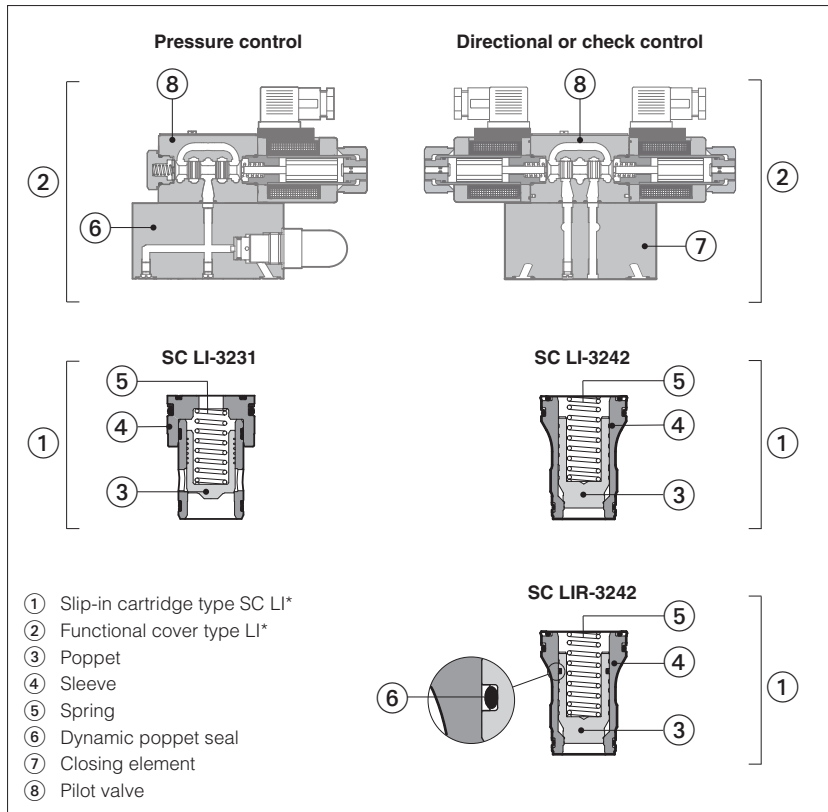


ISO cartridges type SC LI

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 values.

Optional version **SC LIR** with sealed poppet execution is available for applications requiring improved leak-free features as hydraulic circuits with accumulators or with vartical 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				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				Spring cracking pressure - see section 7
Size - see section 6 16 40 80 25 50 100 32 63								

2 GENERAL CHARACTERISTICS

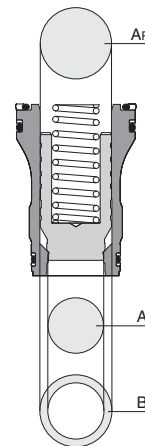
Assembly position	Any position
Subplate surface finishing to ISO 4401	Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100
MTTFd valves according to EN ISO 13849	150 years, see technical table P007
Ambient temperature range	Standard = -30°C ÷ +70°C /PE option = -20°C ÷ +70°C /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, HVLPD	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR, NBR low temp.	HFC	

4 SC LI CARTRIDGE AREAS

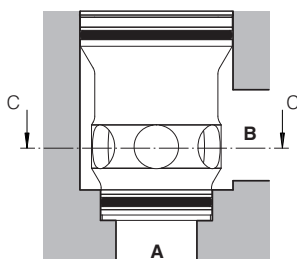
Area ratio	A	B (% of A)	Ap (% of A)
1:1	100%	0	100%
1:1,1	100%	10%	110%
1:1,5	100%	50%	150%
1:1,6	100%	60%	160%



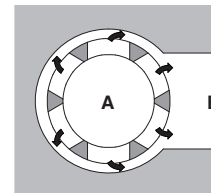
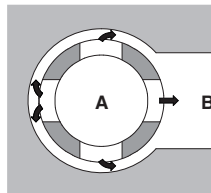
Pressure applied to areas A and B acts to open the poppet.
Pressure applied to area Ap plus the spring force act to close the poppet

A = seat area
B = annular area
Ap = piloting area

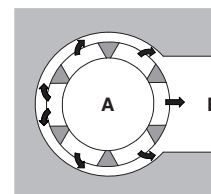
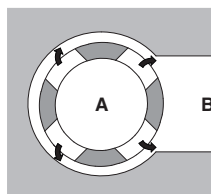
5 INSTALLATION - for cavity dimensions, see table P006



