

LC

2-way cartridge valves - directional function
Size 16 to 100
Max. pressure up to 420 bar
Max. flow up to 25000L/min



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Features

- Valve poppet with or without damping nose 2 area ratios
- 4 different control spring options
- 4 stroke limiting options
- Control cover with built-in poppet valve
- Control cover with built-in shuttle valve
- Control cover for mounting directional spool valves with or without built-in shuttle valve
- Control cover for mounting directional poppet valves with or without built-in shuttle valve



Description

2 way cartridge valves are designed as inserts for compact manifold control blocks. The "logic" cartridge with ports A and B is installed within a cavity with dimensions conforming to DIN ISO 7368. A cover is mounted above the insert which functions as a seal and control interface for the valve poppet. Dependent on type of cover and optional pilot valve, the cartridge valve can perform directional, throttle, pressure or combinations of these functions. The circuit designer can select type and size of cartridge valve with respect to given flows within an application. An economical use of space, reduction of external fluid connections can be achieved via logic systems.

Directional Function

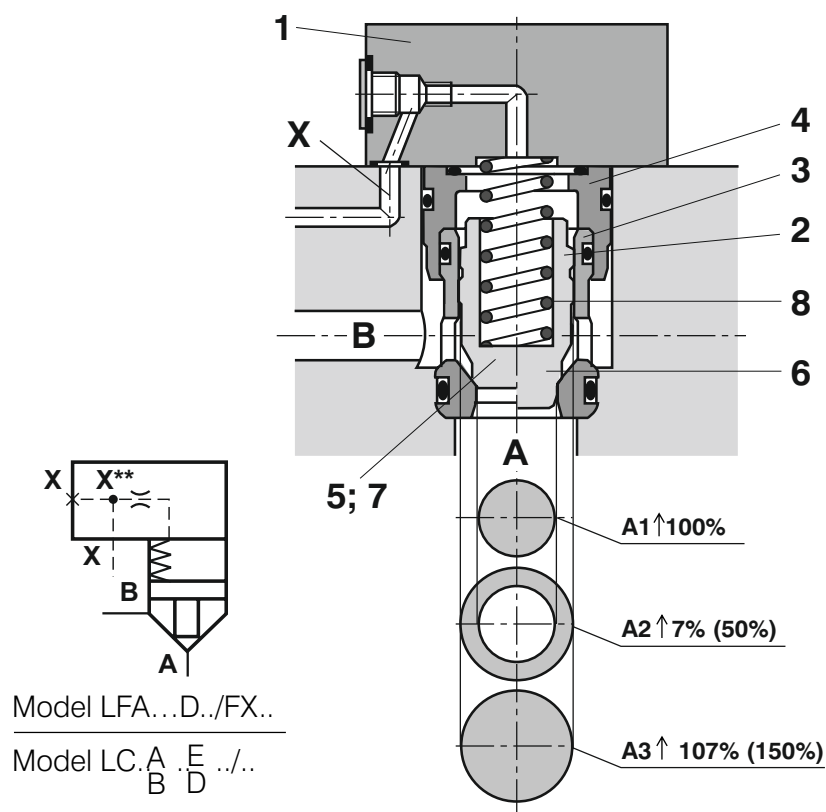
2 way cartridge valves consists basically of the cover (LFA...)...(1) and insert (LC...)...(2). The cover contains the control drillings, orifices, shuttles, and external directional valves as determined on specific model types. Stroke limiting functions and directional valve pilot functions are also available for throttling and/or switching functions. The insert (2) includes a bushing (3)..cap (4), sizes 16 ... 32, and a poppet (5). The poppet (5) may include a dampening nose (6) or not (7). The control spring (8) provides a biasing force to close the poppet as forces $A_1 + A_2$ corresponds $X = A_3$.

Function

2 way cartridge valves are similar to check valves where a biasing spring tries to hold a poppet closed against a flow stream until sufficient forces exist to open the poppet. THM defines area A_1 as 100%. The annulus at "B", area A_2 , can be either 7% or 50% dependent on model selected. An area ratio between $A_1 : A_2$ can be either 2:1 or 14.3:1. Area A_3 is the sum of A_1 and A_2 and is piloted from the source "x". The pilot signal can originate from "A", "B" or other external source. Since $A_1 + A_2$ equals A_3 , the biasing spring is necessary to close the poppet in the event all hydraulic forces are balanced.

