

2-way cartridge valve, actively controllable

Type LC2A

RE 21040

Edition: 2017-05

Replaces: 2016-12



H7697+7694

- ▶ Size 16 ... 125
- ▶ Component series 1X
- ▶ Maximum operating pressure 450 bar
- ▶ Maximum flow 17000 l/min ($\Delta p = 10$ bar)

Features

- ▶ Actively controllable 2/2 directional cartridge valve ("two-level active logics")
- ▶ Modular design, flexible circuit set-up
- ▶ Installation bore according to ISO 7368
- ▶ Energy efficiency due to flow-optimized geometry
- ▶ Leakage-free due to integrated shaft sealing
- ▶ Spool position monitoring "closed" and/or "open" or analog (can also be retrofitted)
- ▶ BG certification

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
LC	2A					- 1X	/																*

01	Logic Cartridge	LC
02	2-level, active	2A
03	Size 16	016
	Size 25	025
	Size 32	032
	Size 40	040
	Size 50	050
	Size 63	063
	Size 80	080
	Size 100	100
	Size 125 (only version "F", valve poppet with overlap; not with version "450")	125

Control spool design (area ratio see section on page 6)

04	$A_1 : A_2 = 2 : 1$ ($A_2 = 50\%$)	A
	$A_1 : A_2 = 14.3 : 1$ ($A_2 = 7\%$)	B
	$A_1 : A_2 = 1 : 0$ ($A_2 = 0\%$)	D
05	Without spring	00
	With spring, cracking pressure approx. 4 bar (referring to control spool design "A")	40
06	Valve poppet without damping nose	E
	Valve poppet with damping nose	D
	Valve poppet with overlap (preferred with "spool position monitoring"; only with control spool design "B")	F
07	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

Maximum operating pressure

08	420 bar (standard)	no code
	450 bar	450

Active area ¹⁾ connected to port (see also page 5):

09	Z1	Z1
	Z2	Z2
	Z1 and Z2	U
	X (not with version "450")	X
	Y (not with version "450")	Y

Spool position monitoring ²⁾ (position switch 1 = "1"; position switch 2 = "2") (version "450" only with "Q7", "Q9" and "without")

10	- Position monitoring "closed"	
	Without position switch ("1" on side "Y" – can be retrofitted)	no code
	With 1 position switch ("1" on side "Y" – mounted)	Q7
	With 2 position switches "1" on side "Y" – mounted, attachment side of "2" NG-dependent – mounted)	Q7Q7
	With 1 position switch and 2nd installation bore ("1" on side "Y" – not fitted, attachment side of "2" NG-dependent – mounted)	Q.Q7
	Without position switch, with 2 installation bores ("1" on side "Y" – not fitted, attachment side of "2" NG-dependent – not fitted)	Q.Q.
	- Combined position monitoring "1" (closed) and "2" (open) ³⁾	
	With 2 position switches "1" on side "Y" – mounted, attachment side of "2" NG-dependent – mounted)	Q7Q7T
	Without position switch, with 2 installation bores ("1" on side "Y" – not fitted, attachment side of "2" NG-dependent – not fitted)	Q.Q.T
	With 1 position switch and 2nd installation bore ("1" on side "Y" – not fitted, attachment side of "2" NG-dependent – mounted)	Q.Q7T

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
LC	2A					-	1X	/															*

10	- Position monitoring "closed"; NAMUR ⁴⁾	
	With 1 position switch ("1" on side "Y" – mounted)	Q8
	- Analog, position sensing	
	Inductive sensor with analog output (1 ... 9 V DC); only with versions "LC2A . D40E-1X/...A", "LC2A . A.D-1X/..." and "LC2A . B.F-1X/..."	Q9
Combination "analog" and "digital" upon request		

Electrical connection for position switch ⁵⁾

11	Without position switch	no code
	U _B = 24 V DC (standard; only with version "Q7" and "Q9")	G24
	U _B = 8 V DC (NAMUR; only with version "Q8"; not with version "450")	G08

Pilot oil bore in the control spool ⁶⁾

12	Without pilot oil bore	no code
	- Pilot oil bore A → spring chamber (only NG25 to 100)	
	NG25 – Maximum pilot oil bore Ø 10.0 mm	A100
	NG32 – Maximum pilot oil bore Ø 13.0 mm	A130
	NG40 – Maximum pilot oil bore Ø 16.0 mm	A160
	NG50 – Maximum pilot oil bore Ø 20.0 mm	A200
	NG63 – Maximum pilot oil bore Ø 26.0 mm	A260
	NG80 – Maximum pilot oil bore Ø 32.0 mm	A320
NG100 – Maximum pilot oil bore Ø 40.0 mm	A400	
13	Without orifice	no code
	With orifice in channel X – ①	X**
14	Without orifice	no code
	With orifice in channel F – to the active area	F**
15	Without orifice	no code
	With orifice in channel Z1 – ② (not with version "X" and "Y")	D**
16	Without orifice	no code
	With orifice in channel Z1 – ①	Z**
17	Without orifice	no code
	With orifice in channel Y – ①	Y**
18	Without orifice	no code
	With orifice in channel Z2 – ② (not with version "X" and "Y")	S**
19	Without orifice	no code
	With orifice in channel Z2 – ①	W**
20	Without orifice	no code
	With orifice in channel X – ② (not with version "Z1", "Z2" and "U")	H**
21	Without orifice	no code
	With orifice in channel X – ② (not with version "Z1", "Z2" and "U")	L**

Corrosion resistance

22	None	no code
	Improved corrosion protection (240 h salt spray test according to EN ISO 9227)	J3

Footnotes see page 4

① = component side

② = plate side

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
LC	2A					-	1X	/															*

Seal material ⁷⁾

23	FKM seals (preferred)	F
	NBR seals (see page 7)	N
	H-ECOPUR seals (with version "450")	P
24	Further details in the plain text	

- 1) Due to the construction, the active area (A_A) can always only be combined with one of the two pilot oil pairs "Z1/Z2" or "X/Y". Any subsequent change from "Z1/Z2" to "X/Y" is only possible with NG125.
- 2) BG certificate, see page 30
- 3) Not for NG16, 25 and 32
- 4) Only with version "G08". Evaluation electronics designed and approved of for NAMUR interfaces are standard.
- 5) Mating connectors, separate order, see page 33.

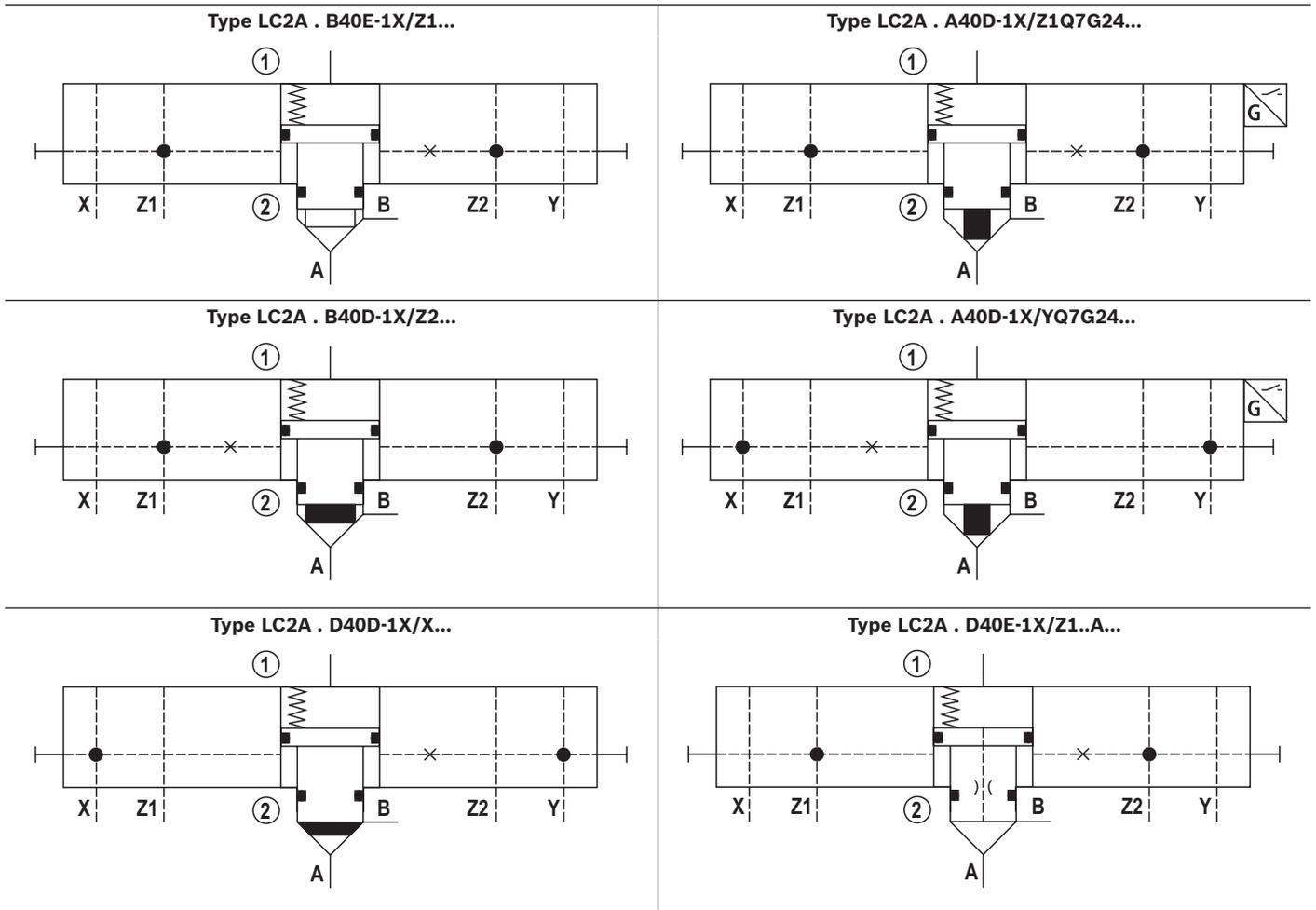
- 6) Only with type LC2A . D40E-1X/... for "check valve function"; the maximum pilot oil bore \varnothing has been determined according to the size.
- 7) The selection of the seal material depends on the operating parameters (fluid, temperature, etc.)

Order example orifice fitting:

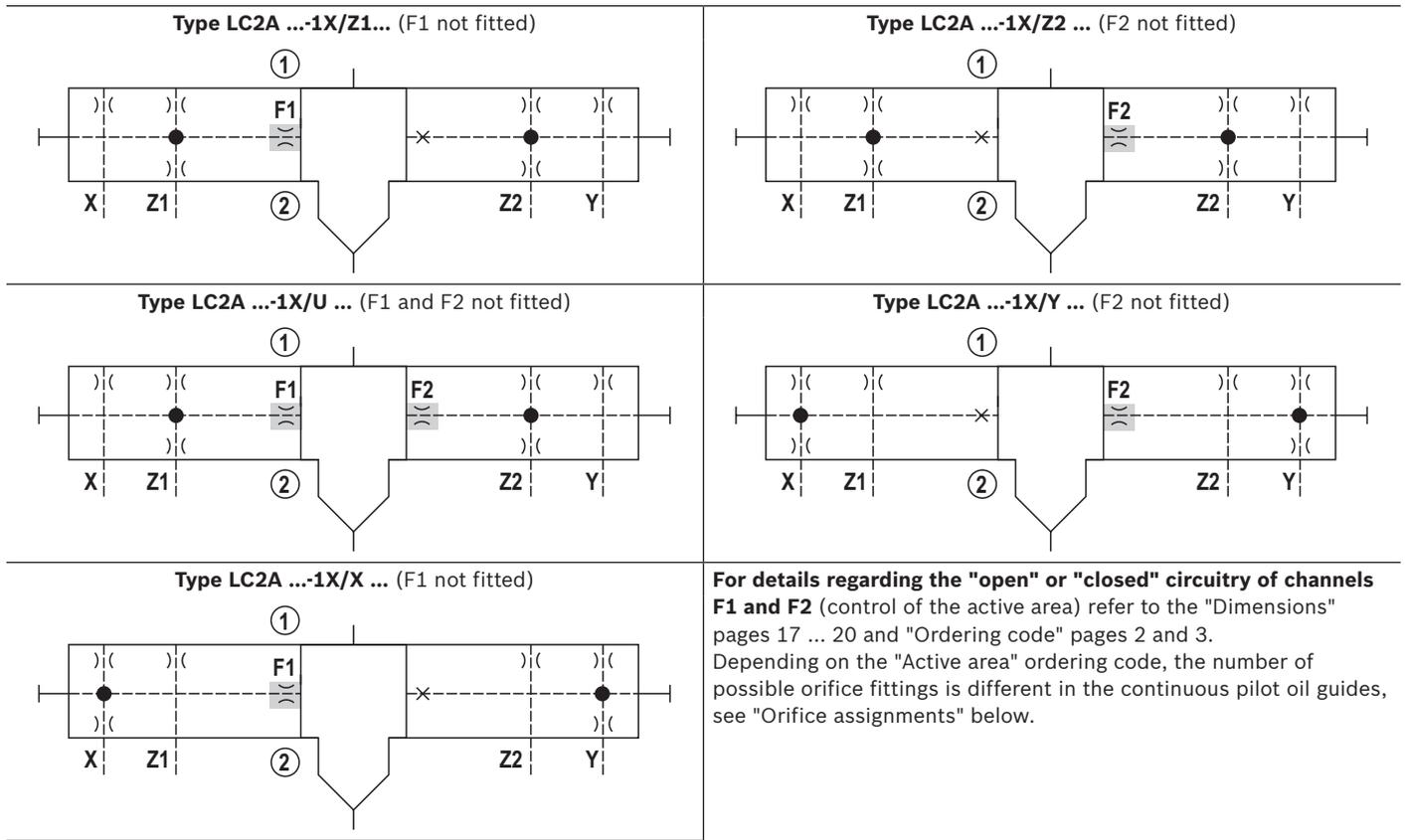
- ▶ ** = specification in mm x 10
e.g. Orifice \varnothing 1.2 mm in channel X - ① = "X12"
- ▶ "99" = blanking plug
e.g. blanking plug in channel Z2 - ① = "W99"