Correct cartridge orientation
(section C-C)



Mounting position with reduced power density
(section C-C)



6 TYPE OF POPPET FOR SC LI SLIP-IN CARTRIDGES

Size Type	SC LI-16	SC LI-25	SC LI-32	SC LI-40	SC LI-50	SC LI-63	SC LI-80	SC LI-100	Functional sketch (hydraulic symbol)	Typical section	Area ratio	Related functional cover see section 9 , 10 , 11 , 12
	●	●	●	●	●	●	●	●				
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 : 1,1	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	
Q _{max} [l/min] Δp = 5 bar												
Mass [kg]	0,2	0,5	0,9	1,7	3,0	7,0	13	22				

- normally available from stock
- on request
- not available

(1) not available for SC LIR

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

7.1 Type of poppets for directional and check controls

Type of poppet	32	33	42	43
Functional sketch (Hydraulic symbol)				
Operating pressure	420 bar max			
Nominal flow at Δp 5bar (l/min)	Size 16: 270 25: 550 32: 1000 40: 1700 see 50: 2500 diagrams Q/ Δp at section 9: 63: 4000 80: 5500 100: 9000	270 550 1000 1700 2500 4000 5500 9000	240 500 800 1400 2200 3300 4000 -	240 500 800 1400 2200 3300 4000 6300
Area ratio A:Ap	1:1,1	1:1,5	1:1,1	1:1,5
Cracking pressure A→B	Spring 1: 0,3 bar 2: 1,5 bar 3: 3 bar 6: 5,5 bar	0,6 bar - 2,5 bar 5,5 bar	0,3 bar 1,5 bar 3 bar 5,5 bar	0,6 bar - 2,5 bar 5,5 bar
Cracking pressure B→A	Spring 1: 3 bar 2: 12,8 bar 3: 32,5 bar 6: 54,5 bar	1,2 bar - 6 bar 11 bar	3 bar 12,8 bar 32,5 bar 54,5 bar	1,2 bar - 6 bar 11 bar

7.2 Type of poppets for check controls

Type of poppet	52	62	63
Functional sketch (Hydraulic symbol)			
Operating pressure	420 bar max		
Nominal flow at Δp 5bar (l/min)	Size 16: 160 25: 400 32: 600 see 40: 1200 diagrams Q/ Δp at section 10: 50: 1800	160 400 600 1200 1800	160 400 600 1200 1800
Area ratio A:Ap	1 : 1,1	1 : 1,1	1 : 1,1
Cracking pressure A→B (1)	Spring 1: 0,3 bar 2: 1,5 bar 3: 3 bar 6: 6 bar	- - - -	- - - -

(1) Depending on the spring cracking pressure and the area ratio of the poppet

7.3 Type of poppets for pressure controls

Type of poppet	31	34	35	36	37
Functional sketch (Hydraulic symbol)					
Operating pressure	420 bar max				
Nominal flow at Δp 5bar (l/min)	Size 16: 180 25: 370 32: 630 see 40: 1100 diagrams Q/ Δp at section 8: 50: 1900 63: 3100 80: 4900	180 - - - - - -	180 370 630 1100 1900 - -	180 370 630 1100 1900 3100 4900	140 250 500 750 - - -
Area ratio A: Ap	1:1	1:1	1:1,1	1:1	1:1
Cracking pressure A→B	Spring 1: - 2: 1,2 bar 3: 3 bar 4: - 6: 6 bar 7: -	- 1,2 bar 3 bar - 6 bar -	0,3 bar 1,2 bar 3 bar - 6 bar -	- - - - 6 bar -	- - - 4 bar - 7 bar
Cracking pressure B→A	Spring 4: - 7: -	- -	- -	- -	4 bar 7 bar

7.4 Poppet area

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

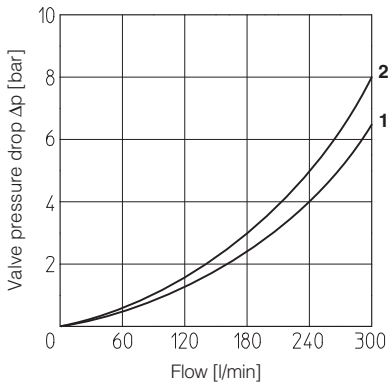
	Poppet type	Size (1)							
		16	25	32	40	50	63	80	100
Stroke (cm)	31, 34	0.5	0.71	1.11	1.31	1.52	1.85	2.19	3.00
	36	0.52	0.82	1.15	1.30	1.52	1.27	-	-
	37	0.60	0.67	0.92	1.05	-	-	-	-
	32, 35, 42, 52, 63	0.80	1.00	1.31	1.70	2.10	2.61	2.80	3.80
	33, 43	0.90	1.11	1.40	1.90	2.30	2.80	3.00	3.87
Pilot volume (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