Basically:

Pressure upon areas A_1 and A_2 open the valve. Pressure upon area A_3 plus the spring close the valve. The resultant force (of opening and closing forces) determines the spool position (5; 7) of the 2-way cartridge valve. 2-way cartridge valves may flow A to B or B to A. When the pilot oil for area A_3 is obtained from port B external port A is closed, leak free.



Series 7X

$$= 16$$
$$= 25$$
$$= 32$$

Nominal size 40

$$= 40$$
$$= 50$$
$$= 63$$
$$= 80$$
$$= 100$$
$$= A$$
$$= B$$
$$= 00$$

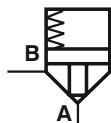
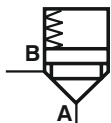
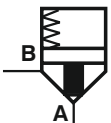
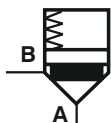
= 05

$$= 10$$
$$= 20$$
$$= 30$$
$$= 40$$
$$= E$$
$$= D$$
$$= 7X$$
$$= 6X$$

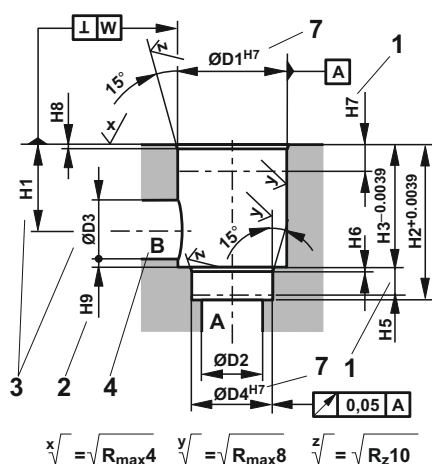
= no code

$$= V$$

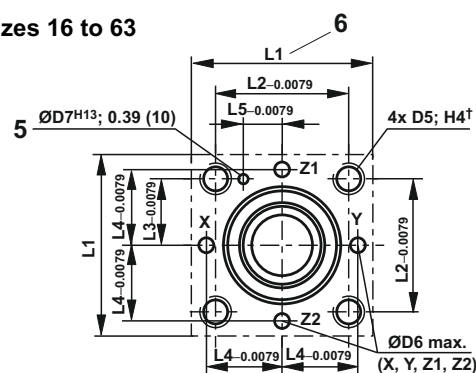
Symbols

Without damping nose		With damping nose	
 Area ratio A1 : A2 = 2 : 1 Version ...A..E../...	 Area ratio A1 : A2 = 14.3 : 1 Version ...B..E../...	 Area ratio A1 : A2 = 2 : 1 Version ...A..D../...	 Area ratio A1 : A2 = 14.3 : 1 Version ...B..D../...

Installation Dimensions

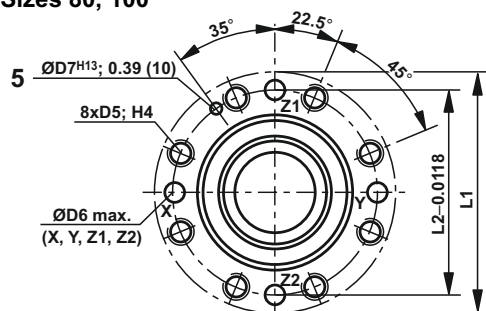


Sizes 16 to 63

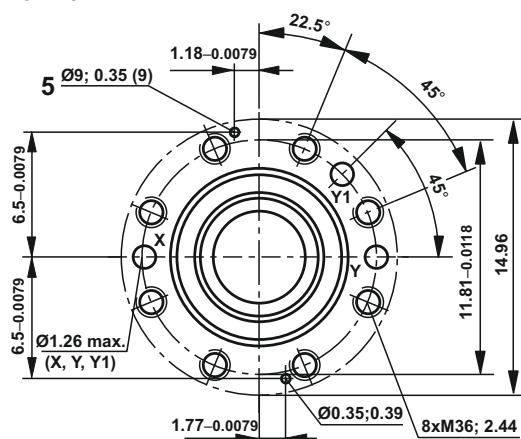


- Depth of fit
- Reference dimension
- For diameters of port B other than ØD3 or (ØD3*), the distance from the cover mounting surface to center of the port must be calculated.
- Port B may be moved about the central axis of port A.
- However, care must be taken that the mounting holes and control holes are not damaged.
- Locating pin holes
- Note on porting pattern size 1 Length L1 (holes on x-y axis) is 3.15 inches in control covers with built on directional valve.
- With $\varnothing \leq 1.77$ inches $\rightarrow$ fit $+0.0154$ permissible