Symbols (① = component side, ② = plate side)

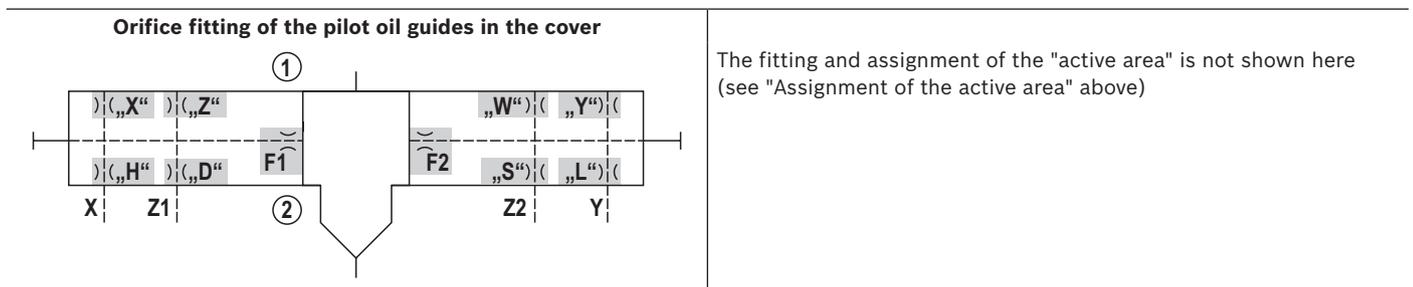
Examples of control spool forms and circuitries of the active area



Assignment of the "active area" A₄ (① = component side, ② = plate side)



Orifice assignments (① = component side, ② = plate side)



For details on the dimensions of the orifice installation bores "X" to "L", see "Dimensions" pages 17 ... 20. On the component side, the orifice installation bores are always completely available; on the plate side, only the combinations of versions "H" and "L" or "D" and "S" are possible, see "Ordering code" pages 2 and 3.

Notice: With control channels that are not required, you must either use a blanking plug ".99" or the corresponding cover.

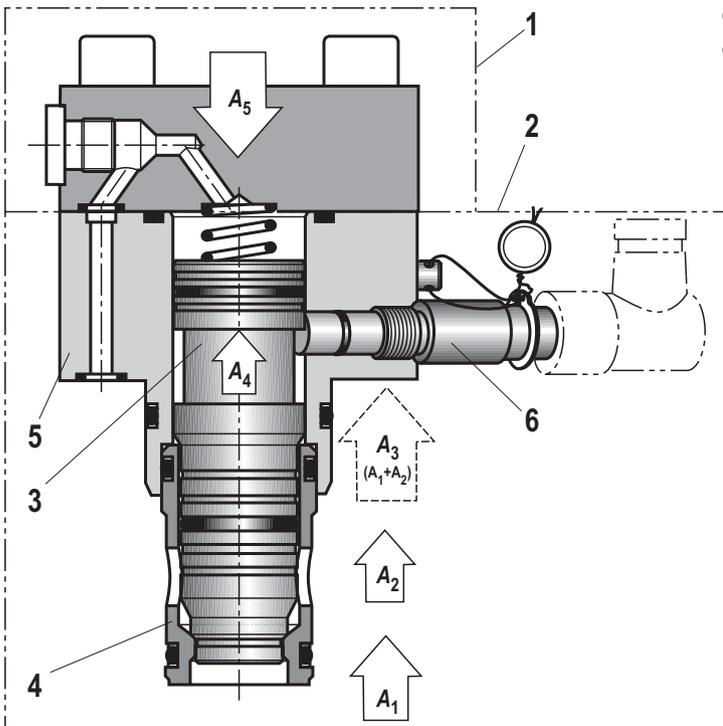
Function, section

General

The 2-way cartridge valves type LC2A (hereinafter referred to as "active logics" (2)) are designed in compact modular design and basically consist of cartridge (control spool (3) and socket (4)), intermediate cover (5) as fixed functional unit and a control cover type LFA (1) that is part of the Rexroth standard logics program. This control cover (separate order, see data sheet 21010 or 21050) establishes the connection with the pilot control valves and/or other hydraulic elements and thus integrates the most different functions - irrespective of the basic assembly. Virtually all standard and special control covers type LFA can be mounted.

Optionally, the active logics (2) is available with position switch (6). By default, the "closed" position of the control spool (3) is recorded. The receiving hole for the position switch is provided as a standard. This means that the position switch "Q7" can be retrofitted at any time without requiring adjustments.

In contrast to the logic assemblies with only one control area in the spring chamber ("passive logics"), the name "active logics" significantly stands for a version with differential spool, with at least one additional control area A_4 ("Two-level active logics"). This area allows for the opening and keeping open of the active logics (2) by means of pilot pressure (without the necessity of pressure in the main ports A or B).



Type LC2A 025 ...-1X/.Q7G24... (with control cover type LFA . D... and monitoring of the closed position of the valve poppet)

The spring chamber area A_5 of the control spool (3) consists of the individual areas $A_1 + A_2 + A_4$. Compared to passive logics without control area A_4 , this results in excess area which, with suitable hydraulic circuitry, offers advantages during closing and keeping closed (excessive force, closing velocity).

In general

$$\text{Area total } A_5 = A_1 + A_2 + A_4 = A_3 + A_4$$

The areas A_1 , A_2 and A_4 are effective in the opening direction, area A_5 (and the spring force) in closing direction. So the resulting effective force determines the position and movement of the control spool (3). Usually, there are no interim positions in the directional function variants. The direction of flow is free and can thus be perfectly adjusted to the application.

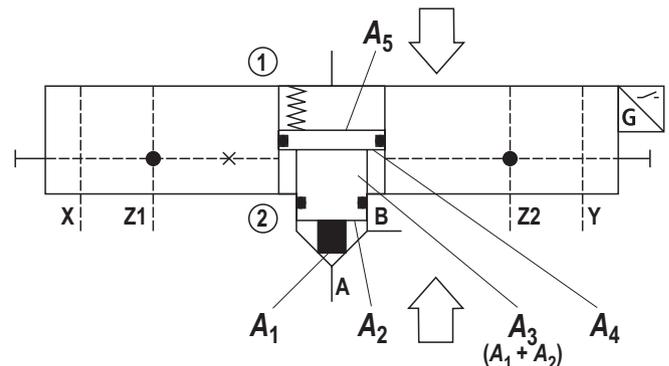
Active logics type LC2A are generally equipped with spool sealing and are therefore leakage-free inside. The seat area is hydraulically "tight".

Active logics for directional function

Depending on the task, different control spool versions are possible. The active area can be connected with the available pilot oil guides in almost any way and in this way, most different functions can be realized with only 1 basic assembly.

Installation bore

The active logics type LC2A can be directly installed in a standard installation bore according to ISO 7368 (see page 23). Thus, it is also suitable as retrofitting for existing "passive logics" that must be leakage-free inside or require position monitoring or faster closing times.



Technical data

(For applications outside these parameters, please consult us!)

general		
Ambient temperature range	°C	-20 ... +80
MTTF _D values according to EN ISO 13849	Years	150 (for further details, see data sheet 08012)
hydraulic		
Maximum operating pressure	bar	450
Maximum flow	l/min	17000 ¹⁾
Hydraulic fluid		See table below
Hydraulic fluid temperature range (at the valve working ports)	°C	--20 ... +80
Viscosity range	mm ² /s	2.8 ... 500
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 20/18/15 ²⁾

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP	NBR, FKM, H-ECOPUR	DIN 51524	90220
Bio-degradable ³⁾	▶ Insoluble in water	HETG	ISO 15380	90221
		HEES		
	▶ Soluble in water	HEPG	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	ISO 12922	90222
		HFDU (ester base)		
		HFDR		
	▶ Containing water ³⁾	HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620)	ISO 12922	90223



Important information on hydraulic fluids:

- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).

▶ Flame-resistant – containing water:

- Life cycle as compared to operation with mineral oil HL, HLP 30 ... 100%
- Maximum hydraulic fluid temperature 60 °C

- ▶ **Bio-degradable and flame-resistant:** If this hydraulic fluid is used, small amounts of dissolved zinc may get into the hydraulic system.

- 1) Measured with $p = 10$ bar; if functionally higher Δp values are admissible, higher flows are possible, as well.
- 2) The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.
For the selection of filters, see www.boschrexroth.com/filter.
- 3) Not recommended for corrosion-protected versions "J3" and "J5" (contains zinc)

Technical data

(For applications outside these parameters, please consult us!)

Size of the annulus area

Area in cm ²	Type	Size								
		16	25	32	40	50	63	80	100	125
A₁	LC2A . A...	1.89	4.26	6.79	11.1	19.63	30.2	37.9	63.6	–
	LC2A . B...	2.66	5.73	9.51	15.55	26.42	41.28	52.8	89.1	133.7
	LC2A . D...	2.84	6.16	10.18	16.62	28.27	44.2	56.74	95.0	–
A₂	LC2A . A...	0.95	1.89	3.39	5.52	8.64	14.0	18.84	31.4	–
	LC2A . B...	0.18	0.43	0.67	1.07	1.85	2.90	3.94	5.9	9.3
	LC2A . D...	–	–	–	–	–	–	–	–	–
A₃	LC2A . A/B/D...	2.84	6.16	10.18	16.62	28.27	44.2	56.74	95.0	143
A₄		0.62	1.39	2.39	3.81	5.94	8.75	11.2	19.1	22.0
A₅		3.46	7.55	12.6	20.4	34.2	52.8	67.9	114.0	165
Area ratio A₅ : A₄ ²⁾		5.58	5.43	5.27	5.35	5.76	6.03	6.06	5.97	7.5

- 2) When determining the nozzle diameters for influencing the switching time, please observe the area ratio **A₅ : A₄** (inflowing and outflowing hydraulic fluid in the control chambers **A₅** and **A₄**)
In case of non-compliance, pressure conversion can be applied!

Control spool form

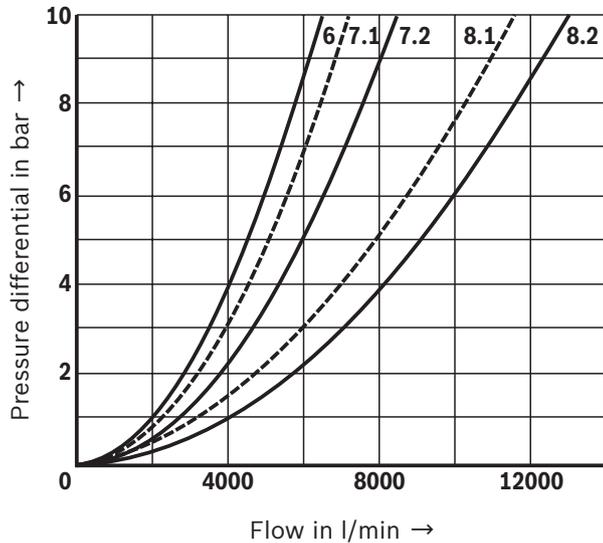
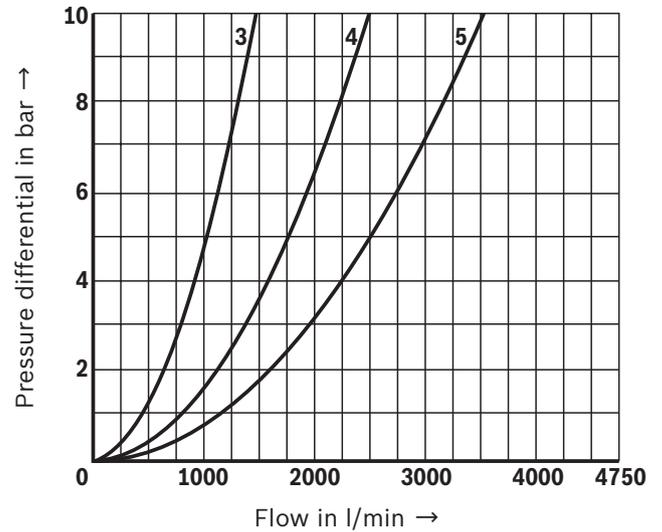
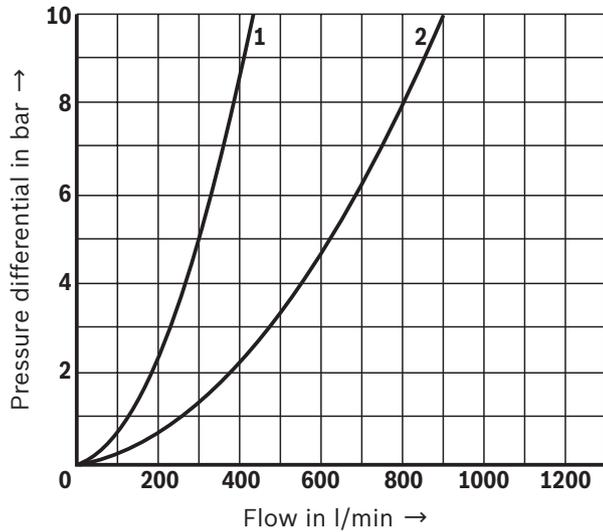
	Type	Size									
		16	25	32	40	50	63	80	100	125	
Stroke	cm	LC2A . .E...	0.9	1.17	1.4	1.7	2.1	2.3	2.4	3.0	–
		LC2A . .D...	0.9	1.17	1.4	1.9	2.3	2.8	3.0	3.8	4.8
		LC2A . .F...	0.9	1.17	1.4	1.9	2.3	2.8	3.0	3.8	4.8
Pilot volume	cm ³	LC2A . .E...	3.1	8.8	17.6	34.7	71.8	121.4	163.0	339.0	–
		LC2A . .D...	3.1	8.8	17.6	38.8	78.7	147.8	203.7	429.4	792
		LC2A . .F...	3.1	8.8	17.6	38.8	78.7	147.8	203.7	429.4	792
Theoretical pilot flow ³⁾	l/min	LC2A . .E...	3.7	10.6	21.1	41.6	86.6	145.7	195.6	406.8	–
		LC2A . .D...	3.7	10.6	21.1	46.6	94.4	177.4	244.4	515.3	950.4
		LC2A . .F...	3.7	10.6	21.1	46.6	94.4	177.4	244.4	515.3	950.4
Weight	kg	LC2A ...	2.2	2.6	3.9	10.3	16.5	30.5	52.5	92.0	167

