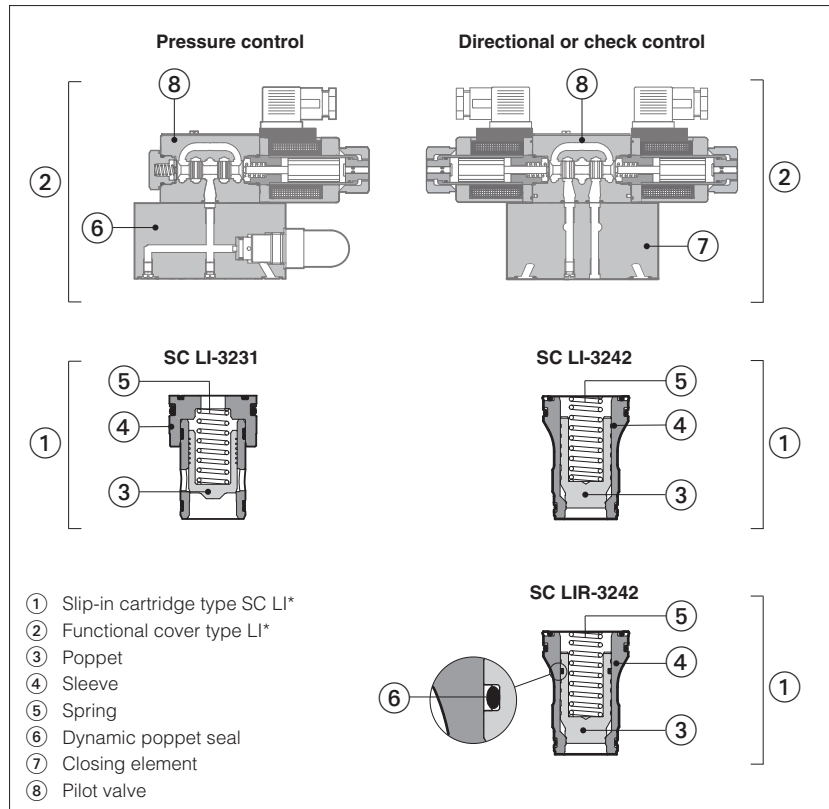


ISO cartridges type SC LI

2 way slip-in, directional, pressure, flow, check controls



2way slip-in cartridges conforming with ISO 7368 standard cavities for installation in compact manifolds. They are available in several versions to perform directional, pressure, flow and check controls in combination with relevant functional covers.

They permit to control very high flow rates at low pressure drops, reducing the manifold dimensions respect to subplate valves.

The slip-in cartridge ① is made by a poppet ③ sliding into a sleeve ④ and kept in closed position by a spring ⑤ available with different cracking pressure valves.

Optional version **SC LIR** with sealed poppet execution is available for applications requiring improved leak-free features as hydraulic circuits with accumulators or with vertical loads.

The functional covers ② are made by a closing element with ISO 7368 mounting surface ⑦ provided with internal piloting lines for the cartridge operation. They can be equipped with pilot valves ⑧ and devices performing the specific control (pressure relief, flow metering, directional, check)

Sizes: **16 to 100** ISO 7368

Max flow up to **9000 l/min** at Δp 5 bar

Max pressure **420 bar**

1 MODEL CODE

SC LI	R -	16	43	1	*	/	*
Cartridge according to ISO 7368					Series number		Seals material: - = NBR PE = FKM BT = NBR low temp.
- = standard execution R = sealed poppet execution (only for poppet type 32, 33, 42, 43) poppet type 32 not available for size 100 - see section 6							
Size - see section 6							
16 40 80 25 50 100 32 63							
			Type of poppet - see section 6 Pressure controls 31, 34, 35, 36, 37 Directional, flow and check controls 32, 33 normally closed, without damping nose 42, 43 normally closed, with damping nose Check controls 52 normally closed 62, 63, 96 normally open				

2 GENERAL CHARACTERISTICS

Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100
MTTFd valves according to EN ISO 13849	150 years, see technical table P007
Ambient temperature range	Standard = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C
Storage temperature range	Standard = -30°C ÷ +80°C /PE option = -20°C ÷ +80°C /BT option = -40°C ÷ +80°C
Compliance	RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

