

2-way cartridge valves- directional function

Cartridge valves type LC...

Control covers type LFA...

Nominal sizes 16 to 160

Series 2X; 6X; 7X

Maximum operating pressure 420 bar

Maximum flow 25000 L/min

Contents

Description	Page
Features	1
Cavity and porting pattern	2, 3
Function, section, symbol	4
Technical data	4
Cartridge valves type LC...:	
– Ordering details, symbols	5
– Technical data	6
– Characteristic curves	7
– Spare parts:	
• Seal kits and compression springs	7
Control covers type LFA...:	
– Ordering details	
• Type code	8
• Basic functions	9
– Orifices	10
– Pilot valves	11
– Spare parts:	
• Fixing screws	11
• Seal kits	12
• R-rings	12
Ordering details, symbols and unit dimensions of the control cover:	
– Type D	13
– Type H	14 to 15
– Type G	17, 18
– Types R; RF; R2	19, 20
– Types WEA; WEB	21 to 23
– Types WEMA; WEMB; WEA8; WEB8	24 to 26
– Types WECA; WEA9	27 to 29
– Types GWA; GWB	30 to 32
– Types KWA; KWB	33 to 35
– Type E	36
– Type EH2	37
– Types EWA; EWB	38 to 40
Inductive limit switch:	
– Electrical connections	41
– Plug-in connectors	41

H5591•



Control cover type LFA 25 WEA7X/...
with directional valve 4WE 6 D6X/EG24N9K4 and plug-in connector

H5455•



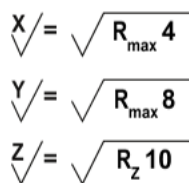
Cartridge valve type LC 25 A40E7X/...

Features

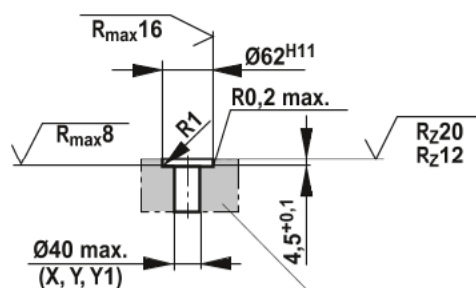
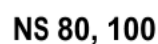
- Valve poppet with or without damping nose
- 2 area ratios
- 4 different springs
- 4 stroke limiters
- Control cover with built-in poppet valve
- Control cover with built-in shuttle valve
- Control cover for mounting directional spool valves with or without built-in shuttle valve
- Control cover for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

Further information:

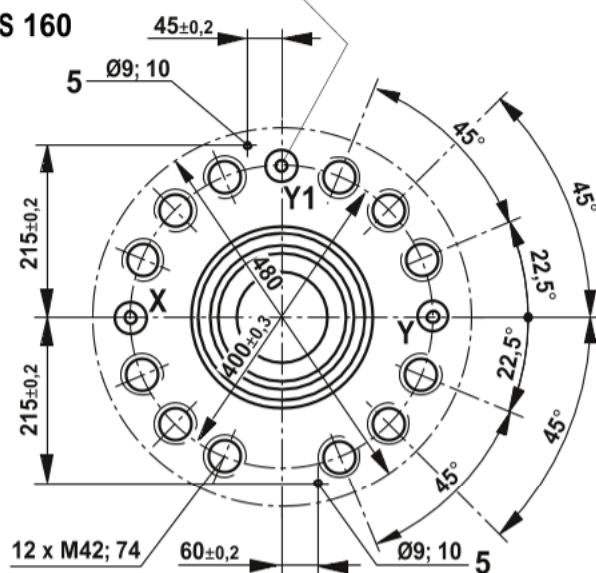
Pilot valves	Nom. size 6	Nom. size 10
Directional spool valve type WE	RE 23 178	RE 23 327
Directional poppet valve type SEW	RE 22 058	RE 22 075
Directional poppet valve type SED	RE 22 049	RE 22 045