Cracking pressure in bar

Direction of flow A to B ⁴⁾	LC2A . A...	3.50	3.90	3.80	4.0	4.11	3.8	3.13	3.04	–
	LC2A . B...	2.48	2.90	2.70	2.86	3.05	2.8	2.25	2.17	1.45
Direction of flow B to A ⁴⁾	LC2A . A...	6.96	8.74	7.6	8.05	9.34	8.15	6.3	6.2	–
	LC2A . B...	36.6	38.3	38.6	41.5	43.6	39.4	30.2	32.5	20.7
Control open with active area	Version "40"	> 30								
	Without spring	>12								

- 3) Quantity indications refer to a theoretical switching time of **t** = 50 ms (control chamber **A₅**)
- 4) With direction of flow B → A, the control spool version "D" ("0%") has no immediately effective control open area (**A₂** = 0). For this direction of flow, the active area is to be controlled. We recommend a minimum pressure of 30 bar. The cracking pressure of the control spool version "D" almost corresponds to version "B" (A → B)

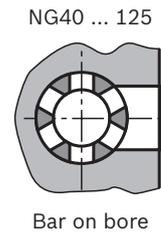
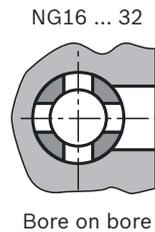
Characteristic curves: without damping nose "E", direction of flow A → B
 (simulated with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)



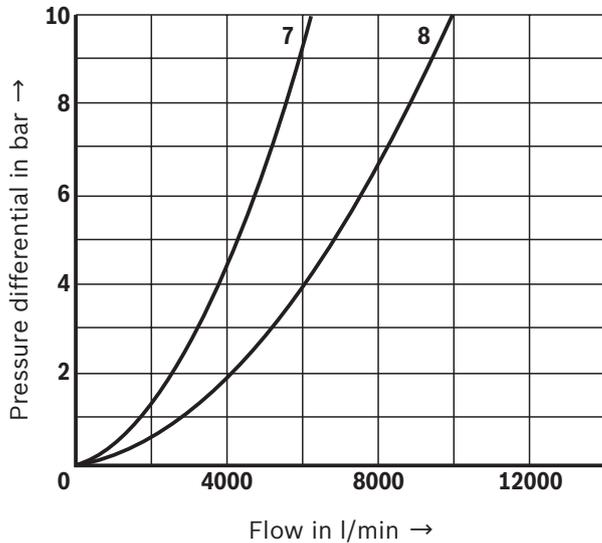
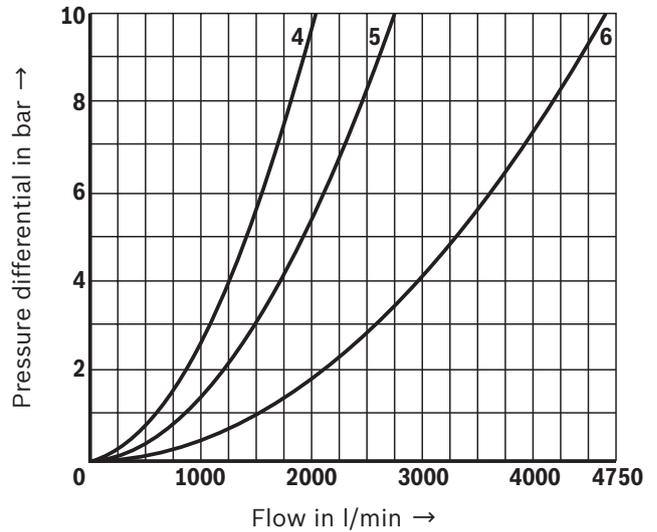
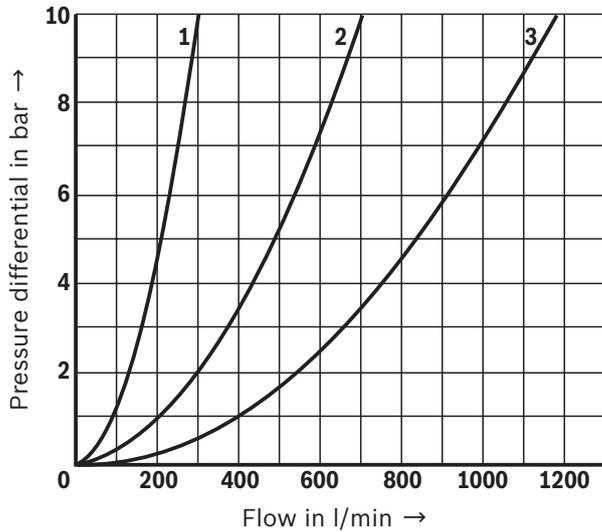
- 1 Size 16
- 2 Size 25
- 3 Size 32
- 4 Size 40
- 5 Size 50
- 6 Size 63
- 7.1 Size 80, control spool design "A"
- 7.2 Size 80, control spool design "B" and "D"
- 8.1 Size 100, control spool design "A"
- 8.2 Size 100, control spool design "B" and "D"

Notice:
 The specified characteristic curves were simulated with 100% spool stroke and an aligned socket (see sketch on the right). The simulation results were validated by measurement results. The basis was an installation geometry with $\varnothing D3^*$ (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

Recommended socket alignment:



Characteristic curves: without damping nose "E", direction of flow B → A
 (simulated with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

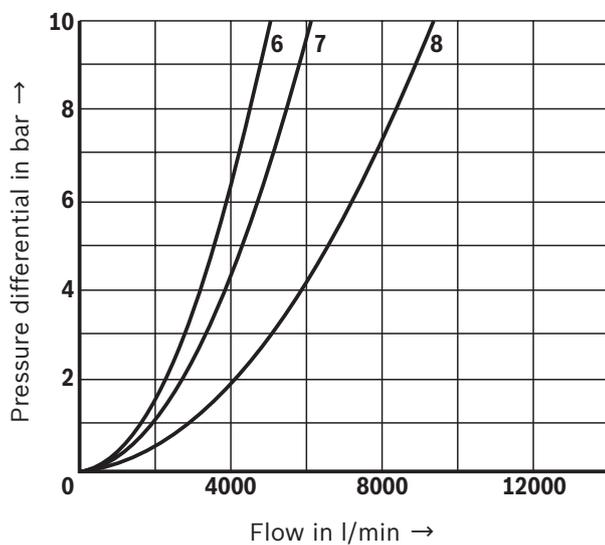
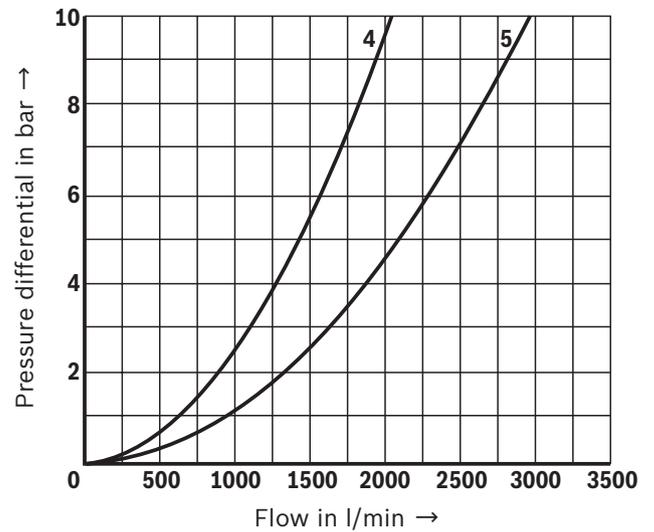
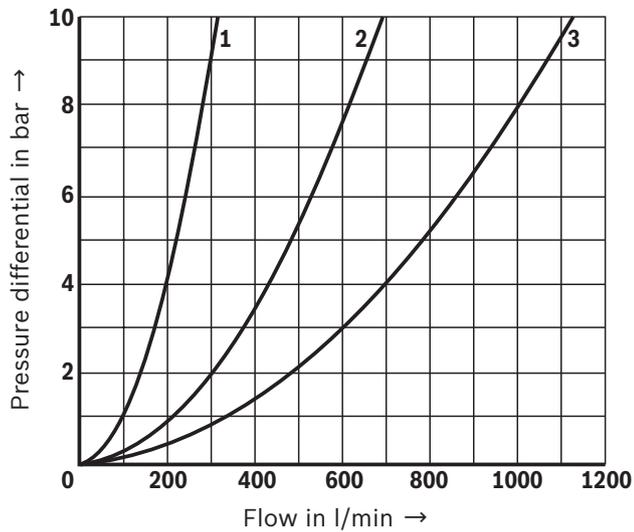


- 1 Size 16
- 2 Size 25
- 3 Size 32
- 4 Size 40
- 5 Size 50
- 6 Size 63
- 7 Size 80
- 8 Size 100

Notice:

The specified characteristic curves were simulated with 100% spool stroke and an aligned socket (see sketch on page 9). The simulation results were validated by measurement results. The basis was an installation geometry with $\varnothing D3^*$ (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

Characteristic curves: with damping nose "D", direction of flow A → B
(simulated with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

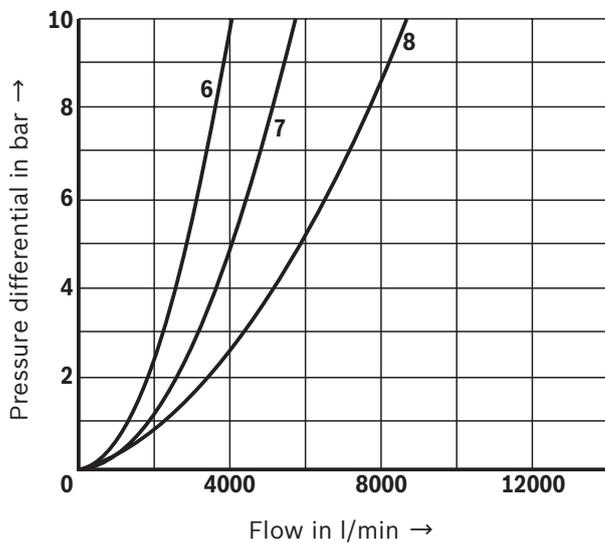
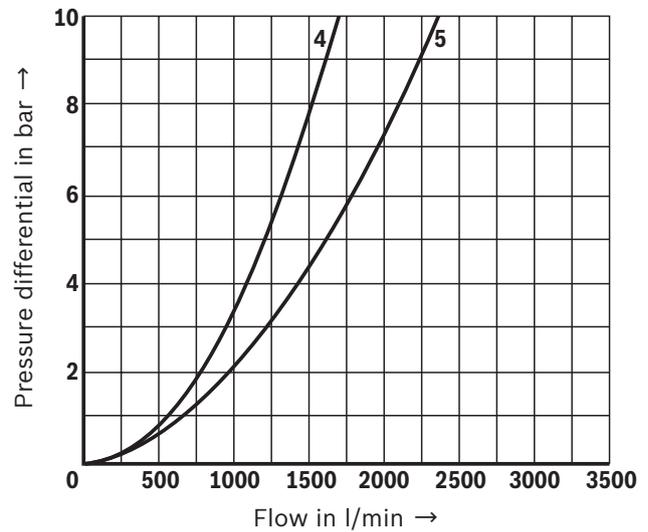
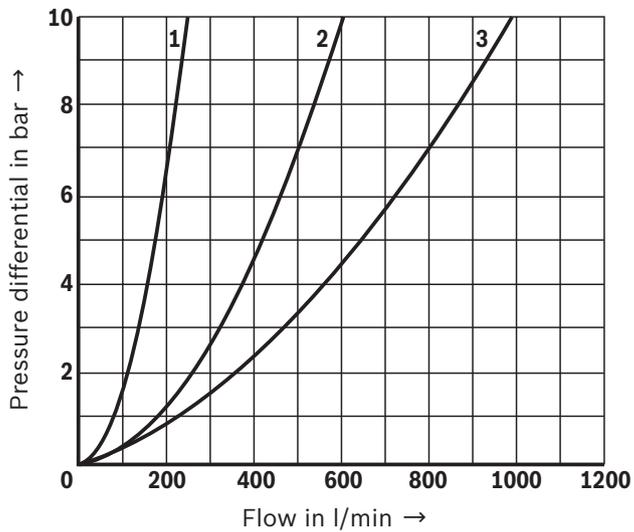


- 1 Size 16
- 2 Size 25
- 3 Size 32
- 4 Size 40
- 5 Size 50
- 6 Size 63
- 7 Size 80
- 8 Size 100

Notice:

The specified characteristic curves were simulated with 100% spool stroke and an aligned socket (see sketch on page 9). The simulation results were validated by measurement results. The basis was an installation geometry with $\varnothing D3^*$ (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