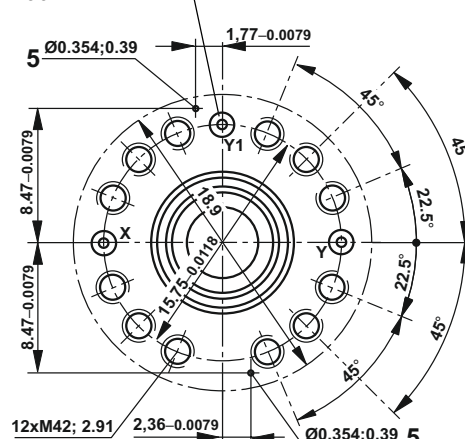
Sizes 80, 100



Size 125



Size 160





Dimensions in mm

Size	16	25	32	40	50	63	80	100
ØD1	32	45	60	75	90	120	145	180
ØD2	16	25	32	40	50	63	80	100
ØD3	16	25	32	40	50	63	80	100
(ØD3*)	25	32	40	50	63	80	100	125
ØD4	25	34	45	55	68	90	110	135
ØD5	M8	M12	M16	M20	M20	M30	M24	M30
ØD6 ¹⁾	4	6	8	10	10	12	16	20
ØD7 ^{H13}	4	6	6	6	8	8	10	10
H1	34	44	52	64	72	95	130	155
(H1*)	29.5	40.5	48	59	65.5	86.5	120	142
H2	56	72	85	105	122	155	205	245
H3	43	58	70	87	100	130	175 ^{-0.2}	210 ^{-0.2}
H4	20	25	35	45	45	65	50	63
H5	11	12	13	15	17	20	25	29
H6	2	2.5	2.5	3	3	4	5	5
H7	20	30	30	30	35	40	40	50
H8	2	2.5	2.5	3	4	4	5	5
H9	0.5	1	1.5	2.5	2.5	3	4.5	4.5
L1	65/80	85	102	125	140	180	250	300
L2	46	58	70	85	100	125	200	245
L3	23	29	35	42.5	50	62.5	-	-
L4	25	33	41	50	58	75	-	-
L5	10.5	16	17	23	30	38	-	-
W	0.05	0.05	0.1	0.1	0.1	0.2	0.2	0.2

1) max. dim.

Technical data

Pressure fluid 1) suitable for NBR and FPM seals 2) only suitable for FPM seals	Mineral oil (HL, HLP) to DIN 51 524 ¹⁾ Fast bio-degradable pressure fluids to VDMA 24 568 HETG ¹⁾ ; HEPG (polyglycol) ²⁾ ; HEES (synthetic ester) ²⁾ ; other fluids on request
Pressure fluid temperature range	-20 to +80
Viscosity range	2.8 to 380
Degree of contamination	Maximum permissible degree of contamination of the fluid is to NAS 1638 class 9. Therefore, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.
Max. operating pressure for connection A, B, X, Z1, Z2	420 (without built-on directional valve) 315 / 350 / 420 : p_{max} of the built-on directional spool valve max 420 p_{max} of the built-on directional poppet valve
Operating pressure for connections Y	Dependant to the tank pressure of the pilot valve