NS 16 to 63



NS 160



Cavity and porting pattern to DIN ISO 7368 (with the exception of NS 125 and 160) (Dimensions in mm)

NS	16	25	32	40	50	63	80	100	125	160
ØD1	32	45	60	75	90	120	145	180	225	300
ØD2	16	25	32	40	50	63	80	100	150 ¹⁾	200 ¹⁾
ØD3	16	25	32	40	50	63	80	100	125	200
(ØD3*)	25	32	40	50	63	80	100	125	150	250 ¹⁾
ØD4	25	34	45	55	68	90	110	135	200	270
ØD5	M8	M12	M16	M20	M20	M30	M24	M30	–	–
ØD6 ¹⁾	4	6	8	10	10	12	16	20	–	–
ØD7	4	6	6	6	8	8	10	10	–	–
H1	34	44	52	64	72	95	130	155	192	268
(H1*)	29,5	40,5	48	59	65,5	86,5	120	142	180	243
H2	56	72	85	105	122	155	205	245	300 ^{+0,15}	425 ^{+0,15}
H3	43	58	70	87	100	130	175 ^{±0,2}	210 ^{±0,2}	257 ^{±0,5}	370 ^{±0,5}
H4	20	25	35	45	45	65	50	63	–	–
H5	11	12	13	15	17	20	25	29	31	45
H6	2	2,5	2,5	3	3	4	5	5	7 ^{±0,5}	8 ^{±0,5}
H7	20	30	30	30	35	40	40	50	40	50
H8	2	2,5	2,5	3	4	4	5	5	5,5 ^{±0,2}	5,5 ^{±0,2}
H9	0,5	1	1,5	2,5	2,5	3	4,5	4,5	2	2
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	0,2	0,2

¹⁾ Maximum dimension

- 1 Depth of fit
- 2 Reference dimension
- 3 For diameters of port B other than ØD3 or (ØD3*) the distance from the cover mounting surface to centre of the port must be calculated.
- 4 Port B may be moved about the central axis of port A. However, care must be taken that the fixing holes and control holes are not damaged.
- 5 Locating pin holes
- 6 **Note on porting pattern NS 16:** Length L1 (holes on x–y axis) is 80 mm in control covers with built-on directional valve.
- 7 With $\varnothing \leq 45$ mm → fit H8 permissible!

Function, section, symbol

2-way cartridge valves are designed as inserts for compact manifold control blocks. The main component with ports A and B fits into an installation cavity with dimensions to DIN ISO 7368 and is built into the control block and sealed with a cover. In most cases, the cover also acts as a connection between the control side of the main component and the pilot valves. By controlling the main valve with suitable pilot valves, the main component can assume pressure, directional or throttling functions, or a combination of these. Particularly economic designs can be achieved by matching the valve sizes to the varying flows required by the individual paths of an actuator. When the element on the main valve is able to assume more than one function, a particularly economic design can be achieved.

Directional function

2-way cartridge valves basically comprise of control cover (1) and cartridge element (2). The control cover contains the control drillings, and depending on the function required optionally a stroke limiter, a hydraulically controlled directional poppet valve or a shuttle valve. In addition, directional spool valves or directional poppet valves may be mounted onto the control cover. The cartridge element basically comprises of a bush (3), a ring (4) (only up to NS 32), a valve poppet (5), optionally with damping nose (6), or without damping nose (7), and closing spring (8).