Characteristic curves: with damping nose "D", direction of flow B → A
(simulated with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

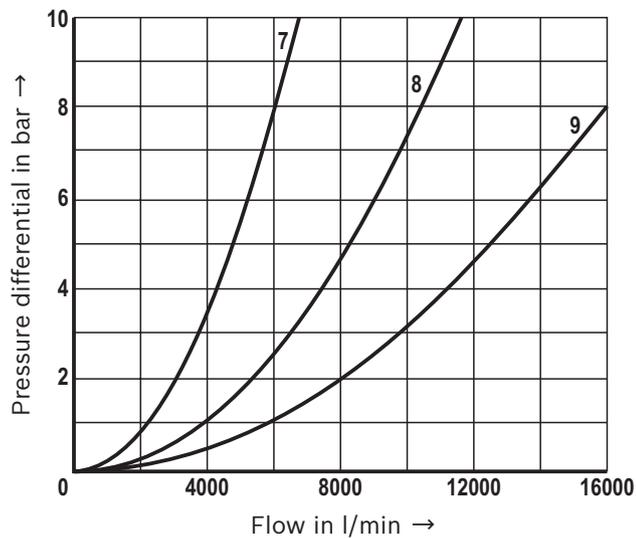
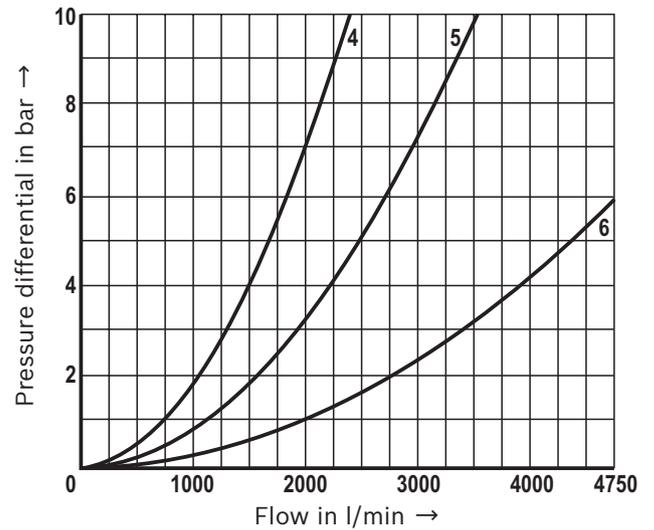
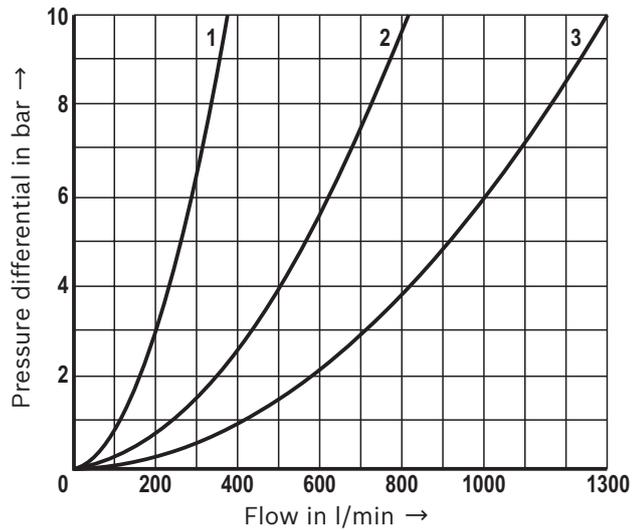


- 1 Size 16
- 2 Size 25
- 3 Size 32
- 4 Size 40
- 5 Size 50
- 6 Size 63
- 7 Size 80
- 8 Size 100

Notice:

The specified characteristic curves were simulated with 100% spool stroke and an aligned socket (see sketch on page 9). The simulation results were validated by measurement results. The basis was an installation geometry with $\varnothing D3^*$ (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

Characteristic curves: with overlap "F", direction of flow A → B
(simulated with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ °C}$)

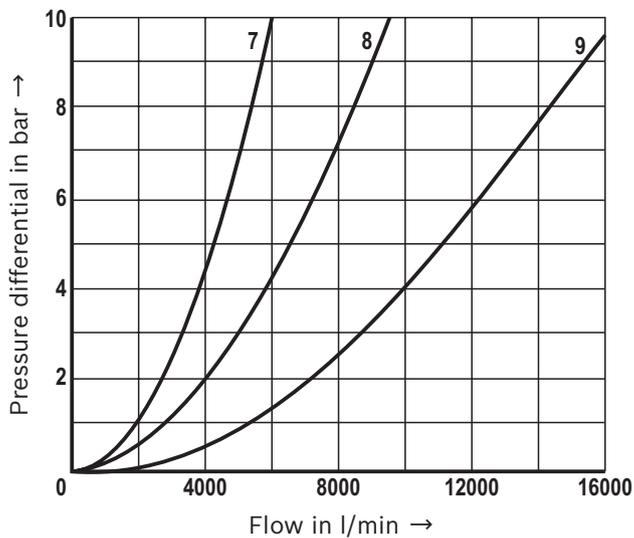
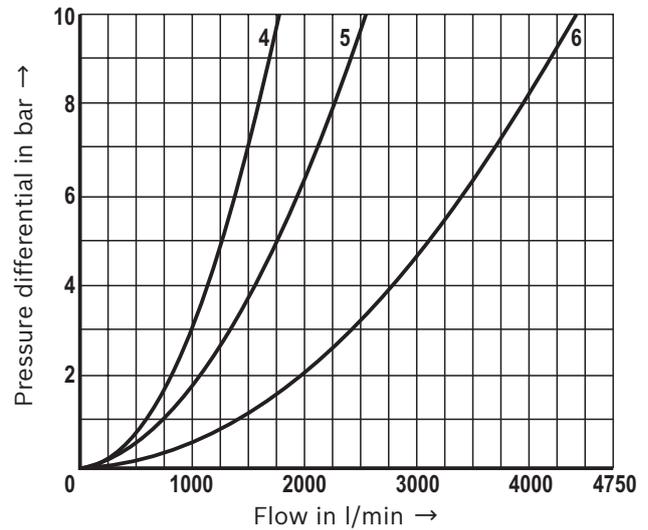
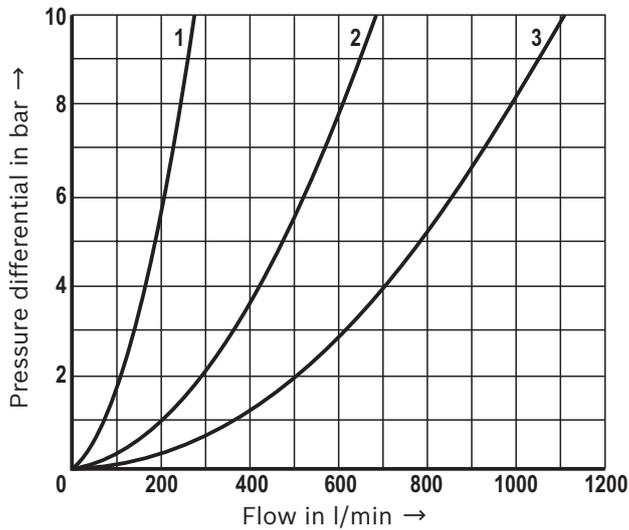


- 1 Size 16
- 2 Size 25
- 3 Size 32
- 4 Size 40
- 5 Size 50
- 6 Size 63
- 7 Size 80
- 8 Size 100
- 9 Size 125

Notice:

The specified characteristic curves were simulated with 100% spool stroke and an aligned socket (see sketch on page 9). The simulation results were validated by measurement results. The basis was an installation geometry with $\varnothing D3^*$ (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

Characteristic curves: with overlap "F", direction of flow B → A
(simulated with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

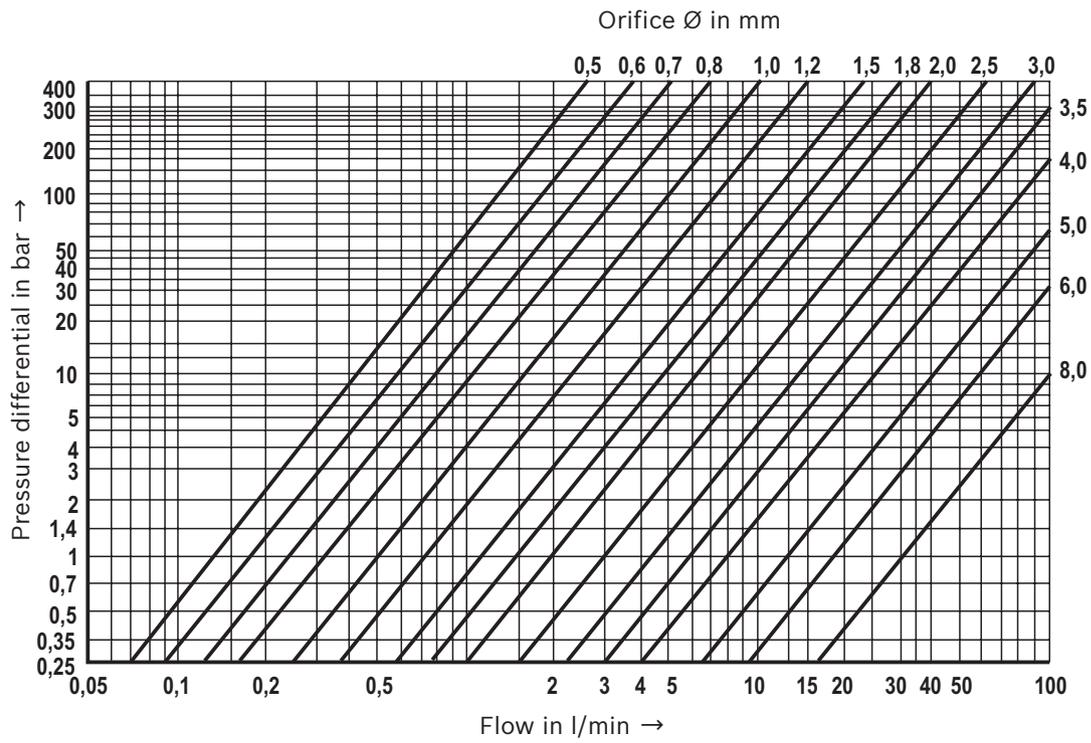


- 1 Size 16
- 2 Size 25
- 3 Size 32
- 4 Size 40
- 5 Size 50
- 6 Size 63
- 7 Size 80
- 8 Size 100
- 9 Size 125

Notice:

The specified characteristic curves were simulated with 100% spool stroke and an aligned socket (see sketch on page 9). The simulation results were validated by measurement results. The basis was an installation geometry with $\varnothing D3^*$ (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

Characteristic curves for selecting the orifices



Orifices and plug screws

Orifices

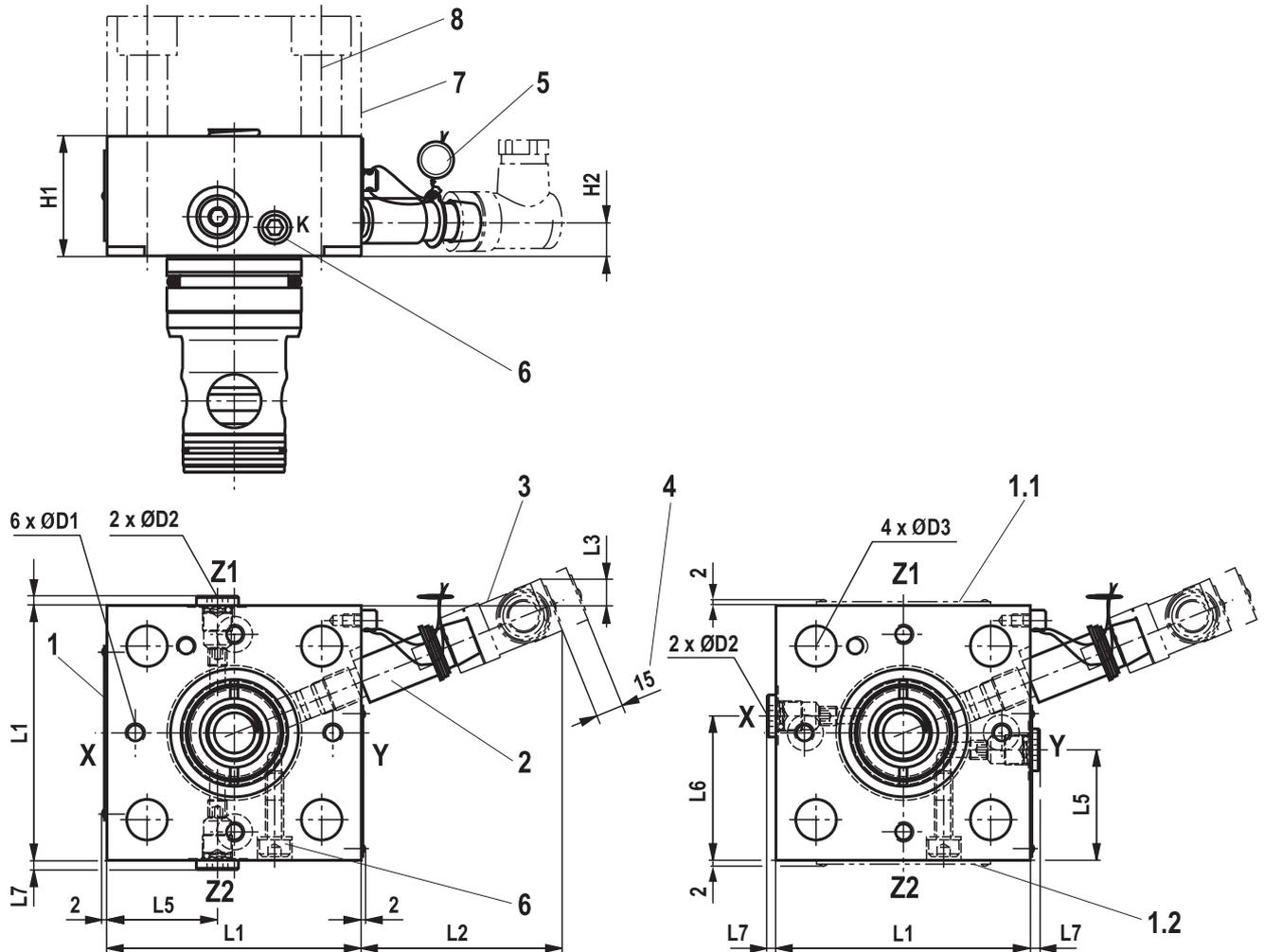
Orifice Ø in mm	Order numbers	Material numbers						
		M6 conical	M8x1 conical	G 1/8 conical	G 1/4 conical	G 3/8 conical	G 1/2 conical	G 1 conical
–	00	–	–	–	–	–	–	–
0.5	05	R913040356	R913017600	R913030187	R913040456	–	–	–
0.6	06	R913040358	R913017605	R913017606	R913020197	–	–	–
0.7	07	R913040360	R913017609	R913046092	–	–	–	–
0.8	08	R913029447	R913017614	R913017616	R913017615	R913040481	R913040499	–
1.0	10	R913019186	R913017621	R913024679	R913017622	R913040484	R913040500	–
1.2	12	R913040362	R913017627	R913017629	R913017628	R913040486	R913040501	–
1.5	15	R913028337	R913017637	R913017639	R913017638	R913040488	R913028317	–
1.8	18	R913030186	R913017644	R913017646	R913017645	R913040489	R913045913	–
2.0	20	R913029870	R913017651	R913040450	R913017652	R913028417	R913028336	–
2.5	25	R913032543	R913035796	R913017656	R913019582	R913040493	R913040502	–
3.0	30	R913040368	R913017661	R913017663	R913017662	R913018266	R913040503	R913040467
3.5	35	–	R913017667	R913040452	R913040463	R913028318	R913019856	R913040469
4.0	40	–	R913017670	R913027078	R913040464	R913018265	R913029168	R913040470
4.5	45	–	R913046571	R913017671	R913040465	–	R913040506	–
5.0	50	–	–	R913017673	R913040468	R913023871	R913019857	R913040471
5.5	55	–	–	R913027077	–	R913040495	R913053659	–
6.0	60	–	–	–	–	R913023870	R913028418	R913020247
7.0	70	–	–	–	R913040461	R913017675	R913040509	–
7.5	75	–	–	–	–	R913023430	–	R913018328
8.0	80	–	–	–	–	R913046570	R913040510	R913020246
closed	99	R913019128	R913019129	R913019137	R913019136	R913019138	–	R913019140