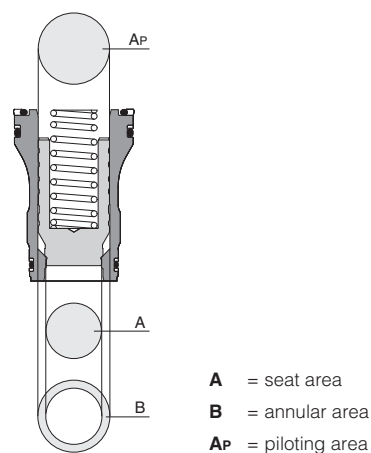
3 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature	NBR seals (standard) = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$, with HFC hydraulic fluids = $-20^{\circ}\text{C} \div +50^{\circ}\text{C}$ FKM seals (/PE option) = $-20^{\circ}\text{C} \div +80^{\circ}\text{C}$ NBR low temp. seals (/BT option) = $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$, with HFC hydraulic fluids = $-40^{\circ}\text{C} \div +50^{\circ}\text{C}$		
Recommended viscosity	20 ÷ 100 mm ² /s - max allowed range 15 ÷ 380 mm ² /s		
Max fluid contamination level	ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog		
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM, NBR low temp.	HL, HLP, HLPD, HVLP, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDR, HFDR	ISO 12922
Flame resistant with water	NBR, NBR low temp.	HFC	

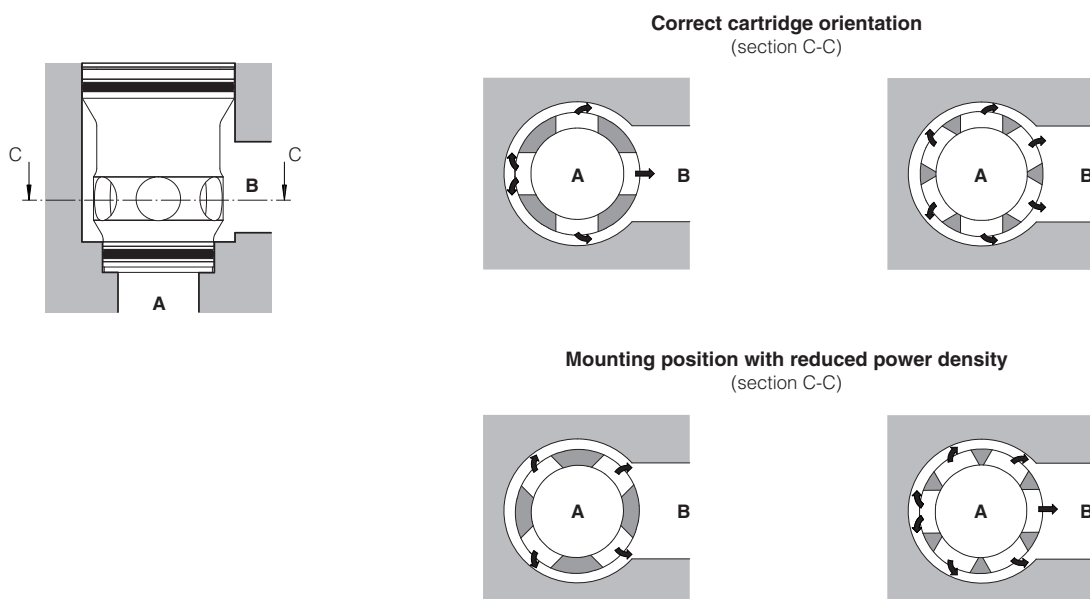
4 SC LI CARTRIDGE AREAS

Area ratio	A	B (% of A)	Ap (% of A)
1:1	100%	0	100%
1:1,1	100%	10%	110%
1:1,5	100%	50%	150%
1:1,6	100%	60%	160%

Pressure applied to areas A and B acts to open the poppet.
Pressure applied to area Ap plus the spring force act to close the poppet



5 INSTALLATION - for cavity dimensions, see table P006



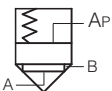
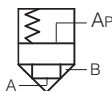
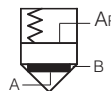
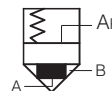
6 TYPE OF POPPET FOR SC LI SLIP-IN CARTRIDGES