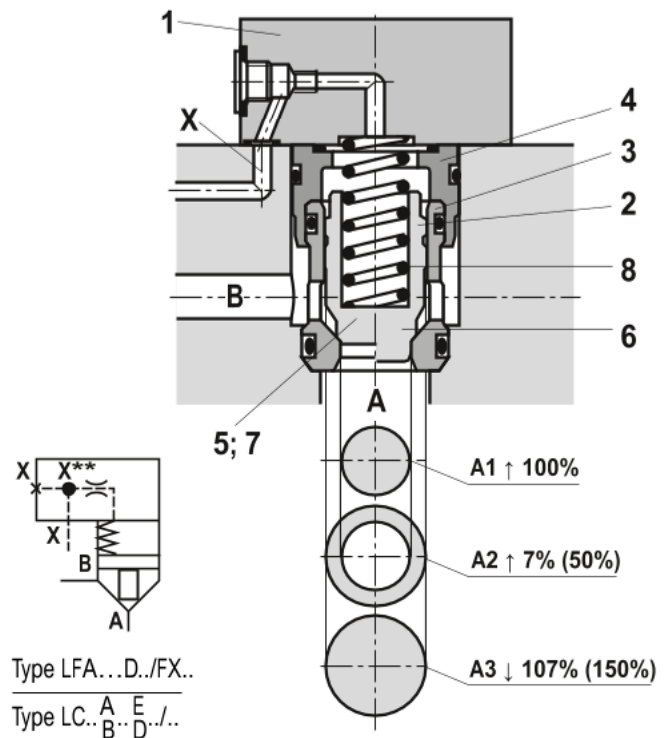
Function

2-way cartridge valves operate dependent on pressure. Hence for operation, there are three important pressurised areas: A1, A2, A3. The area on valve seat A1 is taken as 100 %. The annular area A2 is 7% or 50% of area A1 depending on the model. The area ratio A1 : A2 is, therefore either 14,3 : 1 or 2 : 1. Area A3 is equal to sum of areas A1 + A2. Due to the different area ratios A1 : A2 and consequently the different annulus area (A2), area A3 may on one occasion be 107 % and another occasion 150 % of the 100 % area at seat A1.

Basically the following applies:

Areas A1 and A2 operate to open the valve. Area A3 and the spring operates to close the valve. The effective direction of the resultant force (of opening and closing forces) determines the switched position of the 2-way cartridge valve.

2-way cartridge valves may have flow passed from A to B or from B to A. When area A3 is pressurised by obtaining pilot oil from port B or by an external pilot oil supply, port A is closed, leak-free.



Technical data (for applications outside these parameters, please consult us!)

Pressure fluid	Mineral oils (HL, HLP) to DIN 51 524 ¹⁾ ; Fast bio-degradable pressure fluids to VDMA 24 568 (also see RE 90 221); HETG (rape seed oil) ¹⁾ ; HEPG (polyglycole) ²⁾ ; HEES (synthetic ester) ²⁾ ; other fluids on request		
Pressure fluid temperature range	°C	– 20 to + 80	
Viscosity range	mm ² /s	2.8 to 380	
Degree of contamination	Maximum permissible degree of contamination of the fluid is to NAS 1638 class 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.		
Max. operating pressure	– Without directional valve	bar	420
	– Ports A, B, X, Z1, Z2	bar	315; 350; 420 (dependent on the built-on valve)
	– Port Y	bar	Corresponds to the tank pressure of the built-on valve