Plug screws

Thread	Tightening torque M_A in Nm $\pm 10\%$	
	420 bar	450 bar
G1/8	12	18
G1/4	30	45
G3/8	55	83
G1/2	80	120
G3/4	135	175
G1	225	270

Dimensions: NG16 ... 63
(dimensions in mm)

With spool position monitoring (1 position switch "Q7", position monitoring "closed")
(with version "450" only with pilot oil bore "Z1" and "Z2")



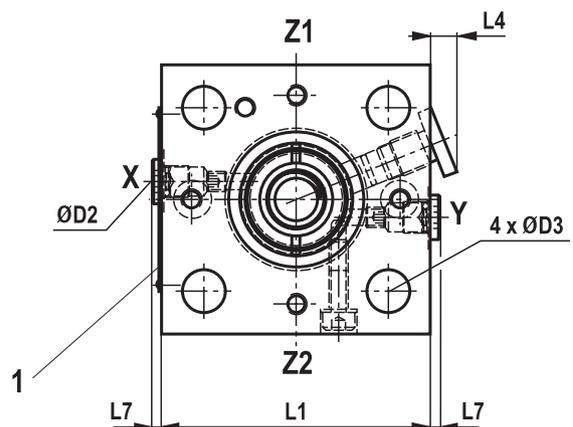
View: Version "Z1", "Z2" or "U"

View: Version "X" or "Y"
(not version "450")

NG	16	25	32	40	50	63
L1	80	85	100	125	140	180
L2	67	67	65	58	58	45
L3	15	9.5	2	-	-	-
L4	7	10	7	-	-	-
L5	34.5	37	45	56	63.5	82.5
L6	45.5	48	55	69	63.5	82.5
L7	5	5	5	5	5	5
L7 ¹⁾	10	10	10	11	11	11
H1	40	40	50	80	100	110
H2	11.5	11.5	13.5	29.5	42.5	45.5
ØD1	M6	M6	M8 x 1	G1/8	G1/8	G1/4
ØD2	G1/8	G1/8	G1/8	G1/4	G1/4	G3/8
ØD3	8.5	13.5	19	22	24	26 ⁺¹

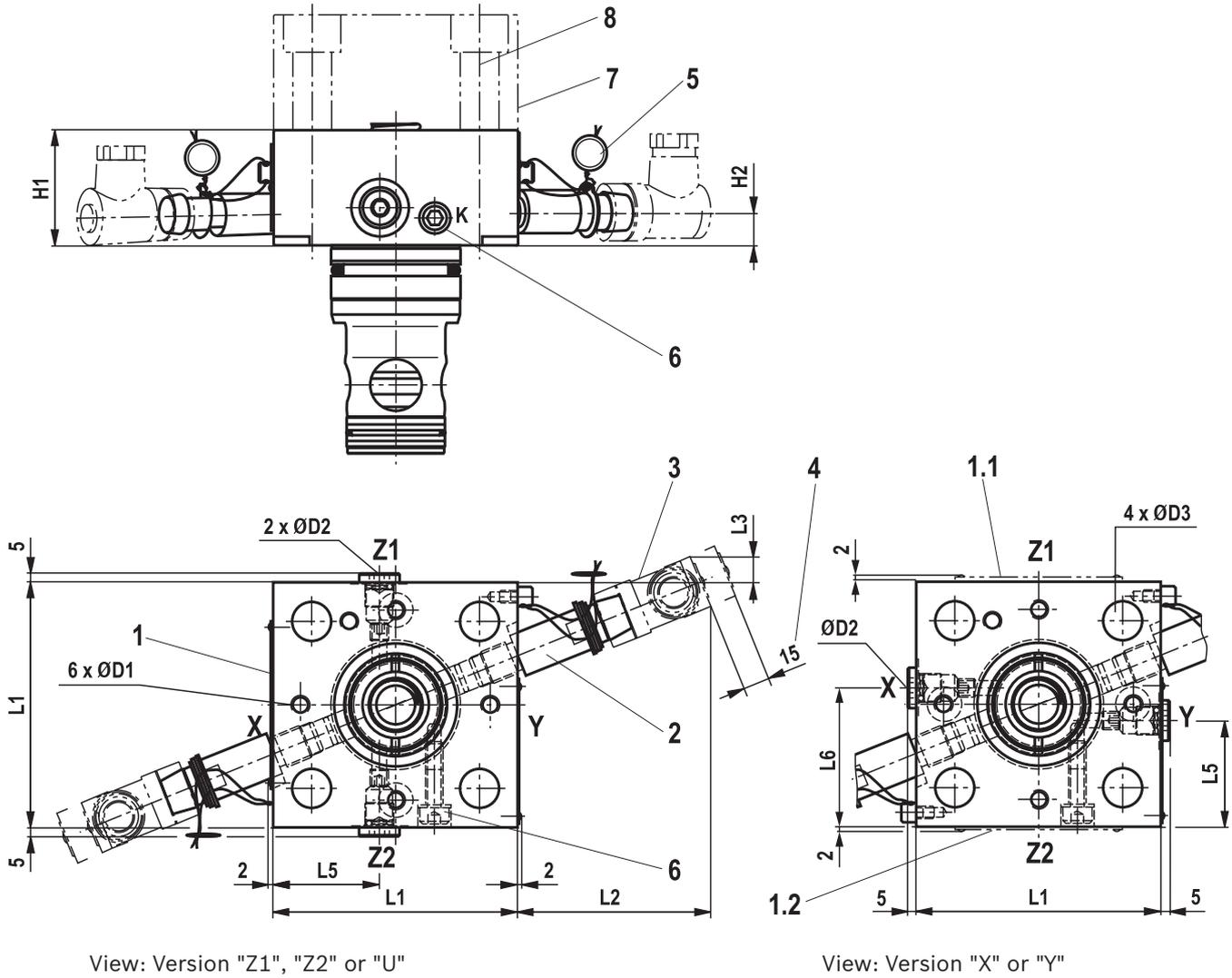
¹⁾ Version "450"

Without spool position monitoring (blind plug)



Dimensions: NG16 ... 32
(dimensions in mm)

With spool position monitoring (2 position switches "Q7", position monitoring "closed")
(not with version "450")



View: Version "Z1", "Z2" or "U"

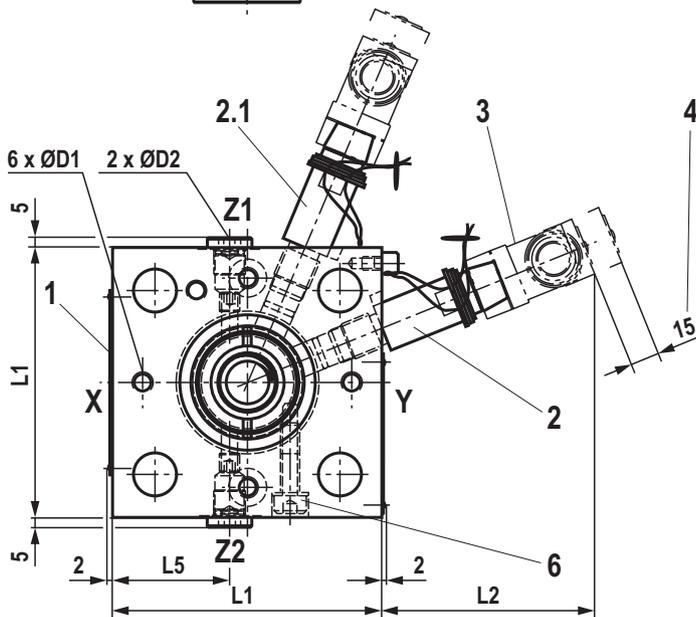
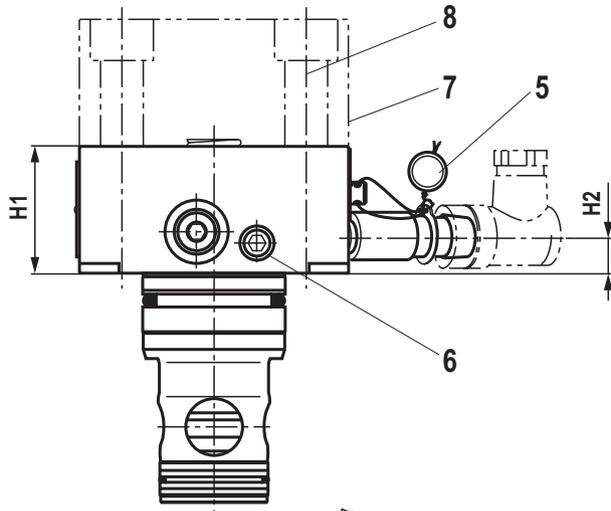
View: Version "X" or "Y"

NG	16	25	32
L1	80	85	100
L2	67	67	65
L3	15	9.5	2
L5	34.5	37	45
L6	45.5	48	55
H1	40	40	50
H2	11.5	11.5	13.5
ØD1	M6	M6	M8 x 1
ØD2	G1/8	G1/8	G1/8
ØD3	8.5	13.5	19

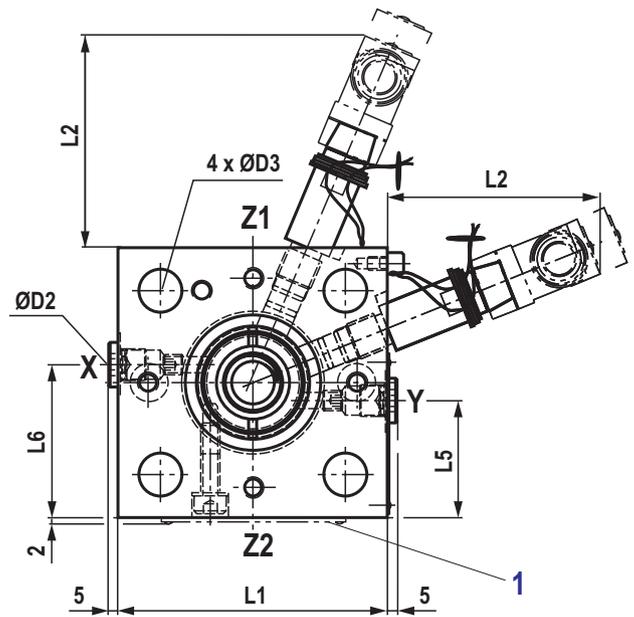
Item explanations see page 22.