SIZE TYPE	SC LI-16	SC LIR-16	SC LI-25	SC LIR-25	SC LI-32	SC LIR-32	SC LI-40	SC LIR-40	SC LI-50	SC LIR-50	SC LI-63	SC LIR-63	SC LI-80	SC LIR-80	SC LI-100	SC LIR-100	Functional sketch (hydraulic symbol)	Typical section	Area ratio	Related functional cover (only for SC LI) see section 9, 10, 11, 12
Mass [Kg]	0.2		0.5		0.9		1.7		3		7		13		22					
31	●	-	●	-	●	-	●	-	●	-	●	-	●	-	-	-			1 : 1	LIMM, LIMHA, LIMHC, LIC, LICM
Q _{max} [l/min] Δp = 5 bar	180		370		630		1100		1900		3100		4900		-					
32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	-			1 : 1.1	LIDA, LIDD, LIDB, LIDBH, LIDEW
Q _{max} [l/min] Δp = 5 bar	270		550		1000		1700		2500		4000		5500		9000					
33	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			1 : 1.5	LIDA, LIDD, LIDB, LIDBH, LIDEW
Q _{max} [l/min] Δp = 5 bar	270		550		1000		1700		2500		4000		5500		9000					
34	●	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-			1 : 1	LIMM, LIMHA, LIMHC
Q _{max} [l/min] Δp = 5 bar	180																			
35	●	-	●	-	●	-	●	-	●	-	-	-	-	-	-	-			1:1.1	LIMM, LIMHA, LIMHC
Q _{max} [l/min] Δp = 5 bar	180		370		630		1100		1900											
36	●	-	●	-	●	-	●	-	●	-	●	-	●	-	-	-			1:1	LIC, LICM
Q _{max} [l/min] Δp = 5 bar	180		370		630		1100		1900		3100		4900							
37	●	-	●	-	●	-	●	-	-	-	-	-	-	-	-	-			1:1	LIRA
Q _{max} [l/min] Δp = 5 bar	140		250		500		750													
42	●	●	●	●	●	●	●	●	●	●	●	●	●	●	-	-			1:1.1	LIDA, LIDD, LIDB, LIDBH, LIDEW
Q _{max} [l/min] Δp = 5 bar	240		500		800		1400		2200		3300		4000							
43	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			1:1.5	LIDA, LIDD, LIDB, LIDBH, LIDEW
Q _{max} [l/min] Δp = 5 bar	240		500		800		1400		2200		3300		4000		6300					
52	●	-	●	-	●	-	●	-	●	-	-	-	-	-	-	-			1:1.1	LIDA
Q _{max} [l/min] Δp = 5 bar	160		400		600		1200		1800											
62	●	-	●	-	●	-	●	-	●	-	-	-	-	-	-	-			1:1.1	LIDO
Q _{max} [l/min] Δp = 5 bar	160		400		600		1200		1800											
63	●	-	●	-	●	-	●	-	●	-	-	-	-	-	-	-			1 : 1.1	LIDO
Q _{max} [l/min] Δp = 5 bar	160		400		600		1200		1800											
69	●	-	●	-	●	-	●	-	●	-	-	-	-	-	-	-			1 : 1.6	

- normally available from stock
- on request
- not available

7 HYDRAULIC CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

7.1 Type of poppets for directional and check controls SC LI and SC LIR

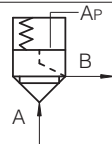
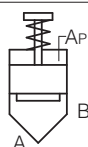
Type of poppet	32				33				42				43				
Functional sketch (Hydraulic symbol)																	
Area ratio A:Ap	1:1,1				1:1,5				1:1,1				1:1,5				
Operating pressure	420 bar max																
Nominal flow at Δp 5 bar (l/min) see diagrams Q/Δp at section 8																	
Size 16	270				270				240				240				
Size 25	550				550				500				500				
Size 32	1000				1000				800				800				
Size 40	1700				1700				1400				1400				
Size 50	2500				2500				2200				2200				
Size 63	4000				4000				3300				3300				
Size 80	5500				5500				4000				4000				
Size 100	9000				9000				-				6300				
Cracking pressure (bar)																	
Spring (1)	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	
Size 16	A→B	0.3	1.5	3	5.3	0.6	1.6	2.9	5.1	0.3	1.7	3.3	6.1	0.7	1.9	3.3	5.7
	B→A	3.2	16	30.5	50.3	1.2	3.2	5.8	10	3.6	17.7	34.5	63.4	1.3	3.7	6.5	11.2
Size 25 (2)	A→B	0.3	1.5	3	5	0.6	1.4	3	5	0.3	1.7	3.3	6.1	0.7	1.5	3.3	5.8
	B→A	3.1	15.1	30.5	50.3	1.2	2.8	5.9	9.9	3.5	17.1	33.3	61.4	1.3	3	6.5	11.3
Size 32 (3)	A→B	0.3	1.5	3	5	0.6	1.6	3	5.4	0.3	1.7	3.7	6.3	0.7	1.8	3.4	6.3
	B→A	3.5	17	34.2	56.7	1.2	3.2	6	10.7	3.9	18.8	41.6	71.1	1.4	3.6	6.9	12.7
Size 40	A→B	0.3	1.5	3	5	0.6	1.5	3	5.5	0.4	1.8	3.5	6.4	0.7	1.8	3.6	7.3
	B→A	2.9	14.7	29.4	48.3	1.2	3	6	11	3.5	17.2	34	62	1.3	3.6	7.2	14.6
Size 50	A→B	0.3	1.5	3	4.3	0.6	1.6	3	4.8	0.4	1.7	3.4	5.2	0.7	1.9	3.4	5.7
	B→A	3.6	16.9	33.8	48.4	1.4	3.6	6.7	10.8	4.2	18.9	38.1	58.9	1.5	4.4	7.7	12.9
Size 63	A→B	0.3	1.5	2.9	4.2	0.6	1.5	2.9	5.8	0.4	1.7	3.4	4.7	0.7	1.8	3.3	6.5
	B→A	3.1	15	29.2	42	1.3	3.3	6.4	12.5	3.6	16.6	33.8	47.2	1.5	4	7.2	14.1
Size 80	A→B	0.3	1.5	3	4.6	0.6	1.5	3	5.3	0.3	1.7	3.3	4.9	0.7	1.8	3.3	5.9
	B→A	3	14.8	29.2	45.2	1.3	3.1	6.3	11.2	3.4	16.6	32.9	48.8	1.4	3.8	7	12.4
Size 100	A→B	0.3	1.5	3		0.6	1.5	3.1	6					0.7	1.9	3.8	7.4
	B→A	3	15	30.5		1.2	3	6.3	12.2					1.5	3.9	7.8	14.9