Technical data

2-way cartridge valve - directional function

Nominal size		16	25	32	40	50	63	80	100
Area A1 in cm ²	LC..A..	1.89	4.26	6.79	9.24	16.6	22.9	37.9	63.6
	LC..B..	2.66	5.73	9.51	12.95	22.9	32.2	52.8	89.1
Area A2 in cm ²	LC..A..	0.95	1.89	3.39	4.61	8.03	11.3	18.84	31.4
	LC..B..	0.18	0.43	0.67	0.9	1.73	2	3.94	5.9
Area A3 in cm ²	LC..A.., LC..B..	2.84	6.16	10.18	13.85	24.63	34.2	56.74	95
Stroke in cm	LC..E..	0.9	1.17	1.4	1.2	1.6	1.9	2.4	3
	LC..D..	0.9	1.17	1.4	1.6	2	2.4	3	3.8
Control volume in cm ³	LC..E..	2.56	7.21	14.3	16.6	39.4	65	136	285
	LC..D..	2.56	7.21	14.3	22.2	49.3	82	170	361
Theoretical pilot flow at a switching time of 10 ms in l/min	LC..E..	15.4	43.3	86	100	236	390	816	1710
	LC..D..	15.4	43.3	86	133	296	492	1020	2166
Weight in kg	Cartridge valve	0.25	0.5	1.1	1.8	3.8	7	13	27
	Control cover	12	2.3	4	7.4	10.5	21	27	42
Cracking pressure in bar Direction of flow A to B	LC..A 00..	0.02	0.025	0.05	0.05	0.05	0.07	0.07	0.1
	LC..A 05..	0.35	0.35	0.36	0.43	0.45	0.42	0.44	0.43
	LC..A 10..	0.7	0.68	0.72	0.87	0.87	0.85	0.88	0.88
	LC..A 20..	2.03	2.18	2.12	1.73	1.74	1.7	1.75	1.75
	LC..A 30..	-	-	-	-	-	-	-	-
	LC..A 40..	3.5	3.9	3.8	3.49	3.35	3.32	3.13	3.04
	LC..B 00..	0.014	0.02	0.035	0.035	0.035	0.05	0.05	0.07
	LC..B 05..	0.25	0.26	0.26	0.31	0.32	0.3	0.31	0.31
	LC..B 10..	0.49	0.5	0.5	0.62	0.63	0.61	0.63	0.63
	LC..B 20..	1.44	1.62	1.62	1.24	1.26	1.21	1.26	1.25
	LC..B 30..	-	-	-	-	-	-	-	-
	LC..B 40..	2.48	2.9	2.7	2.5	2.43	2.36	2.25	2.17
Direction of flow B to A	LC..A 00..	0.04	0.05	0.1	0.1	0.1	0.14	0.14	0.2
	LC..A 05..	0.69	0.78	0.72	0.86	0.93	0.85	0.88	0.88
	LC..A 10..	1.38	1.53	1.42	1.74	1.8	1.73	1.77	1.78
	LC..A 20..	4.05	4.91	4.25	3.46	3.6	3.44	3.53	3.54
	LC..A 30..	-	-	-	-	-	-	-	-
	LC..A 40..	6.96	8.74	7.6	7	6.9	6.7	6.3	6.2
	LC..B 00..	0.24	0.25	0.5	0.5	0.5	0.8	0.7	1
	LC..B 05..	3.69	3.4	3.64	4.1	4.3	4.7	4.2	4.6
	LC..B 10..	7.43	6.69	7.24	8.2	8.4	9.6	8.4	9.4
	LC..B 20..	21.3	21.5	21.6	16.4	16.7	19	16.9	18.7
	LC..B 30..	-	-	-	-	-	-	-	-
	LC..B 40..	36.6	38.3	38.6	33.2	32.2	37	30.2	32.5