Dimensions: NG40 ... 63
(dimensions in mm)

With spool position monitoring (2 position switches "Q7", position monitoring "closed" and "open")
(not with version "450")



View: Version "Z1", "Z2" or "U"



View: Version "X" or "Y"

NG	40	50	63
L1	125	140	180
L2	58	58	45
L5	56	63.5	82.5
L6	69	63.5	82
H1	80	100	110
H2 ¹⁾	29.5	42.5	45.5
H2 ²⁾	23	35	36
ØD1	G1/8	G1/8	G1/4
ØD2	G1/4	G1/4	G3/8
ØD3	22	24	26 ⁺¹

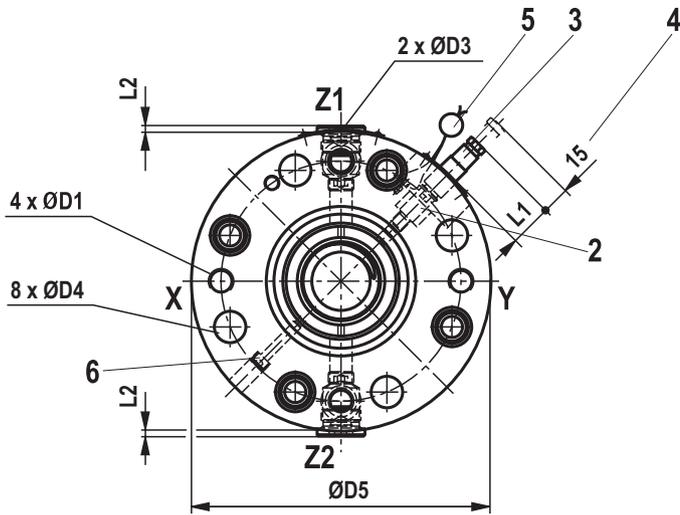
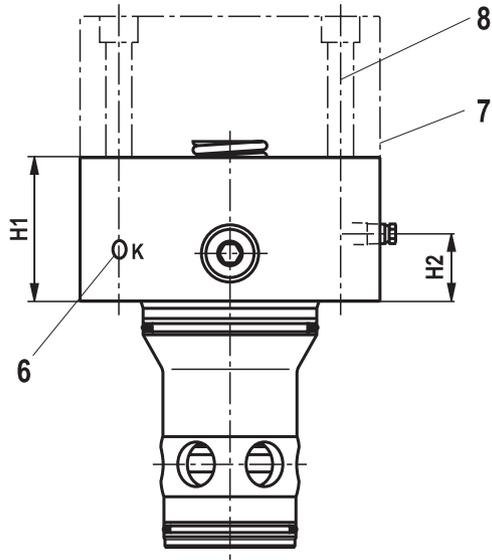
1) Position monitoring "closed"

2) Position monitoring "open"

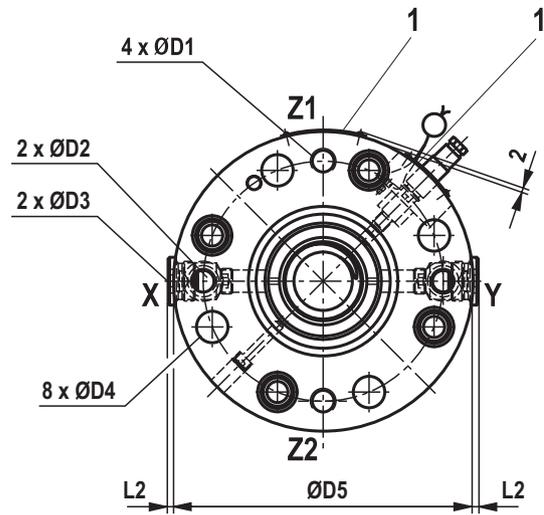
Item explanations see page 22.

Dimensions: NG80 ... 125
(dimensions in mm)

With spool position monitoring (1 position switch "Q7", position monitoring "closed")
(version "450" only up to NG100 and pilot oil bore "Z1" and "Z2")



View: Version "Z1", "Z2" or "U"



View: Version "X" or "Y"

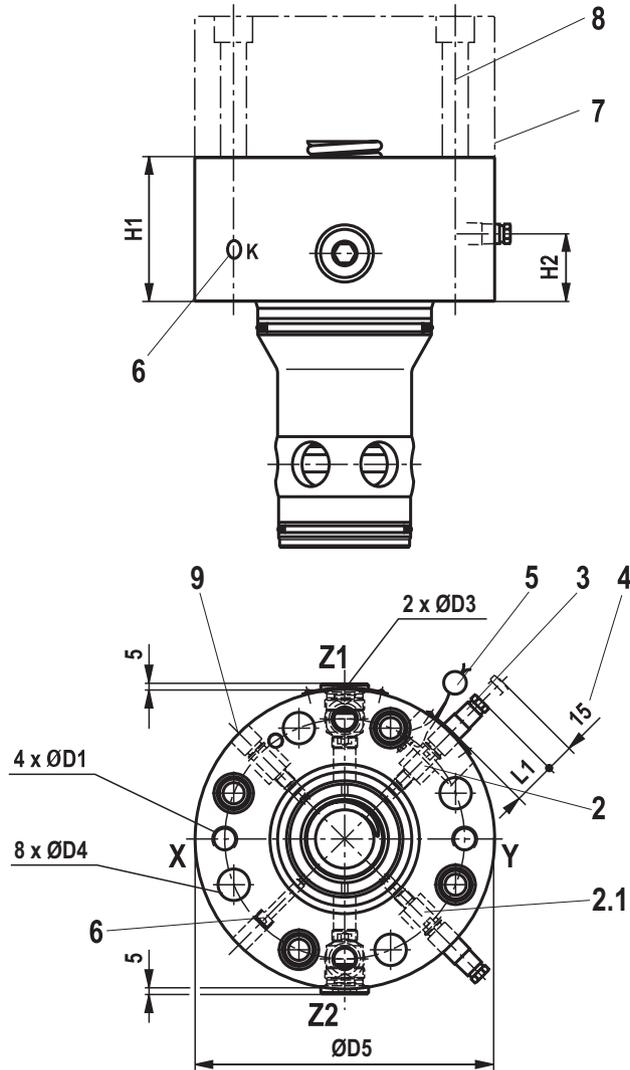
NG	80	100	125
ØD1	G1/2	G1/2	G3/4
ØD2	G1/2	G1/2	G1/2
ØD3	G1	G1	G3/4
ØD3 ¹⁾	G3/4	G3/4	-
ØD4	26 ⁺¹	33 ^{+0.5}	40
ØD5	250	300	380
L1	37	26	-
L2	5	5	5
L2 ¹⁾	13	13	-
H1	120	140	160
H2	48	55.2	65.2

Item explanations see page 22.

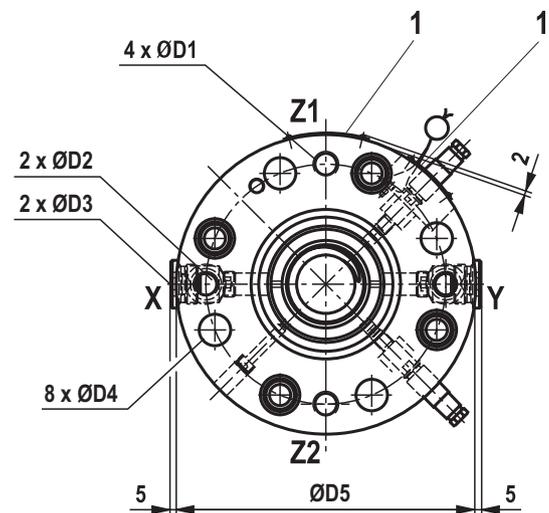
1) Version "450"

Dimensions: NG80 ... 125
(dimensions in mm)

With spool position monitoring (2 position switches "Q7", position monitoring "closed" and "open")
(not with version "450")



View: Version "Z1" or "Z2"



View: Version "X" or "Y"

NG	80	100	125
ØD1	G1/2	G1/2	G3/4
ØD2	G1/2	G1/2	G1/2
ØD3	G1	G1	G3/4
ØD4	26 ⁺¹	33 ^{+0.5}	40
ØD5	250	300	380
L1	37	26	-
H1	120	140	160
H2 ¹⁾	48	55.2	65.2
H2 ²⁾	37.3	44.7	54.5

1) Position monitoring "closed"

2) Position monitoring "open"

Item explanations see page 22.

Dimensions

- 1 Name plate
- 1.1 Name plate NG16 and 25
- 1.2 Name plate NG32 ... 63
- 2 Position switch (optional) or blind plug
- 2.1 Position switch "open" ("Q7T")
- 3 Mating connector (separate order, see page 33)
- 4 Space required for removing the mating connector
- 5 Sealing by the factory
- 6 Transport lock for control spool (marking K).
Don't remove! Loosening or removal and installation only admissible in case of service/repair!
- 7 Standard end/control cover type LFA... (separate order, depends on the basic hydraulic function)
- 8 Valve mounting screws (separate order, see table below)
- 9 Connection possibility for a 3rd position switch "closed" (optional, only NG125)

Valve mounting screws (separate order)

NG	Control cover type LFA		Hexagon socket head cap screws ISO 4762 - 10.9-fIZn/nc/480h/C				
			Quantity	Dimension	Material number (preferred)	Tightening torque $M_A^{2)}$ in Nm $\pm 10\%$	
	420 bar	450 bar				420 bar	450 bar
16	1)	D, H	4	M8x80	R913015803	30	
	WE., GW.	KWMA		M8x85	R913004145		
	–	WEM., GWMA20		M8x95	R913015806		
	WEM.	–		M8x110	R913015792		
	HWM.	HWM.		M8x140	R913018191		
25	1)	D, H, WEM., KWMA	4	M12x90	R913015617	100	90
	–	GWMA20		M12x130	R913015591		
	HWM.	HWM.		M12x140	R913015593		
32	1)	D, WEM, KWMA,	4	M16x110	R913015642	240	220
	H3, H4	–		M16x120	R913014711		
	H1, H2	H1, H2		M16x130	R913014713		
	–	GWMA20		M16x140	R913015591		
	HWM.	HWM.		M16x160	R913015647		
40	1)	D, WEM, KWMA,	4	M20x150	R9130157676	480	430
	–	GWMA20		M20x180	R913014714		
	H., HWM.	H., HWM.		M20x190	R913015680		
50	1)	D, WEM, KWMA, GWMA20	4	M20x180	R913014714	480	430
	H., HWM.	H., HWM.		M20x220	R913014716		
63	1)	D, WEM, KWMA, GWMA20	4	M30x210	R913015754	1600	1500
	H., HWM.	H., HWM.		M30x260	R913015758		
80	1)	D, WEM, GWMA20	8	M24x220	R913015719	800	750
	H2, H4	H., KWMA		M24x240	R913015721		
100	D, WE.	D, GWMA20, KWMA	8	M30x260	R913015758	1600	1500
	1)	H.		M30x280	R913015760		
125	H., WEM, WE, D	–	8	M36x320	R913050473	2300	–

1) More available series control covers

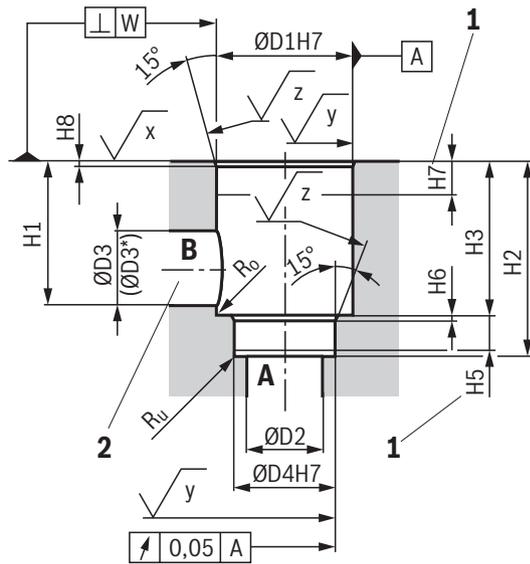
2) Calculated with total friction coefficient $\mu = 0.09 \dots 0.14$, adjust in case of modified surfaces

Notice:

The length of the valve mounting screws of the active logics (intermediate cover) must be selected according to the related control cover type LFA...

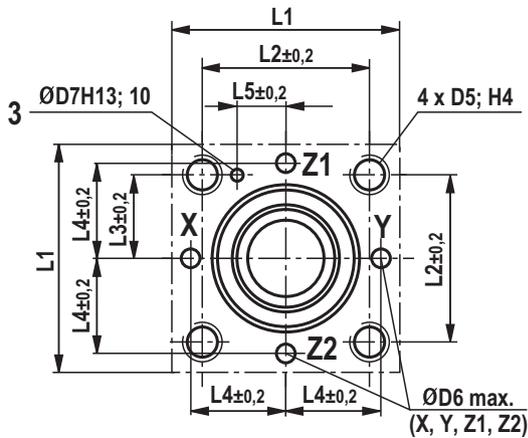
Screw type, screw length and tightening torque are to be adjusted to the conditions depending on the application. For reasons of stability, exclusively the valve mounting screws listed above may be used.