(1) Spring type 1 is not available for SC-LIR size 16 to 40

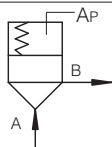
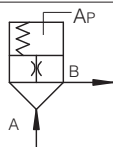
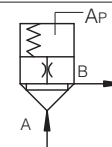
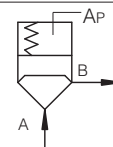
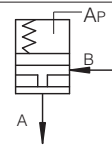
(2) Cracking pressure for SC LIR-25 (A-B / B-A): SC LIR-25332 = 2.1 bar / 4.1 bar
SC LIR-25432 = 2.3 bar / 4.5 bar

(3) Cracking pressure for SC LIR-32 (A-B / B-A): SC LIR-32332 = 2.1 bar / 4.2 bar
SC LIR-32432 = 2.3 bar / 4.6 bar

7.2 Type of poppets for check controls SC LI

Type of poppet	52				62				63						
Functional sketch (Hydraulic symbol)															
Area ratio A:Ap	1:1,1				1:1,1				1:1,1						
Operating pressure	420 bar max														
Nominal flow at Δp 5 bar (l/min) see diagrams Q/Δp at section 8															
Size 16	160				160				160						
Size 25	400				400				400						
Size 32	600				600				600						
Size 40	1200				1200				1200						
Size 50	1800				1800				1800						
Cracking pressure (bar)															
Spring	1	2	3	6	3				6						
Size 16 A→B	0.3	1.5	3	6	Normally open				Normally open						
Size 25 A→B	0.3	1.5	3	6											
Size 32 A→B	0.3	1.5	3	6											
Size 40 A→B	0.3	1.5	3	6											
Size 50 A→B	0.3	1.5	3	6											

7.3 Type of poppets for pressure controls SC LI

Type of poppet	31			34			35			36			37		
Functional sketch (Hydraulic symbol)															
Area ratio A:Ap	1:1			1:1			1:1,1			1:1			1:1		
Operating pressure	420 bar max														
Nominal flow at Δp 5 bar (l/min) see diagrams Q/Δp at section 8															
Size 16	180			180			180			180			140		
Size 25	370			-			370			370			250		
Size 32	630			-			630			630			500		
Size 40	1100			-			1100			1100			750		
Size 50	1900			-			1900			1900			-		
Size 63	3100			-			-			3100			-		
Size 80	4900			-			-			4900			-		
Cracking pressure (bar)															
Spring	2	3	6	2	3	6	1	2	3	6	6	6	4	7	
Size 16 A→B	1.2	3	6	1.2	3	6	0.3	1.2	3	6	6	6	4	7	
B→A													4	7	
Size 25 A→B	1.2	3	6				0.3	1.2	3	6	6	6	4	7	
B→A													4	7	
Size 32 A→B	1.2	3	6				0.3	1.2	3	6	6	6	4	7	
B→A													4	7	
Size 40 A→B	1.2	3	6				0.3	1.2	3	6	6	6	4	7	
B→A													4	7	
Size 50 A→B	1.2	3	6				0.3	1.2	3	6	6	6			
B→A															
Size 63 A→B	1.2	3	6								6	6			
B→A															
Size 80 A→B	1.2	3	6								6	6			
B→A															