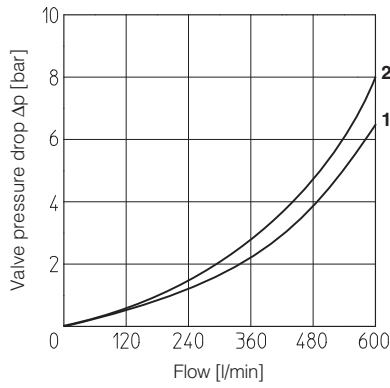
(2) Theoretical pilot flow with switching time = 10ms

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

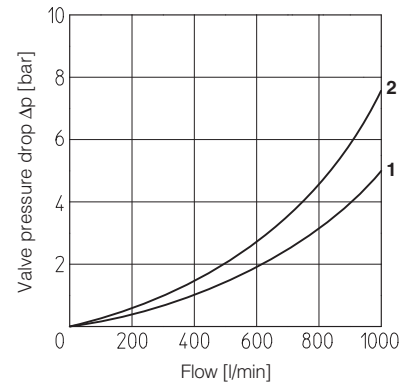
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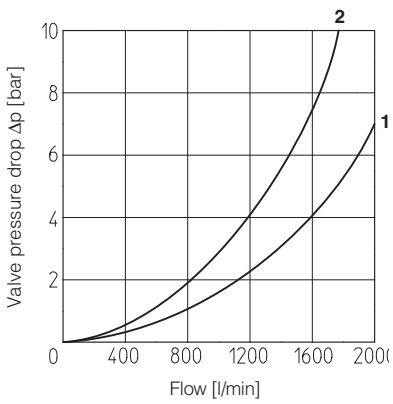
size 25



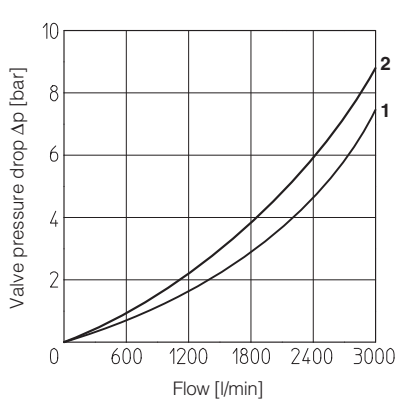
size 32



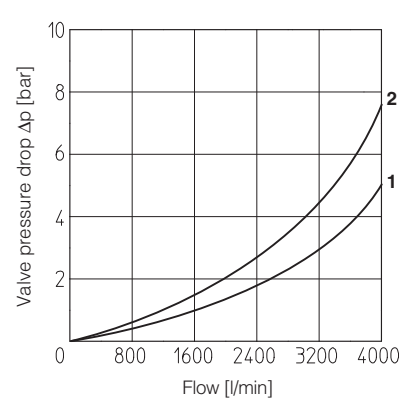
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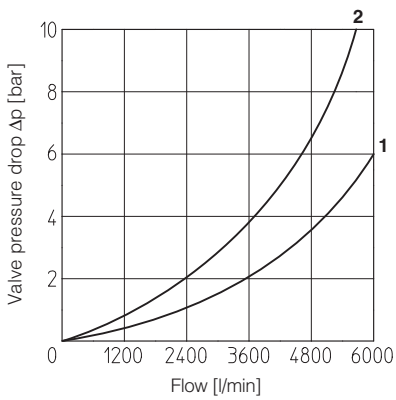
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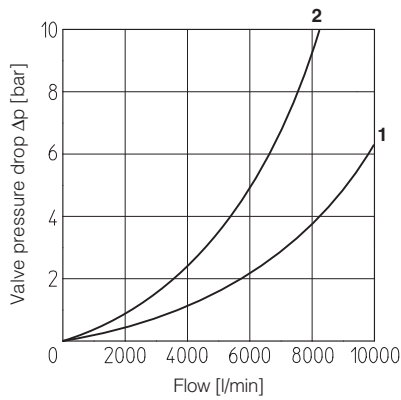
size 63