Installation bore and connection dimensions according to DIN ISO 7368
(dimensions in mm)

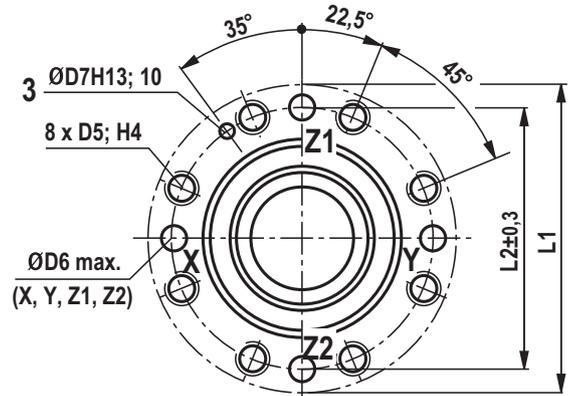


- \sqrt{x} = $\sqrt{Rz1max\ 4}$
- \sqrt{y} = $\sqrt{Rz1max\ 8}$
- \sqrt{z} = $\sqrt{0,0025- / Pt\ max\ 16}$

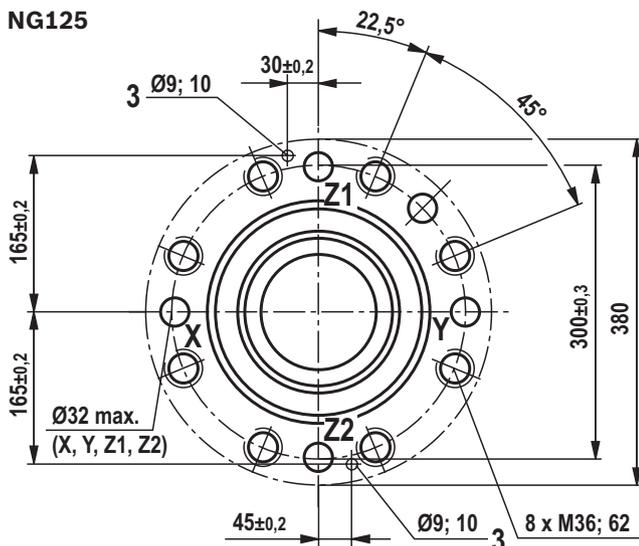
NG16 ... 63



NG80 and 100



NG125



- 1 Depth of fit
- 2 Port B can be positioned around the central axis of port A. However, it must be observed that the mounting bores and the pilot oil bores are not damaged.
- 3 Bore for locating pin

Notes:

- ▶ All information on the mounting bore D5 is based on the use of hexagon socket head cap screws according to ISO 4762.
- ▶ Installation see assembly instructions 21040-MON.

Dimensions see page 24.

Installation bore and connection dimensions according to DIN ISO 7368 (dimensions in mm)

NG	16	25	32	40	50	63	80	100	125
ØD1H7	32	45	60	75	90	120	145	180	225
ØD2	16	25	32	40	50	63	80	100	150
ØD3	16	25	32	40	50	63	80	100	125
ØD3* ¹⁾	25	32	40	50	63	80	100	125	160
ØD4H7	25	34	45	55	68	90	110	135	200
ØD5	M8	M12	M16	M20	M20	M30	M24	M30	–
ØD6	4	6	8	10	10	12	16	20	–
ØD7H13	4	6	6	6	8	8	10	10	–
H1	42.5	57	68.5	84.5	97.5	127	170.5	205.5	255
H2	56 ^{+0.1}	72 ^{+0.1}	85 ^{+0.1}	105 ^{+0.1}	122 ^{+0.1}	155 ^{+0.1}	205 ^{+0.1}	245 ^{+0.1}	300 ^{+0.15}
H3	43 ^{±0.2}	58 ^{±0.2}	70 ^{±0.2}	87 ^{±0.3}	100 ^{±0.3}	130 ^{±0.3}	175 ^{±0.4}	210 ^{±0.4}	257 ^{±0.5}
H4	20	25	35	45	45	65	50	63	–
H5	11	12	13	15	17	20	25	29	31
H6	2	2.5	2.5	3	3	4	5	5	7 ^{±0.5}
H7	20	30	30	30	35	40	40	50	50
H8	2	2.5	2.5	3	4	4	5	5	5.5 ^{±0.2}
H9	0.5	1	1.5	2.5	2.5	3	4.5	4.5	2
L1	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	0.1	0.1	0.1	0.1
R _o ²⁾	2	2	2	4	4	4	4	4	4
R _u ²⁾	1	1	1	1	1	1	1	1	1

1) Due to the use of a bore with ØD3*, port B protrudes over the upper limit of the area intended in ISO 7368. This is, however, possible due to the sealing concept and reduces the pressure loss during flow through the valve. Thus, we recommend a bore with ØD3*.

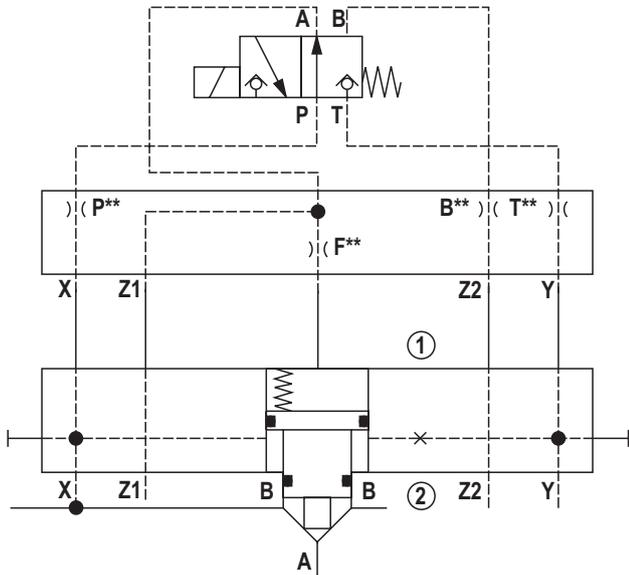
2) Maximum dimension

Circuit examples (schematic diagram, function must be checked with the application)

Notice:

It has to be ensured that pilot oil ports that are not required (blanking plugs) and all pressurized transitions between LFA and LC2A (R-rings) are sealed. This is particularly true for variants marked with *.

Check valve, releasable

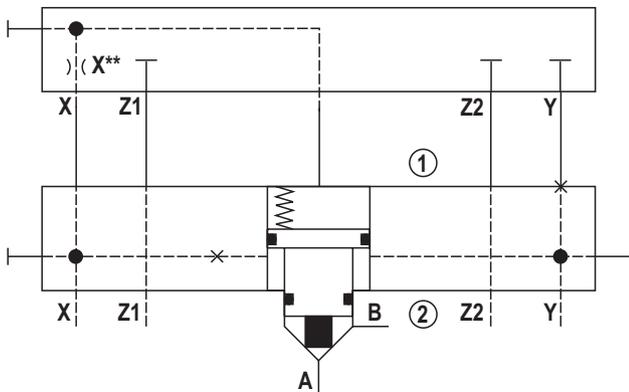


Type M-3SEW 6 U../420..

Type LFA . WEMA...

Type LC2A . A40E-1X/X...

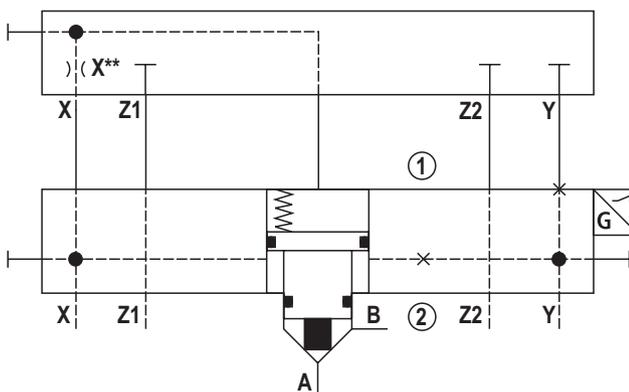
"Pressure-supported closing by excess area" function (e.g. with control cover type "D")



*Type LFA . D...

Type LC2A . A40D-1X/...Y99

"Passive logics with piston seal and spool position monitoring" function (closing with spring force without excess area; here with control cover type "D"); ideal for the retrofitting of existing circuits

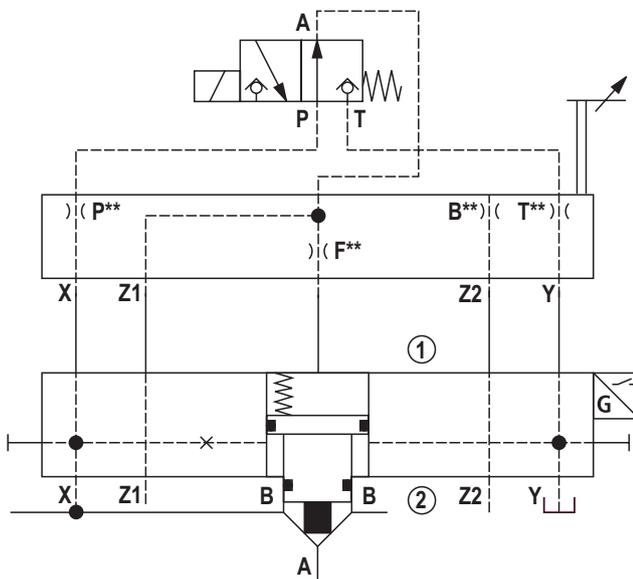


*Type LFA . D...

Type LC2A . A40D-1X/XQ7... Y99

Circuit examples (schematic diagram, function must be checked with the application)

"Passive logics with spool sealing" function, spool position monitoring and stroke limitation



Type M-3SEW . U../420..

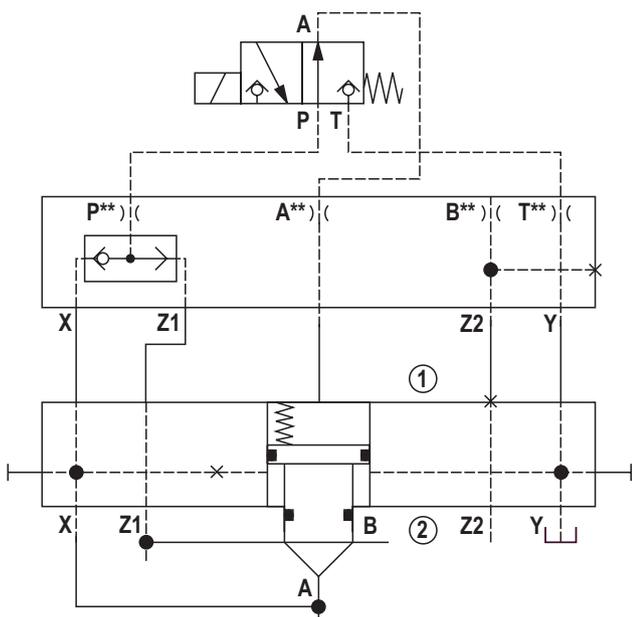
Type LFA . HWMA...

Type LC2A . A40D-1X/YQ7...

Advantages:

- ▶ Retrofitting for existing installation using the existing control cover type LFA and pilot control valves
- ▶ Leakage-free locking
- ▶ Position monitoring
- ▶ Shortened closing time

"Closed basic position" function; safe locking, increased closing force



Type M-3SEW 6 U../420..

Type LFA . GWMA...

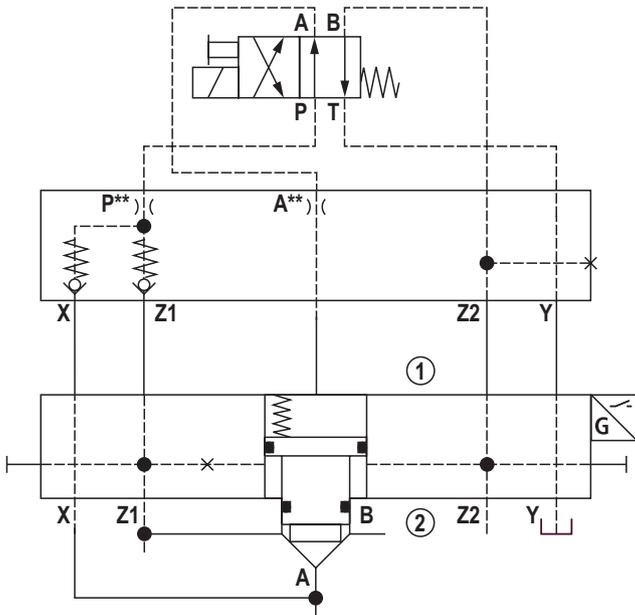
Type LC2A . D40E-1X/Y... (W99)

Advantages:

- ▶ "Safe locking" in both directions
- ▶ Control spool cannot be controlled open from side B (version "...D.E...")
- ▶ Position switch retrofittable
- ▶ Shortened switching time

Circuit examples (schematic diagram, function must be checked with the application)

"Separation between both pilot pressures and hydraulic keeping open in case of pilot pressure failure" function



Type M-4SEW . D../420..

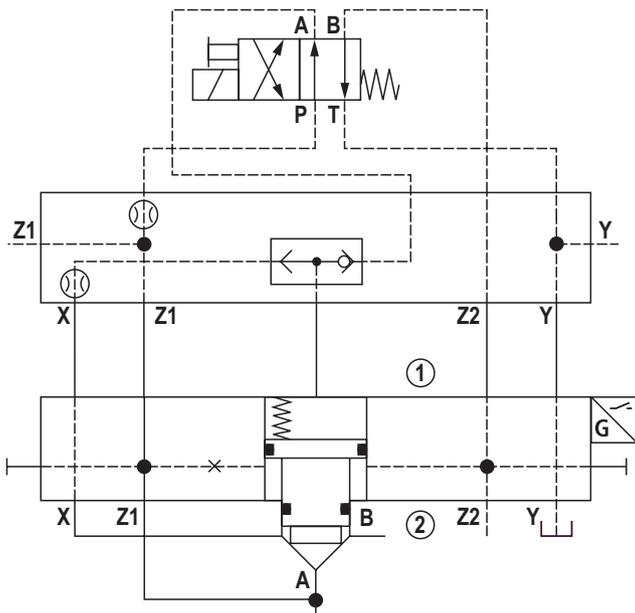
Type LFA . GWMA20...

Type LC2A . B40F-1X/Z2Q7...

Advantages:

- ▶ Leakage-free separation of the two pilot pressures "X" and "Z1"
- ▶ Function of a hydraulic detent ("Keeping open", also in case of pilot pressure failure)
- ▶ Permits complete pressure compensation of both main ports

"Check valve" and "Safe locking" function; increased closing force



Type M-4SEW . D../420..

Type LFA . KWMA...