7.4 Poppet area SC LI and SC LIR

Area (cm ²)	Poppet type	Size (1)							
		16	25	32	40	50	63	80	100
A	31, 34	2.32	4.68	7.55	11.95	18.10	33.18	47.78	69.40
	36	2.27	4.52	8.04	12.57	19.63	20.43	-	-
	37	2.54	4.91	8.04	12.57	-	-	-	-
	32, 35, 42, 52, 63	2.87	5.60	9.35	15.07	25.97	40.15	51.53	86.43
	33, 43	2.09	4.08	6.79	11.04	19.63	30.19	38.48	63.62
B	31, 34	0.22	0.23	0.49	0.62	1.54	3.13	2.48	9.14
	36	0	0	0	0	0	0	-	-
	37	0	0	0	0	-	-	-	-
	32, 35, 42, 52, 63	0.28	0.56	0.83	1.55	2.31	4.03	5.22	8.61
	33, 43	1.05	2.07	3.39	5.57	8.64	13.99	18.26	31.42
Ap	31, 34	2.54	4.91	8.04	12.57	19.63	36.32	50.27	78.54
	36	2.54	4.91	8.04	12.57	19.63	20.43	-	-
	37	2.54	4.91	8.04	12.57	-	-	-	-
	32, 35, 42, 52, 63	3.14	6.16	10.18	16.62	28.27	44.18	56.75	95.03
	33, 43	3.14	6.16	10.18	16.62	28.27	44.18	56.75	95.03

7.5 Poppet stroke and pilot volume SC LI and SC LIR

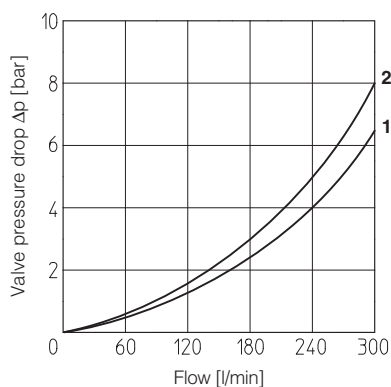
	Poppet type	Size (1)							
		16	25	32	40	50	63	80	100
Stroke (cm)	31, 34	0.5	0.71	1.11	1.31	1.52	1.85	2.19	3.00
	36	0.52	0.82	1.15	1.30	1.52	1.27	-	-
	37	0.60	0.67	0.92	1.05	-	-	-	-
	32, 35, 42, 52, 63	0.80	1.00	1.31	1.70	2.10	2.61	2.80	3.80
	33, 43	0.90	1.11	1.40	1.90	2.30	2.80	3.00	3.87
Pilot volume (cm ³)	31, 34	1.27	3.49	8.93	16.46	29.85	67.19	110.08	235.62
	36	1.32	4.03	9.25	16.34	29.85	25.94	-	-
	37	1.53	3.29	7.40	13.19	-	-	-	-
	32, 35, 42, 52, 63	2.51	6.16	13.28	28.25	59.38	115.89	159.89	361.13
	33, 43	2.83	6.83	14.25	31.49	65.03	123.70	170.24	367.78
Theoretical pilot flow (2) (l/min)	31, 34	7.63	20.91	53.56	98.77	179.07	403.12	660.49	1413.72
	36	7.94	24.15	55.49	98.02	179.07	155.66	-	-
	37	9.16	19.73	44.39	79.17	-	-	-	-
	32, 35, 42, 52, 63	15.08	36.95	79.70	169.51	356.26	690.51	953.32	2166.76
	33, 43	16.96	41.01	85.50	188.96	390.19	742.20	1021.41	2206.67

(1) See section 6 for the availability of different sizes for each poppet type

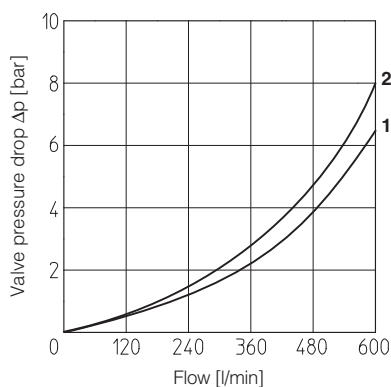
(2) Theoretical pilot flow with switching time = 10ms

8.1 Poppets type 32, 33, 42, 43 for directional, flow and check controls

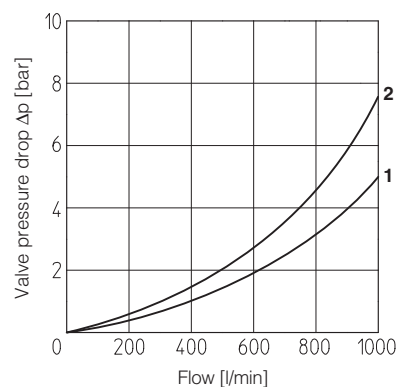
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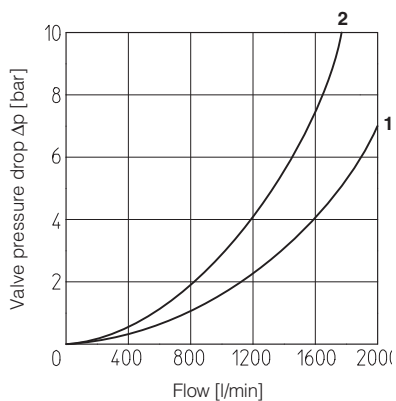
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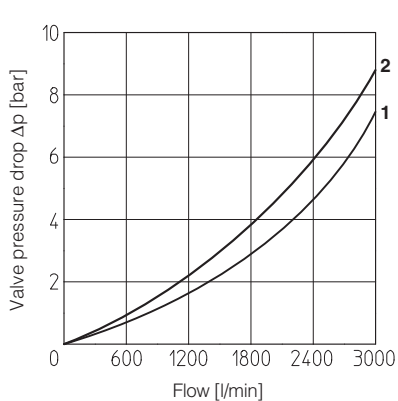
size 32



