   |                                                                                     |
| size 40                                | =40 |  |  |  |  |     |   |                                                                                     |
| size 50                                | =50 |  |  |  |  |     |   |                                                                                     |
| size 63                                | =63 |  |  |  |  |     |   |                                                                                     |
| area ratio 2:1<br>(annulus area=50%)   | =A  |  |  |  |  |     |   |                                                                                     |
| area ratio 14.3:1<br>(annulus area=7%) | =B  |  |  |  |  |     |   |                                                                                     |
|                                        |     |  |  |  |  | TX= |   | 70 to 79 series<br>(70 to 79 series installation and<br>connection size unchanged)  |
|                                        |     |  |  |  |  | E=  |   | valve spool without damping nose                                                    |
|                                        |     |  |  |  |  | D=  |   | valve spool with damping nose                                                       |
|                                        |     |  |  |  |  | 00= |   | cracking pressure approx. 0 MPa (without spring)                                    |
|                                        |     |  |  |  |  | 05= |   | cracking pressure approx. 0.05 MPa                                                  |
|                                        |     |  |  |  |  | 10= |   | cracking pressure approx. 0.1 MPa                                                   |
|                                        |     |  |  |  |  | 20= |   | cracking pressure approx. 0.2 MPa                                                   |
|                                        |     |  |  |  |  | 40= |   | cracking pressure approx. 0.4 MPa                                                   |

## Logic cartridge valves functional symbols

Valve spool without damping nose

Valve spool with damping nose



## Technical parameters

|                                   |                           |       |                                                                                          |
|-----------------------------------|---------------------------|-------|------------------------------------------------------------------------------------------|
| Maximum working pressure          | without directional valve | bar   | 420                                                                                      |
|                                   | port A, B, X, Z1, Z2      | bar   | 315;350; 420 (dependent on the attached directional valve)                               |
|                                   | port Y                    | bar   | Depending on the return oil pressure of the directional valve                            |
| Pressure medium                   |                           |       | Mineral oil - for NBR seal or FKM seal<br>Phosphate ester - for FKM seal                 |
| Pressure medium temperature range |                           | °C    | -30 to +80 (NBR seal)<br>-20 to +80 (FKM seal)                                           |
| Viscosity range                   |                           | mm²/s | 2.8 to 380                                                                               |
| Cleanliness of oil                |                           |       | The maximum allowable pollution level of oil is ISO4406 Class 20 / 18 / 15 <sup>1)</sup> |

<sup>1)</sup>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.

## Technical parameters

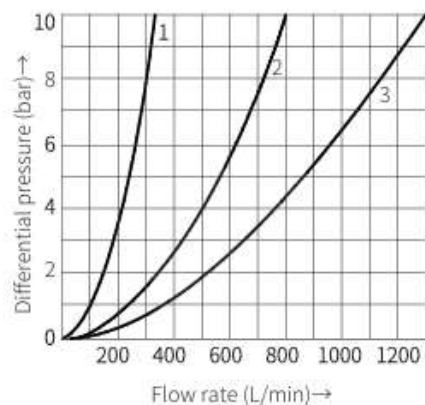
2-way logic cartridge valves-directional function