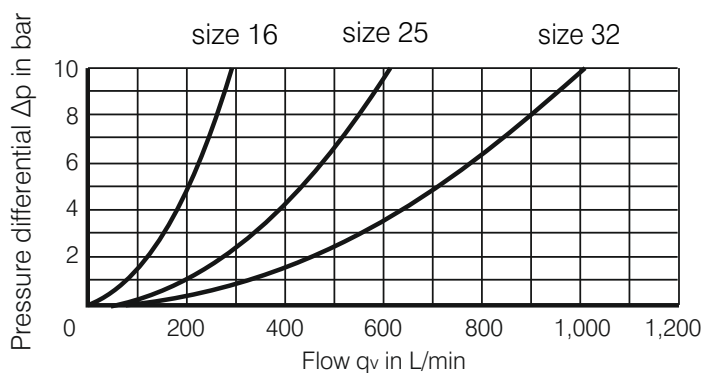


Performance curves

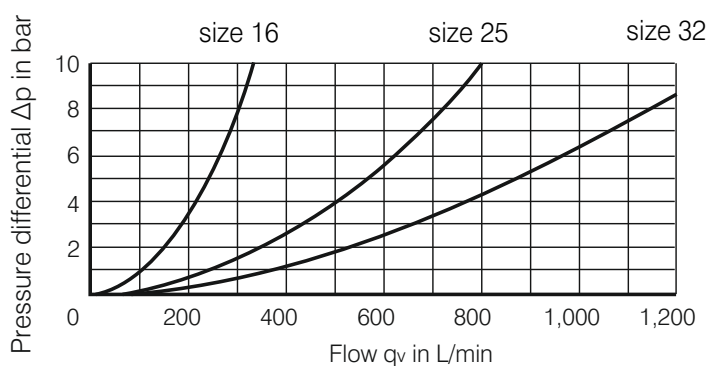
Measured at $n = 190 \text{ SUS}$ ($41 \text{ mm}^2/\text{s}$) and $t = 122^\circ \text{F}$ (50°C)