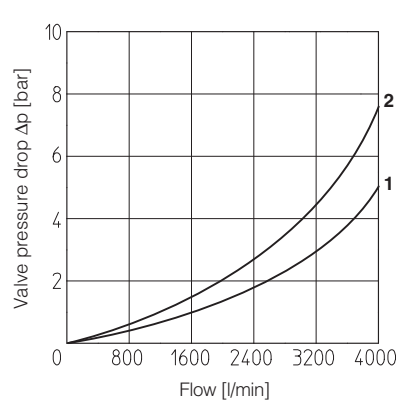
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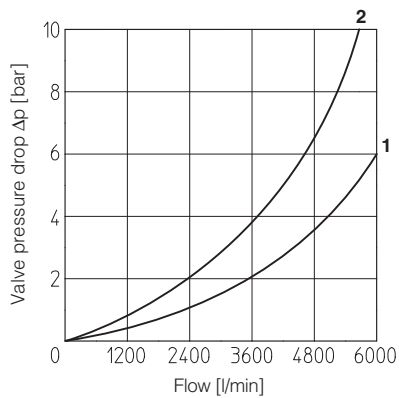
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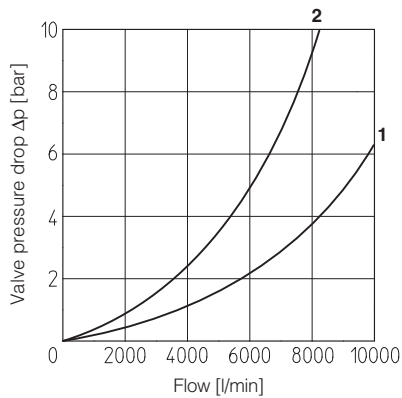
size 63



size 80

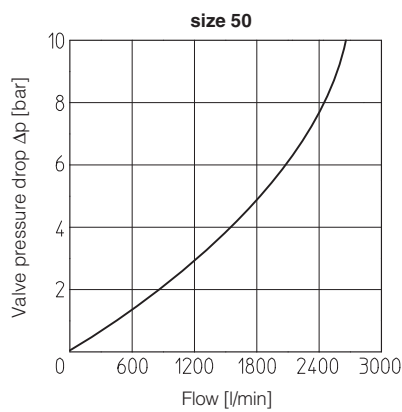
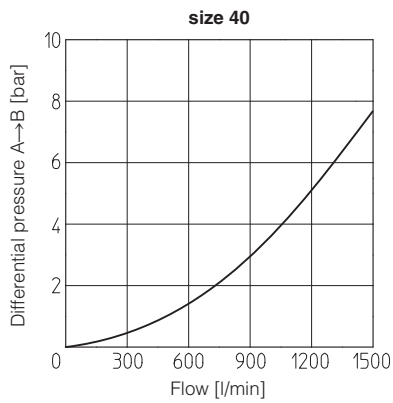
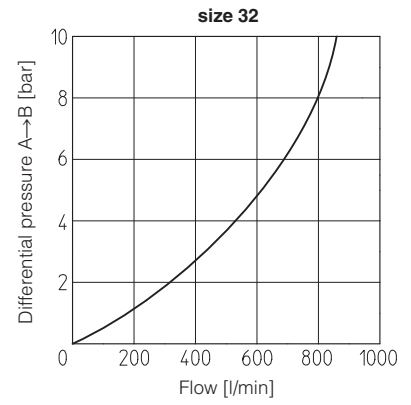
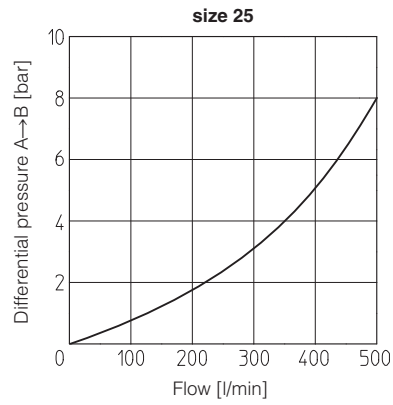
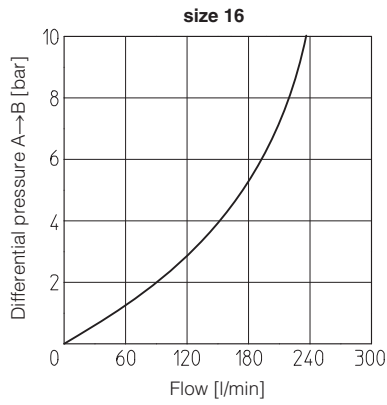