¹⁾ Suitable for NBR and FKM seals

²⁾ Only suitable for FKM seals

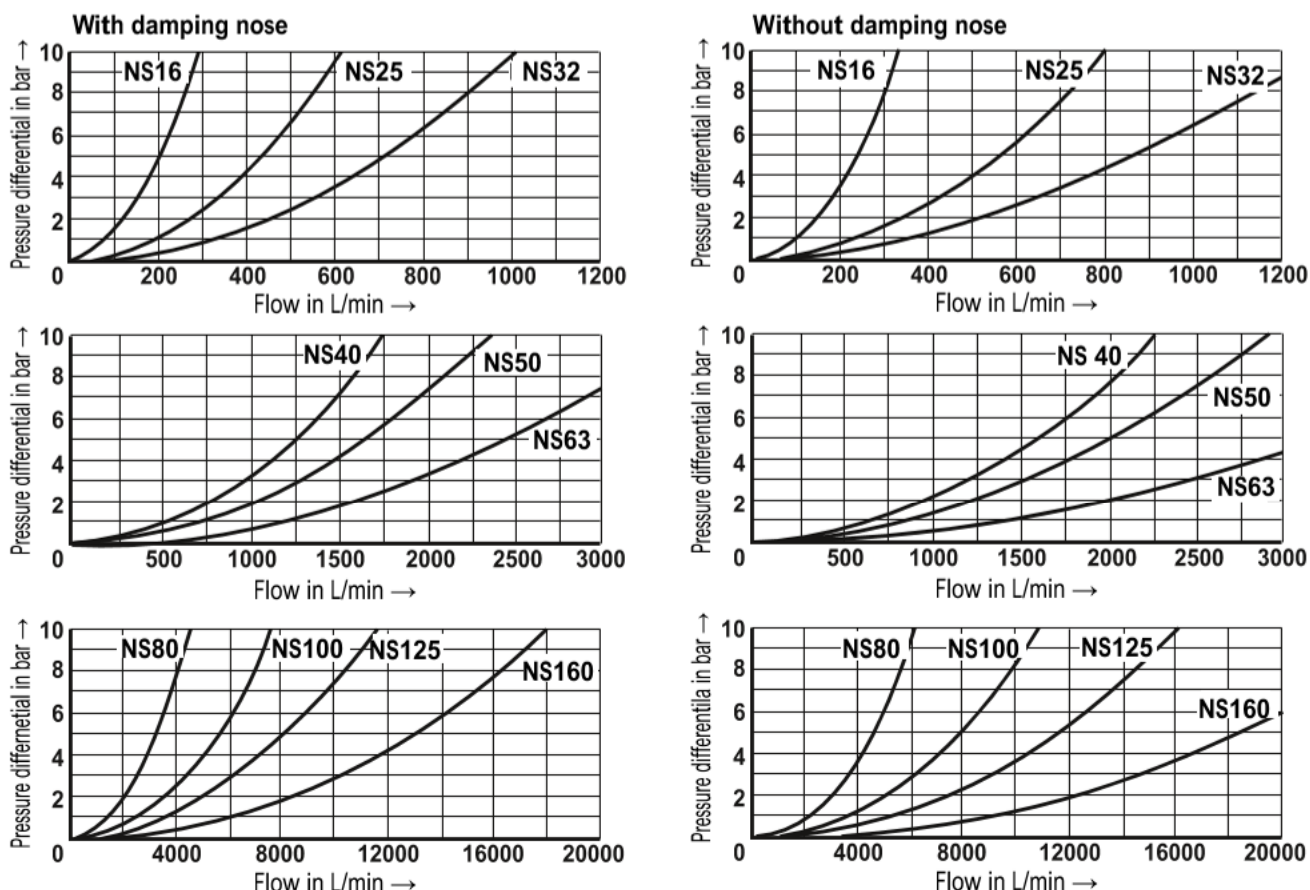
Preferred types and standard components are highlighted in the RPS (Rexroth Price list Standard).

Technical data (for applications outside these parameters, please consult us!)