| Area                                         |                 | Model                     | Size |      |       |       |       |       |
|----------------------------------------------|-----------------|---------------------------|------|------|-------|-------|-------|-------|
|                                              |                 |                           | 16   | 25   | 32    | 40    | 50    | 63    |
| A1                                           | cm <sup>2</sup> | LC..A..                   | 1.89 | 4.26 | 6.79  | 11.1  | 19.63 | 30.2  |
|                                              |                 | LC..B..                   | 2.66 | 5.73 | 9.51  | 15.55 | 26.42 | 41.28 |
| A2                                           | cm <sup>2</sup> | LC..A..                   | 0.95 | 1.89 | 3.39  | 5.52  | 8.64  | 14    |
|                                              |                 | LC..B..                   | 0.18 | 0.43 | 0.67  | 1.07  | 1.85  | 2.90  |
| A3                                           | cm <sup>2</sup> | LC..A..                   | 2.84 | 6.16 | 10.18 | 16.62 | 28.27 | 44.2  |
|                                              |                 | LC..B..                   | 2.84 | 6.16 | 10.18 | 16.62 | 28.27 | 44.2  |
| Stroke                                       | cm              | LC..E..                   | 0.9  | 1.17 | 1.4   | 1.7   | 2.1   | 2.3   |
|                                              |                 | LC..D..                   | 0.9  | 1.17 | 1.4   | 1.9   | 2.3   | 2.8   |
| Pilot volume                                 | cm <sup>3</sup> | LC..E..                   | 2.56 | 7.21 | 14.3  | 28.3  | 59.4  | 102   |
|                                              |                 | LC..D..                   | 2.56 | 7.21 | 14.3  | 31.6  | 65.0  | 124   |
| Theoretical pilot Flow <sup>1)</sup> (L/min) |                 | LC..E..                   | 15.4 | 43.3 | 86    | 170   | 356   | 612   |
|                                              |                 | LC..D..                   | 15.4 | 43.3 | 86    | 190   | 390   | 744   |
| Weight                                       | kg              | Logic cartridge valves LC | 0.25 | 0.5  | 1.1   | 1.9   | 3.9   | 7.2   |
| Cracking pressure bar                        |                 | LC..A 00..                | 0.02 | 0.02 | 0.05  | 0.05  | 0.05  | 0.07  |
|                                              |                 | LC..A 05..                | 0.35 | 0.35 | 0.36  | 0.35  | 0.37  | 0.31  |
|                                              |                 | LC..A 10..                | 0.70 | 0.68 | 0.72  | 0.71  | 0.67  | 0.64  |
|                                              |                 | LC..A 20..                | 2.03 | 2.18 | 2.12  | 2.02  | 2.01  | 2     |
|                                              |                 | LC..A 30..                | —    | —    | —     | —     | —     | —     |
| Direction of flow A to B                     |                 | LC..A 40..                | 3.50 | 3.90 | 3.80  | 4.0   | 4.11  | 3.8   |
|                                              |                 | LC..B 00..                | 0.01 | 0.02 | 0.04  | 0.04  | 0.04  | 0.05  |
|                                              |                 | LC..B 05..                | 0.25 | 0.26 | 0.26  | 0.25  | 0.28  | 0.23  |
|                                              |                 | LC..B 10..                | 0.49 | 0.50 | 0.51  | 0.51  | 0.48  | 0.47  |
|                                              |                 | LC..B 20..                | 1.44 | 1.62 | 1.52  | 1.44  | 1.5   | 1.5   |
| Cracking pressure bar                        |                 | LC..B 30..                | —    | —    | —     | —     | —     | —     |
|                                              |                 | LC..B 40..                | 2.48 | 2.90 | 2.70  | 2.86  | 3.05  | 2.8   |
|                                              |                 | LC..A 00..                | 0.04 | 0.05 | 0.1   | 0.1   | 0.1   | 0.14  |
|                                              |                 | LC..A 05..                | 0.69 | 0.78 | 0.72  | 0.7   | 0.84  | 0.68  |
|                                              |                 | LC..A 10..                | 1.38 | 1.53 | 1.42  | 1.43  | 1.47  | 1.37  |
| Direction of flow B to A                     |                 | LC..A 20..                | 4.05 | 4.91 | 4.25  | 4.06  | 4.57  | 4.33  |
|                                              |                 | LC..A 30..                | —    | —    | —     | —     | —     | —     |
|                                              |                 | LC..A 40..                | 6.96 | 8.74 | 7.6   | 8.05  | 9.34  | 8.15  |
|                                              |                 | LC..B 00..                | 0.24 | 0.25 | 0.5   | 0.5   | 0.5   | 0.8   |
|                                              |                 | LC..B 05..                | 3.69 | 3.4  | 3.64  | 3.64  | 3.95  | 3.27  |
| Cracking pressure bar                        |                 | LC..B 10..                | 7.43 | 6.69 | 7.24  | 7.37  | 6.88  | 6.62  |
|                                              |                 | LC..B 20..                | 21.3 | 21.5 | 21.6  | 20.9  | 21.4  | 20.9  |
|                                              |                 | LC..B 30..                | —    | —    | —     | —     | —     | —     |
|                                              |                 | LC..B 40..                | 36.6 | 38.3 | 38.6  | 41.5  | 43.6  | 39.4  |