size 80

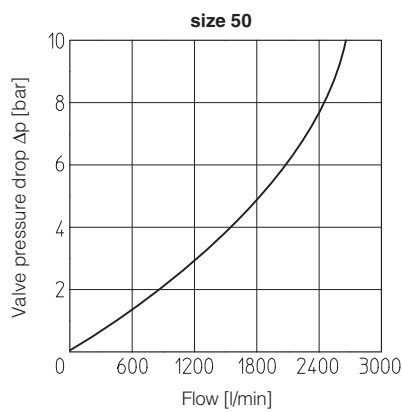
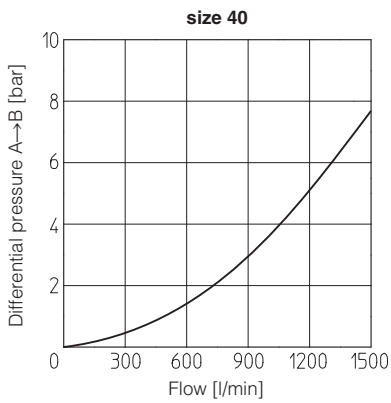
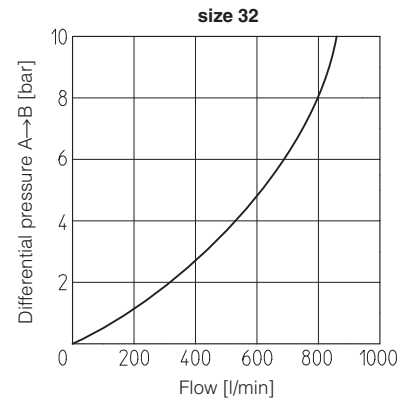
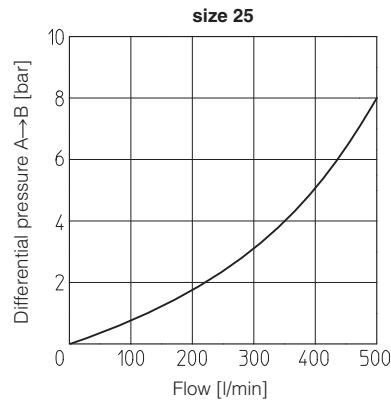
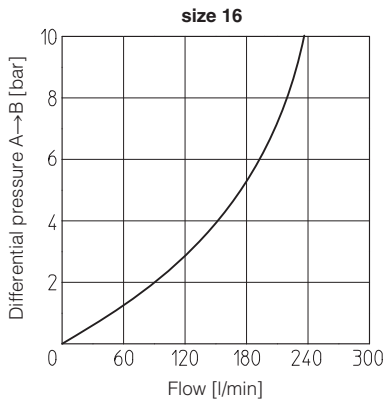


size 100

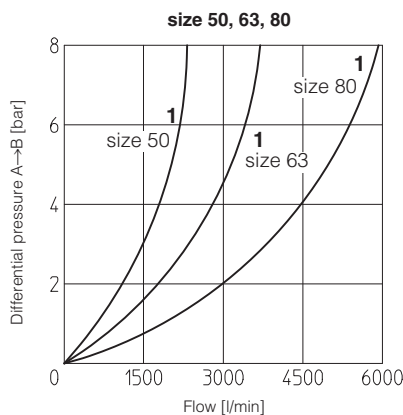
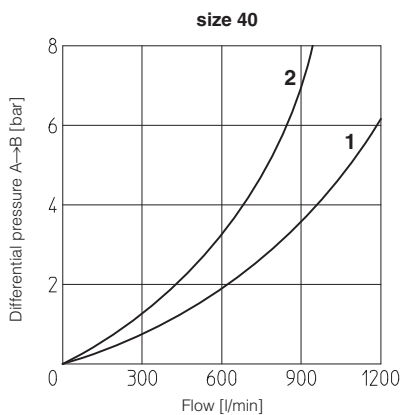
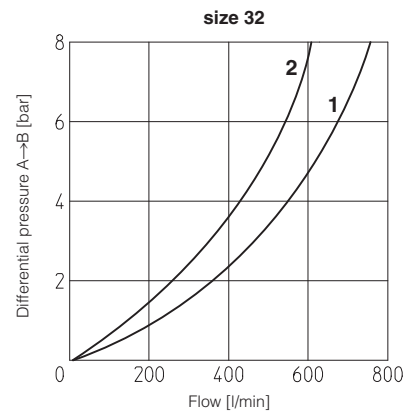
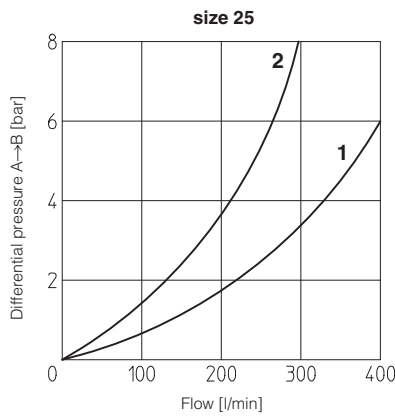
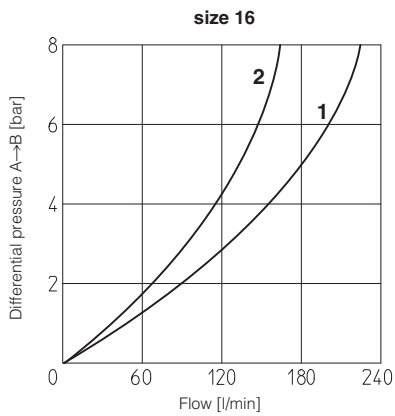