Directional valve function

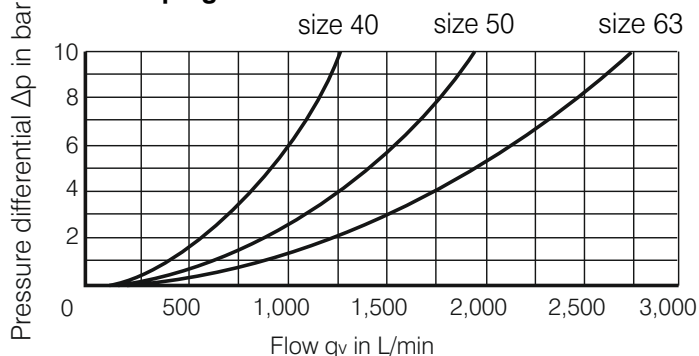
With damping nose



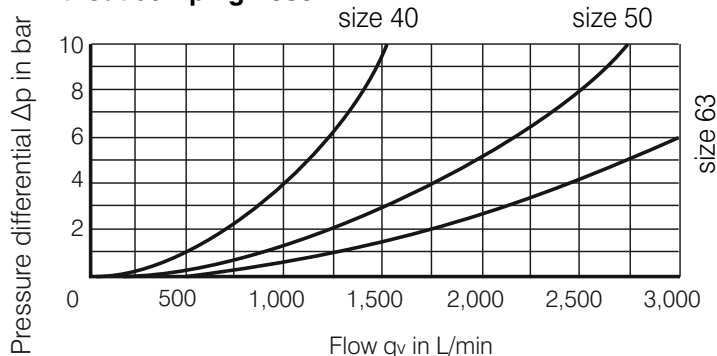
Without damping nose



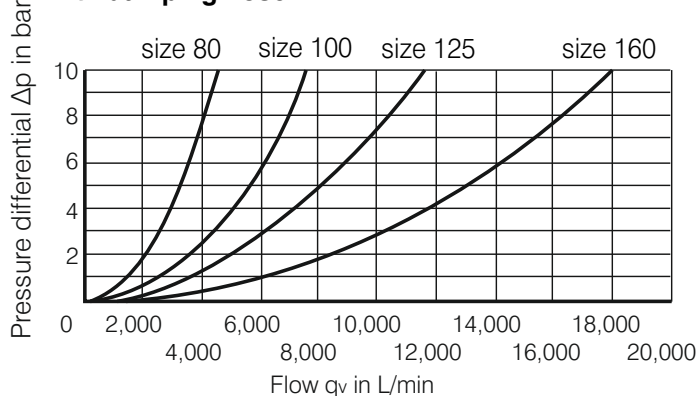
With damping nose



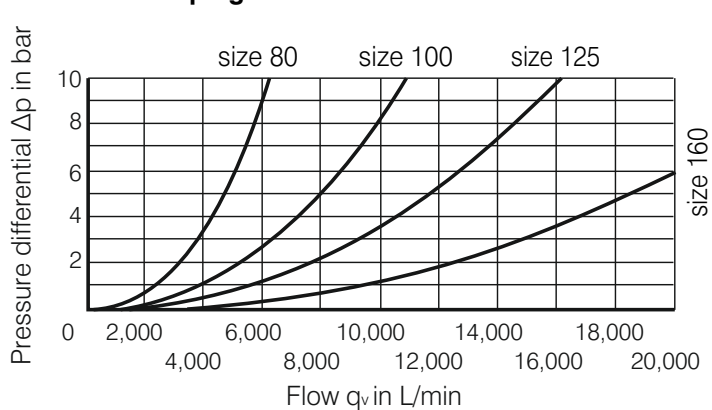
Without damping nose



With damping nose



Without damping nose





Seal kits for cartridge valves

Seal kit for	UID	
	NBR	FPM
LC 16..7X/..	T016001001	T016001002
LC 25..7X/..	T025001001	T025001002
LC 32..7X/..	T032001001	T032001002
LC 40..6X/..	T040002001	T040002002
LC 50..6X/..	T050002001	T050002002
LC 63..6X/..	T063002001	T063002002
LC 80..6X/..	T080002001	T080002002
LC 100..6X/..	T100002001	T100002002

Compression springs for cartridge valves

(Dimensions in mm)

Size	Model	Spring dimensions in mm	UID
16	LC 16*05**7X	10.5 / 0.8 x 42 / 7	T016051001
	LC 16*10**7X	10.5 / 1 x 42 / 8.5	T016101011
	LC 16*20**7X	10.2 / 1.3 x 40.5 / 8	T16201021
	LC 16*40**7X	10 / 1.6 x 38.2 / 9	T016401031
25	LC 25*05**7X	16 / 1.4 x 61 / 10.5	T025052001
	LC 25*10**7X	15.8 / 1.6 x 61 / 9.5	T025102011
	LC 25*20**7X	15.3 / 2.25 x 55 / 8	T025202021
	LC 25*40**7X	14.9 / 2.7 x 53.4 / 8.5	T025402031
32	LC 32*05**7X	20.5 / 1.8 x 79 / 11.5	T032053001
	LC 32*10**7X	20 / 2 x 79 / 9.5	T032103011
	LC 32*20**7X	19.6 / 2.8 x 69.5 / 7.5	T032203021
	LC 32*40**7X	19.2 / 3.2 x 71 / 8.5	T032403031
40	LC 40*05**6X	27.5 / 2.5 x 108 / 13.5	T040054001
	LC 40*10**6X	27.5 / 2.8 x 108 / 10.5	T040104011
	LC 40*20**6X	27 / 3.2 x 108 / 9.5	T040204021
	LC 40*40**6X	26 / 4 x 104 / 11	T040404031
50	LC 50*05**6X	36 / 3.2 x 130 / 10.5	T050055001
	LC 50*10**6X	35.5 / 3.6 x 130 / 9	T050105011
	LC 50*20**6X	34.5 / 4.5 x 130 / 12	T050205021
	LC 50*40**6X	33.5 / 5.6 x 117 / 10	T050405031
63	LC 63*05**6X	43.5 / 3.6 x 165 / 9	T063056001
	LC 63*10**6X	43 / 4 x 165 / 7	T063106011
	LC 63*20**6X	42 / 5 x 164 / 9	T063206021
	LC 63*40**6X	40.5 / 6.3 x 158 / 11	T063406031
80	LC 80*05**6X	57 / 5 x 200 / 10.5	T080057001
	LC 80*10**6X	56.5 / 5.6 x 200 / 8.5	T080107011
	LC 80*20**6X	55 / 7 x 201 / 11.5	T080207021
	LC 80*40**6X	53 / 9 x 176 / 10	T080407031
100	LC 100*05**6X	74 / 7 x 250 / 14	T100058001
	LC 100*10**6X	73 / 8 x 251 / 12.5	T100108011
	LC 100*20**6X	72 / 9 x 251 / 10.5	T100208021
	LC 100*40**6X	69 / 11.5 x 222 / 10	T100408031

*A or B; **E or D