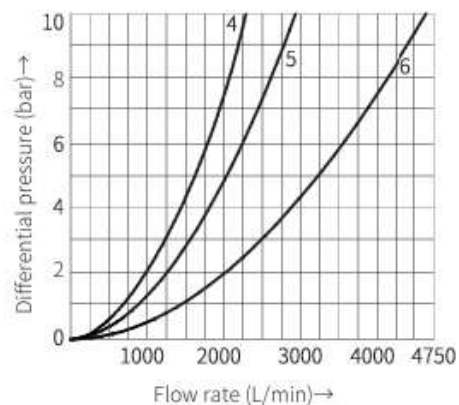
## Characteristic curve

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

Without damping nose

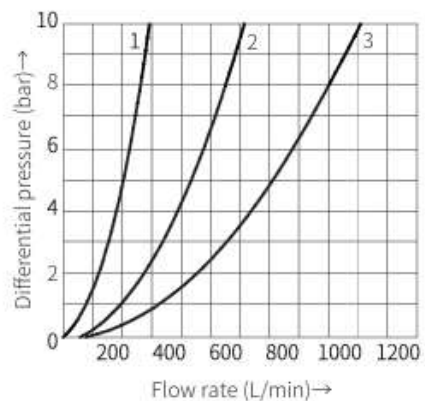


1 Size 16  
2 Size 25  
3 Size 32

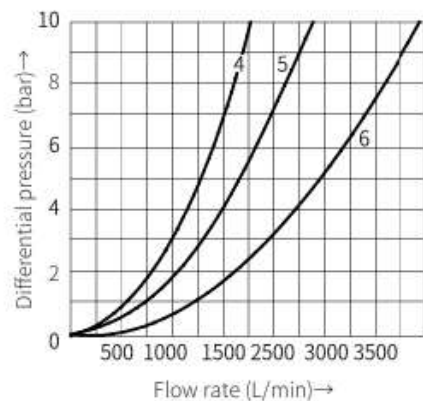


4 Size 40  
5 Size 50  
6 Size 63

With damping nose

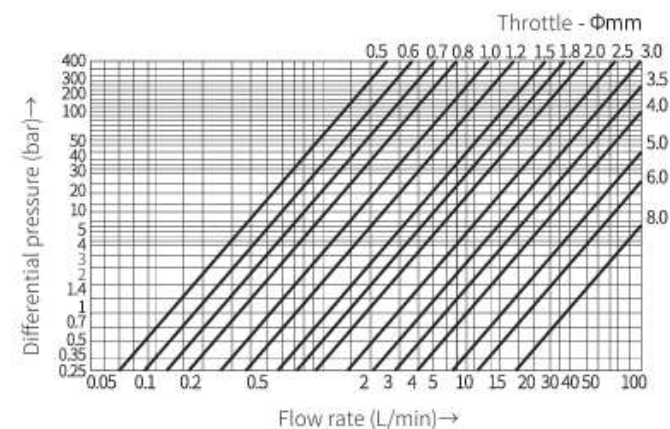


1 Size 16  
2 Size 25  
3 Size 32



4 Size 40  
5 Size 50  
6 Size 63

## Characteristic curve for throttle selection



| Thread | Throttle - $\Phi$ mm |
|--------|----------------------|
| ZM6    | 0.5 to 3.0           |
| ZM8    | 0.5 to 4.0           |
| R3/8   | 0.8 to 6.0           |
| R1/2   | 1.0 to 8.0           |

## Ordering code for throttle

| Nominal size | Thread   |           | Ordering code     |                   |                  |                  |
|--------------|----------|-----------|-------------------|-------------------|------------------|------------------|
|              | Throttle | $\Phi$ mm | ZM6               | ZM8               | R3/8             | R3/8             |
|              | 0.5      |           | ZM6×1- $\Phi$ 0.5 | ZM8×1- $\Phi$ 0.5 | —                | —                |
|              | 0.6      |           | ZM6×1- $\Phi$ 0.6 | ZM8×1- $\Phi$ 0.6 | —                | —                |
|              | 0.7      |           | ZM6×1- $\Phi$ 0.7 | ZM8×1- $\Phi$ 0.7 | —                | —                |
| 16           | 0.8      |           | ZM6×1- $\Phi$ 0.8 | ZM8×1- $\Phi$ 0.8 | R3/8- $\Phi$ 0.8 | —                |
| 25           | 1        |           | ZM6×1- $\Phi$ 1.0 | ZM8×1- $\Phi$ 1.0 | R3/8- $\Phi$ 1.0 | R1/2- $\Phi$ 1.0 |
| 32           | 1.2      |           | ZM6×1- $\Phi$ 1.2 | ZM8×1- $\Phi$ 1.2 | R3/8- $\Phi$ 1.2 | R1/2- $\Phi$ 1.2 |
| 40           | 1.5      |           | ZM6×1- $\Phi$ 1.5 | ZM8×1- $\Phi$ 1.5 | R3/8- $\Phi$ 1.5 | R1/2- $\Phi$ 1.5 |
| 50           | 1.8      |           | ZM6×1- $\Phi$ 1.8 | ZM8×1- $\Phi$ 1.8 | R3/8- $\Phi$ 1.8 | R1/2- $\Phi$ 1.8 |
| 63           | 2        |           | ZM6×1- $\Phi$ 2.0 | ZM8×1- $\Phi$ 2.0 | R3/8- $\Phi$ 2.0 | R1/2- $\Phi$ 2.0 |
|              | 2.5      |           | ZM6×1- $\Phi$ 2.5 | ZM8×1- $\Phi$ 2.5 | R3/8- $\Phi$ 2.5 | R1/2- $\Phi$ 2.5 |
|              | 3        |           | ZM6×1- $\Phi$ 3.0 | ZM8×1- $\Phi$ 3.0 | R3/8- $\Phi$ 3.0 | R1/2- $\Phi$ 3.0 |
|              | 3.5      |           | —                 | ZM8×1- $\Phi$ 3.5 | R3/8- $\Phi$ 3.5 | R1/2- $\Phi$ 3.5 |
|              | 4        |           | —                 | ZM8×1- $\Phi$ 4.0 | R3/8- $\Phi$ 4.0 | R1/2- $\Phi$ 4.0 |
|              | 5        |           | —                 | —                 | R3/8- $\Phi$ 5.0 | R1/2- $\Phi$ 5.0 |
|              | 6        |           | —                 | —                 | R3/8- $\Phi$ 6.0 | R1/2- $\Phi$ 6.0 |
|              | 8        |           | —                 | —                 | —                | R1/2- $\Phi$ 8.0 |