1 = poppet type 32 and 33
2 = poppet type 42 and 43

8.2 Poppets type 52, 62, 63 for check controls



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

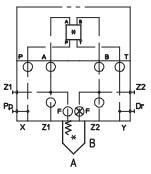
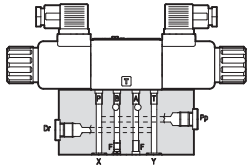


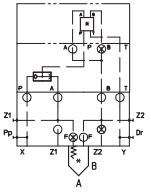
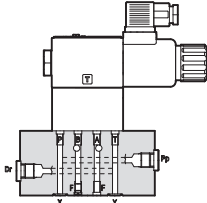


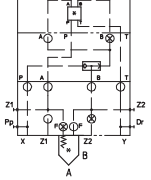



1 = poppet type 31, 34, 35, 36
2 = poppet type 37

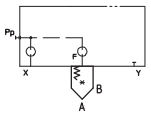
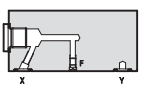
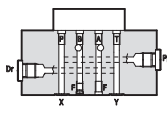
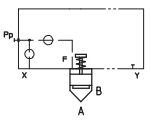
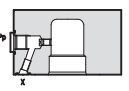
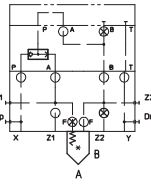
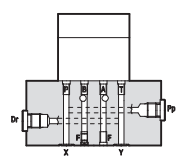
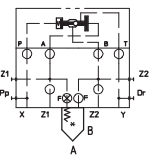
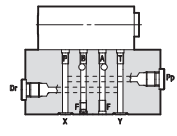
Note:

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			SC LI-**32* SC LI-**33* size 16 ... 100
	25			
	32			
	40			
	50			
	63			
80				
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	1A  1C  		SC LI-**32* SC LI-**33* size 16 ... 100
	25			SC LI-**42* size 16 ... 80
	32			SC LI-**43* size 16 ... 100
	40			
	50			
	63			
80				
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	2A  2C  		SC LI-**32* SC LI-**33* size 16 ... 100
	25			SC LI-**42* size 16 ... 80
	32			SC LI-**43* size 16 ... 100
	40			
	50			
	63			
80				
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				SC LI-**32* SC LI-**33* size 16 ... 80
	25				SC LI-**42* SC LI-**43* size 16 ... 80
	32				
	40				
	50				
	80				
Direct operated check valve normally open LIDO	16				SC LI-**62* SC LI-**63* size 16, 25, 32, 50
	25				
	32				
	40				
	50				
Direct operated check valve with shuttle valve for pilot selection LIDB	16				SC LI-**32* SC LI-**33* size 16 ... 63
	25				
	32				
	40				
	50				
63					
Direct operated check valve with hydraulically operated pilot check valve LIDR	16		01/20 		SC LI-**32* SC LI-**33* size 16 ... 63
	25				
	32				
	40				
	50				
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				
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				
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				
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				

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* SC LI-**33* size 16...63
	25			SC LI-**42* SC LI-**43* size 16...63
	32			
	40			
	50			

13 RELATED DOCUMENTATION

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