2-way cartridge valve - directional function

		Nominal size									
		16	25	32	40	50	63	80	100	125	160
Area A1 in cm ²	LC..A..	1.89	4.26	6.79	11.1	19.63	30.2	37.9	63.6	95	160.6
	LC..B..	2.66	5.73	9.51	15.55	26.42	41.28	52.8	89.1	133.7	224.8
Area A2 in cm ²	LC..A..	0.95	1.89	3.39	5.52	8.64	14.0	18.84	31.4	48	79.9
	LC..B..	0.18	0.43	0.67	1.07	1.85	2.90	3.94	5.9	9.3	15.7
Area A3 in cm ²	LC..A..	2.84	6.16	10.18	16.62	28.27	44.2	56.74	95	143	240.5
	LC..B..	2.84	6.16	10.18	16.62	28.27	44.2	56.74	95	143	240.5
Stroke in cm	LC..E..	0.9	1.17	1.4	1.7	2.1	2.4	2.4	3.0	3.8	5.0
	LC..D..	0.9	1.17	1.4	1.9	2.3	2.8	3.0	3.8	4.8	6.5
Pilot volume in cm ³	LC..E..	2.56	7.21	14.3	28.3	59.4	106	136	285	544	1203
	LC..D..	2.56	7.21	14.3	31.6	65.0	124	170	361	687	1563
Theoretical pilot flow at a switching time of 10 ms in L/min	LC..E..	15.4	43.3	86	170	356	636	816	1710	3264	7218
	LC..D..	15.4	43.3	86	190	390	744	1020	2166	4122	9378
Weight in kg	Cartridge valve	0.25	0.5	1.1	1.9	3.9	7.2	13.0	27.0	44.0	75.0
	Control cover	1.2	2.3	4.0	7.4	10.5	21.0	27.0	42.0	80.0	150.0
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	0.15	0.15
	LC..A 05..	0.35	0.35	0.36	0.35	0.37	0.31	0.44	0.43	0.43	0.45
	LC..A 10..	0.70	0.68	0.72	0.71	0.67	0.64	0.88	0.88	0.88	–
	LC..A 20..	2.03	2.18	2.12	2.02	2.01	2.0	1.75	1.75	1.76	1.94
	LC..A 30..	–	–	–	–	–	–	–	–	2.05	–
	LC..A 40..	3.50	3.90	3.80	4.0	4.11	3.8	3.13	3.04	–	–
	LC..B 00..	0.014	0.02	0.035	0.035	0.035	0.05	0.05	0.07	0.1	0.1
	LC..B 05..	0.25	0.26	0.26	0.25	0.28	0.23	0.31	0.31	0.31	0.32
	LC..B 10..	0.49	0.50	0.51	0.51	0.48	0.47	0.63	0.63	0.62	–
	LC..B 20..	1.44	1.62	1.52	1.44	1.5	1.5	1.26	1.25	1.25	1.4
	LC..B 30..	–	–	–	–	–	–	–	–	1.45	–
	LC..B 40..	2.48	2.90	2.70	2.86	3.05	2.8	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	0.30	0.33
	LC..A 05..	0.69	0.78	0.72	0.7	0.84	0.68	0.88	0.88	0.86	0.91
	LC..A 10..	1.38	1.53	1.42	1.43	1.47	1.37	1.77	1.78	1.73	–
	LC..A 20..	4.05	4.91	4.25	4.06	4.57	4.33	3.53	3.54	3.50	3.9
	LC..A 30..	–	–	–	–	–	–	–	–	4.0	–
	LC..A 40..	6.96	8.74	7.6	8.05	9.34	8.15	6.3	6.2	–	–
	LC..B 00..	0.24	0.25	0.5	0.5	0.5	0.8	0.7	1.0	1.5	1.5
	LC..B 05..	3.69	3.40	3.64	3.64	3.95	3.27	4.2	4.6	4.4	4.6
	LC..B 10..	7.43	6.69	7.24	7.37	6.88	6.62	8.4	9.4	8.9	–
	LC..B 20..	21.3	21.5	21.6	20.9	21.4	20.9	16.9	18.7	17.9	20
	LC..B 30..	–	–	–	–	–	–	–	–	20.7	–
	LC..B 40..	36.6	38.3	38.6	41.5	43.6	39.4	30.2	32.5	–	–

Characteristic curves (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\bar{\alpha} = 50^\circ \text{C}$)



Seal kits for cartridge valves type LC...

Nominal size	Material number		Nominal size	Material number	
	NBR seals	FKM seals		NBR seals	FKM seals
16	00313104	00313107	63	00873024	00873027
25	00313105	00313108	80	00314058	00314067
32	00313106	00313109	100	00314059	00314068
40	00873022	00873025	125	00314060	00314069
50	00873023	00873026	160	00314497	00314388

Compression springs for cartridge valves type LC...