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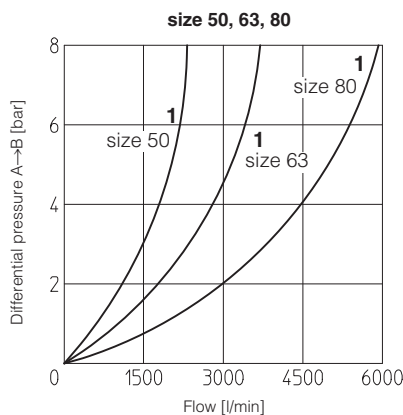
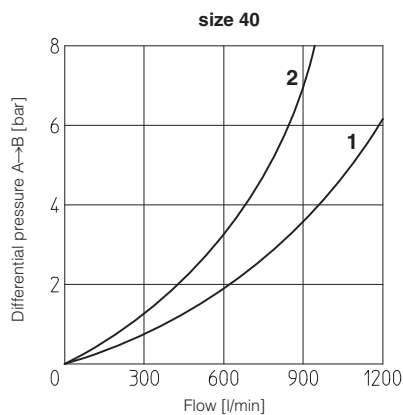
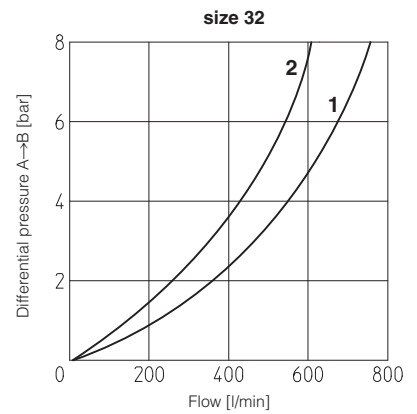
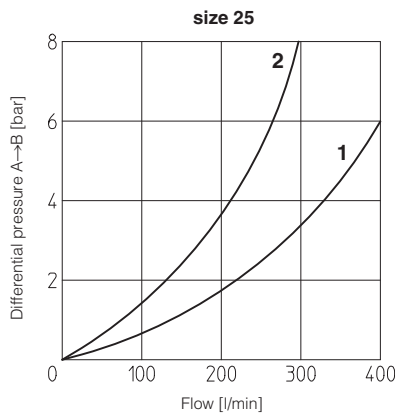
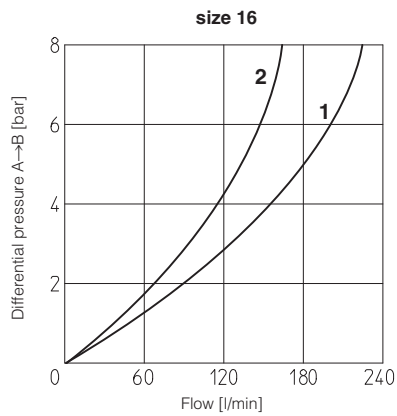


1 = poppet type 32 and 33
2 = poppet type 42 and 43

8.2 Poppets type 52, 62, 63 for check controls



8.3 Poppets type 31, 34, 35, 36, 37 for pressure controls

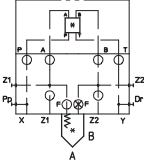
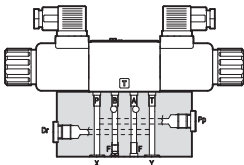
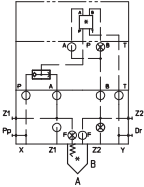
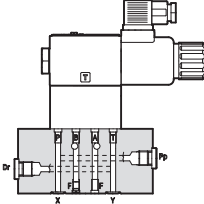
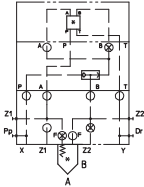
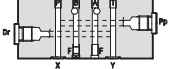