NS	Type	Spring dimensions in mm	Material no.	NS	Type	Spring dimensions in mm	Material no.
16	LC 16 * 05 ** 7X	10.5 / 0.8 x 42 / 7	00002110	63	LC 63 * 05 ** 7X	43.5 / 3.6 x 165 / 9	00002354
	LC 16 * 10 ** 7X	10.5 / 1 x 42 / 8.5	00002111		LC 63 * 10 ** 7X	43 / 4 x 165 / 7	00002355
	LC 16 * 20 ** 7X	10.2 / 1.3 x 40.5 / 8.0	00062747		LC 63 * 20 ** 7X	41.2 / 5.6 x 170.5 / 11	00206693
	LC 16 * 40 ** 7X	10.0 / 1.6 x 38.2 / 9.0	00062753		LC 63 * 40 ** 7X	40.6 / 6.5 x 166 / 10	00206691
25	LC 25 * 05 ** 7X	16 / 1.4 x 61 / 10.5	00002114	80	LC 80 * 05 ** 6X	57 / 5 x 200 / 10.5	00002357
	LC 25 * 10 ** 7X	15.8 / 1.6 x 61 / 9.5	00002115		LC 80 * 10 ** 6X	56.5 / 5.6 x 200 / 8.5	00002359
	LC 25 * 20 ** 7X	15.3 / 2.25 x 55.0 / 8.0	00062762		LC 80 * 20 ** 6X	55 / 7 x 201 / 11.5	00002362
	LC 25 * 40 ** 7X	14.9 / 2.7 x 53.4 / 8.5	00062764		LC 80 * 40 ** 6X	53 / 9 x 176 / 10	00002365
32	LC 32 * 05 ** 7X	20.5 / 1.8 x 79 / 11.5	00002116	100	LC 100 * 05 ** 6X	74 / 7 x 250 / 14	00002363
	LC 32 * 10 ** 7X	20 / 2 x 79 / 9.5	00002117		LC 100 * 10 ** 6X	73 / 8 x 251 / 12.5	00002364
	LC 32 * 20 ** 7X	19.6 / 2.8 x 69.5 / 7.5	00062813		LC 100 * 20 ** 6X	72 / 9 x 251 / 10.5	00002366
	LC 32 * 40 ** 7X	19.2 / 3.2 x 71.0 / 8.5	00062783		LC 100 * 40 ** 6X	69 / 11.5 x 222 / 10	00002367
40	LC 40 * 05 ** 7X	27.5 / 2.5 x 108 / 13.5	00002119	125	LC 125 * 05 ** 2X	86 / 8 x 308 / 12.5	00011090
	LC 40 * 10 ** 7X	27.5 / 2.8 x 108 / 10.5	00002120		LC 125 * 10 ** 2X	85 / 9 x 310 / 10.5	00002649
	LC 40 * 20 ** 7X	26.8 / 3.4 x 109 / 9	00206677		LC 125 * 20 ** 2X	83 / 11 x 310 / 12.5	00002454
	LC 40 * 40 ** 7X	26 / 4.25 x 104 / 10	00206676		LC 125 * 30 ** 2X	80 / 14 x 255 / 10	00002650
50	LC 50 * 05 ** 7X	36 / 3.2 x 130 / 10.5	00002123	160	LC 160 * 05 ** 2X	112.5 / 10 x 418 / 11.5	00011097
	LC 50 * 10 ** 7X	35.5 / 3.6 x 130 / 9	00002124		LC 160 * 20 ** 2X	106 / 16 x 365 / 11	00011232
	LC 50 * 20 ** 7X	34.7 / 4.5 x 138 / 10.5	00206688				
	LC 50 * 40 ** 7X	33.6 / 5.6 x 124 / 9	00054908				

* A or B; ** E or D