1 = poppet type 31, 34, 35, 36
2 = poppet type 37

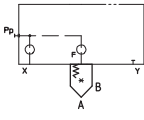
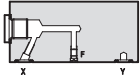
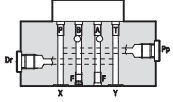
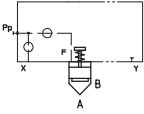
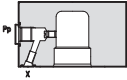
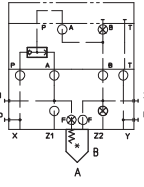
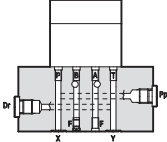
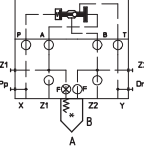
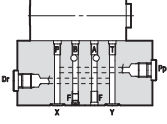
Note:

poppet type 34 only for size 16
poppet type 37 for size 16 to 40

9 FUNCTIONALS COVERS - DIRECTIONAL CONTROL, see table H030

Function and type of control	Size	Hydraulic symbol	Functional cover size 16 ÷ 100	SC LI cartridges
Direct operated directional control valve with solenoid valve for pilot selection LIDEW*	16 25 32 40 50 63 80 100			SC LI-**32* SC LI-**33* size 16 ... 100 SC LI-**42* size 16 ... 80 SC LI-**43* size 16 ... 100
Direct operated directional control valve with solenoid valve and shuttle valve for pilot selection LIDBH1A = open when solenoid is de-energized LIDBH1C = closed when solenoid is de-energized	16 25 32 40 50 63 80 100	1A  1C  		SC LI-**32* SC LI-**33* size 16 ... 100 SC LI-**42* size 16 ... 80 SC LI-**43* size 16 ... 100
Direct operated directional control valve with solenoid and shuttle valve for pilot selection LIDBH2A = when solenoid is de-energized only connections X→F LIDBH2C = when solenoid is de-energized only connections Z1→F	16 25 32 40 50 63 80 100	2A  2C  		SC LI-**32* SC LI-**33* size 16 ... 100 SC LI-**42* size 16 ... 80 SC LI-**43* size 16 ... 100

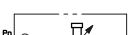
10 FUNCTIONALS COVERS - CHECK FUNCTION, see table H040

Function and type of control	Size	Hydraulic symbol	Functional cover size 16 ÷ 25	Functional cover size 32 ÷ 80	SC LI cartridges
Direct operated check valve normally closed LIDA	16 25 32 40 50 63 80 100				SC LI-**32* SC LI-**33* size 16 ... 100 SC LI-**42* size 16 ... 80 SC LI-**43* size 16 ... 100 SC LI-**52* size 16 ... 50
Direct operated check valve normally open LIDO	16 25 32 40 50				SC LI-**62* SC LI-**63* size 16 ... 50
Direct operated check valve with shuttle valve for pilot selection LIDB	16 25 32 40 50 63				SC LI-**32* SC LI-**33* size 16 ... 63 SC LI-**42* SC LI-**43* size 16 ... 63
Direct operated check valve with hydraulically operated pilot check valve LIDR	16 25 32 40 50 63				SC LI-**32* SC LI-**33* size 16 ... 63 SC LI-**42* SC LI-**43* size 16 ... 63

11 TYPICAL FUNCTIONS OF COVERS - PRESSURE CONTROL, see table H010

Function and type of control	Size	Hydraulic symbol	Functional cover size 16 ÷ 32	Functional cover size 40 ÷ 80	SC LI cartridges
Pressure relief control with manual setting LIMM	16				SC LI-**31* size 16... 80
	25				SC LI-**34* size 16
	32				SC LI-**35* size 16...50
	40				
	50				
	63				
80					
Pressure relief control with solenoid valve for venting LIMHA = unloading when solenoid is de-energized LIMHC = unloading when solenoid is energized LIMH*	16				SC LI-**31* size 16...80
	25				SC LI-**34* size 16
	32				SC LI-**35* size 16...50
	40				
	50				
	63				
80					
Pressure reducing control with manual setting. Open in resting position LIRA	16				SC LI-**37* size 16...40
	25				
	32				
	40				
Function and type of control	Size	Hydraulic symbol	Functional cover size 16 ÷ 25	Functional cover size 32 ÷ 80	SC LI cartridges
Pressure compensator to be coupled with flow control valves LIC	16				SC LI-**31* size 16...80
	25				SC LI-**36* size 16...80
	32				
	40				
	50				
	63				
80					
Pressure compensator with mechanical max pressure regulation to be coupled with flow control valves. LICM	16				SC LI-**31* size 16...80
	25				SC LI-**36* size 16...80
	32				
	40				
	50				
	63				
80					

12 FUNCTIONAL COVERS - FLOW CONTROL, see table H020

Function and type of control	Size	Hydraulic symbol	Functional cover size 16 ÷ 63	SC LI cartridges
Flow control with stroke limiter LIDD	16			SC LI-**32*
	25			SC LI-**33*
	32			size 16...63
	40			
	50			SC LI-**42*
	63			SC LI-**43*
				size 16...63

13 RELATED DOCUMENTATION

H010	ISO cartridge valves type LIM*, LIRA, LIC*
H020	ISO cartridge valves type LIDD
H030	ISO cartridge valves type LIDEW* and LIDBH*
H040	ISO cartridge valves type LID*