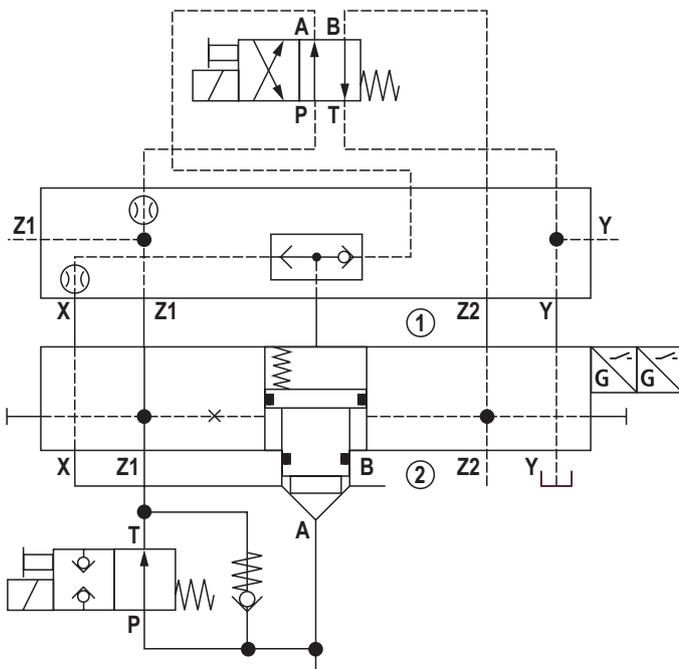
Type LC2A . B40F-1X/Z2Q7...

Advantages:

- ▶ Leakage-free locking
- ▶ Increased closing force (shortened closing time)

Circuit examples (schematic diagram, function must be checked with the application)

"Check valve" (releasable) and "Safe locking" function; "Keeping open" additional function



Type M-4SEW . D../420..

Type LFA . KWMA...

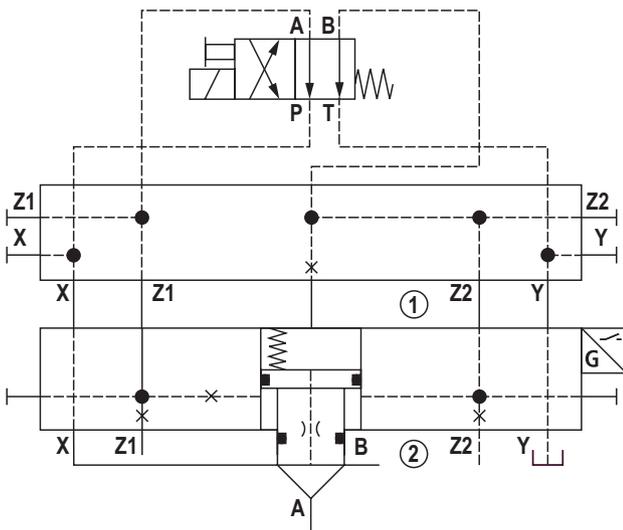
Type LC2A . B40F-1X/Z2Q7Q7T...



Advantages:

- ▶ "Safe locking" in both directions
- ▶ Check valve function that can be switched off
- ▶ Leakage-free locking
- ▶ Monitoring of the open and closed position

"Check valve circuit" function, self-locking, fast-closing



Type M-4SEW . D../420..

Type LFA 40 WEMB...F99

Type LC2A 040 D40E-1X/Z2Q9G24A160D99S99F



Advantages:

- ▶ Maximum load pressure in channel A 500 bar (condition: maximum pressure in channel B 250 bar)
- ▶ Very fast closing by internal spring chamber filling (e.g. NG63 < 20 ms)
- ▶ High locking force
- ▶ Analog position sensing (optional)

Inductive position switch type Q7: Electrical connection

The electrical connection is realized via a 4-pole mating connector with connection thread M12 x 1 (separate order, see page 33). The inductive position switch can be connected as normally closed or normally open contact.

Features:

- ▶ Adjustment-free assembly due to fixed stop
- ▶ Certification according to CE and cULus

Connection voltage:	12 ... 30 V, direct voltage								
Admissible residual ripple:	< 15%								
Load capacity:	200 mA; short-circuit-proof								
Tightening torque M_A	10^{+5} Nm								
Switching outputs:	PNP transistor outputs, load between switching outputs and GND								
Pinout:	<table border="1"> <tr> <td>1</td> <td>+U_B</td> </tr> <tr> <td>2</td> <td>Normally closed contact</td> </tr> <tr> <td>3</td> <td>L0</td> </tr> <tr> <td>4</td> <td>Normally open contact</td> </tr> </table>	1	+ U_B	2	Normally closed contact	3	L0	4	Normally open contact
1	+ U_B								
2	Normally closed contact								
3	L0								
4	Normally open contact								

Notes:

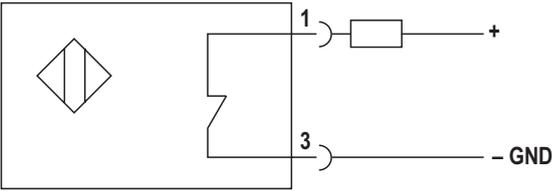
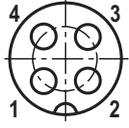
- ▶ The "closed" spool position is adjusted to and optimized for a condition at operating temperature. Considerably deviating operating temperatures thus influence the absolute switching position as well as its hysteresis.
- ▶ The position switch type Q7 has no connection for protective grounding conductors!
- ▶ Assembly tool for position switch type Q7 or blind plug upon request.
- ▶ **BG certificate** (only size 16 ... 100 and valve poppet version "D" and "F"):
The respectively valid "MHHW 10014" certificate for using the active logics type LC2A with position switch type Q7 in hydraulic security locks in injection molding machines according to the manufacturer's installation instructions is available upon request.

Inductive position switch type Q8: Electrical connection

The electrical connection is realized via a 4-pole mating connector (separate order, see page 33) with connection thread M12 x 1.

Features:

- ▶ Certification according to CE
- ▶ Explosion protection according to Ex II 2G Ex ia IIC T6
- ▶ Use not with version "450"

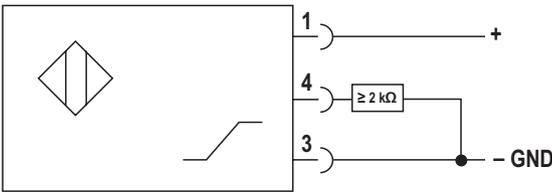
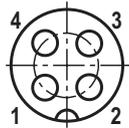
Connection voltage:	8.2 V +9%/-6%, direct voltage								
Maximum current consumption, damped:	1 mA								
Maximum current consumption, not damped:	4 mA								
Tightening torque M_A	10^{+5} Nm								
Switching outputs:	NAMUR evaluation electronics necessary								
									
Pinout:									
	<table border="1"> <tr> <td>1</td> <td>Current source</td> </tr> <tr> <td>2</td> <td>-</td> </tr> <tr> <td>3</td> <td>0 V, GND</td> </tr> <tr> <td>4</td> <td>-</td> </tr> </table>	1	Current source	2	-	3	0 V, GND	4	-
1	Current source								
2	-								
3	0 V, GND								
4	-								

Inductive sensor with analog output type Q9: Electrical connection

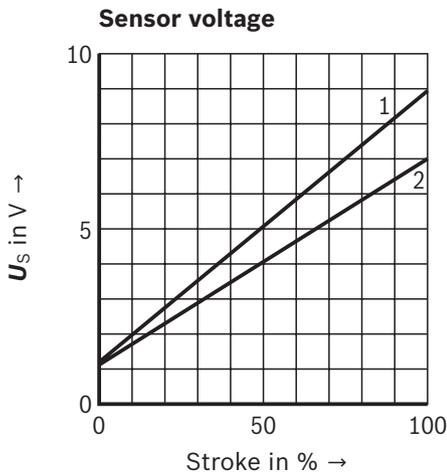
The electrical connection is realized via a 4-pole mating connector with connection thread M12 x 1 (separate order, see page 33).

Features:

- ▶ Certification according to CE

Connection voltage:	15 ... 30 V, direct voltage								
Admissible residual ripple:	< 15%								
Tightening torque M_A	10^{+5} Nm								
Analog output:	Load resistance ≥ 2 k Ω $U_S = 1 \dots 9$ V DC (in the installed, adjusted condition) Notice: The maximum sensor voltage U_S with 100% stroke is size- and/or tolerance-dependent and may range between 7 and 9 V DC. The inductive sensor is adjusted so that with 0% stroke, an output voltage of 1 V DC is available.								
									
Pinout:									
	<table border="1"> <tr> <td>1</td> <td>+U_B</td> </tr> <tr> <td>2</td> <td>-</td> </tr> <tr> <td>3</td> <td>L0</td> </tr> <tr> <td>4</td> <td>+U_S V DC</td> </tr> </table>	1	+ U_B	2	-	3	L0	4	+ U_S V DC
1	+ U_B								
2	-								
3	L0								
4	+ U_S V DC								

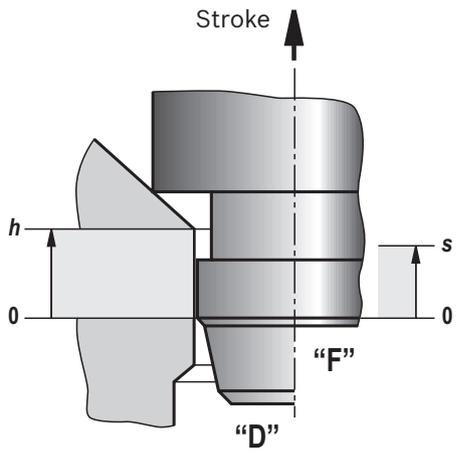
Inductive sensor with analog output type Q9: Characteristic curve



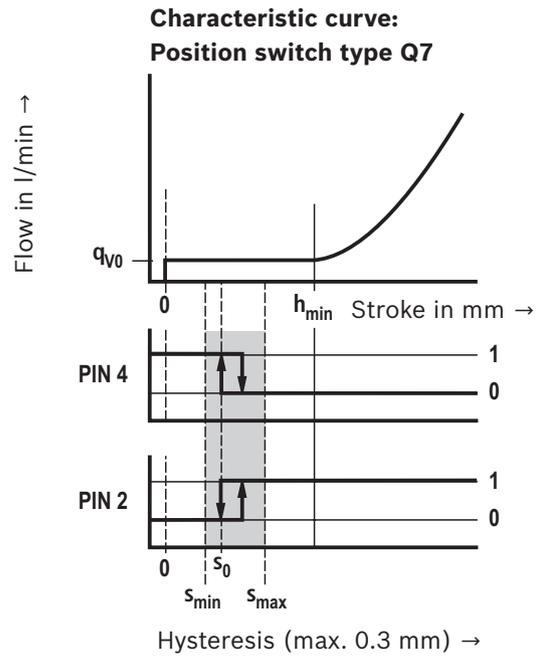
- 1 Upper limit
- 2 Lower limit

Notice:
 The maximum sensor voltage U_S with 100% stroke is size- and/or tolerance-dependent and may range between 7 and 9 V DC. The inductive sensor is adjusted so that with 0% stroke, an output voltage of 1 V DC is available.

Switching point behavior and overlap: Valve poppet with damping nose "D" or overlap nose "F" and position overlap "closed"



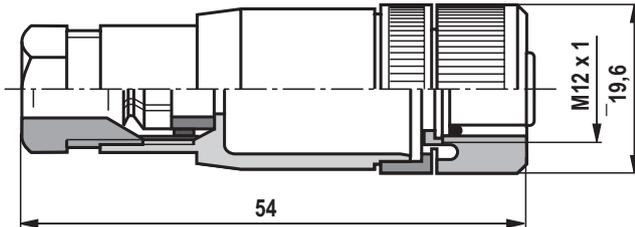
- h Overlap stroke (mechanical)
- s Switching point window (electrical)
- q_{V0} Maximum flow until h_{min}



Mating connectors for inductive position switch (dimensions in mm)

Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, cable gland Pg 9.

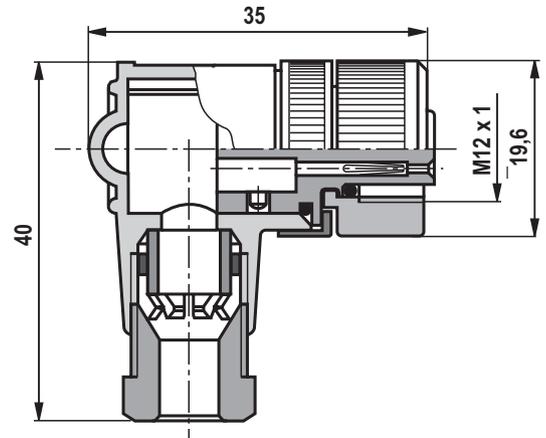
Material no. **R900031155**



Mating connector suitable for K24 4-pole (only up to NG80), M12 x 1 with screw connection, cable gland Pg 9, angled.

Housing can be rotated by 4 x 90° in relation to the contact insert.

Material no. **R900082899**



Notice:

With pre-assembled mating connectors, the alignment of the cable outlet may vary depending on the installation position of the sensor and cause assembly problems!

For further information refer to data sheet 08006.

Further information

- ▶ 2-way cartridge valves, directional functions (passive logics)
- ▶ 2-way cartridge valves, pressure function (passive logics)
- ▶ Hydraulic fluids on mineral oil basis
- ▶ Environmentally compatible hydraulic fluids
- ▶ Flame-resistant, water-free hydraulic fluids
- ▶ Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)
- ▶ Reliability characteristics according to EN ISO 13849
- ▶ Hydraulic valves for industrial applications
- ▶ 2-way cartridge valve, actively controllable
- ▶ Selection of filters
- ▶ Information on available spare parts

Data sheet 21010

Data sheet 21050

Data sheet 90220

Data sheet 90221

Data sheet 90222

Data sheet 90223

Data sheet 08012

Data sheet 07600-B

Assembly instructions 21040-MON

www.boschrexroth.com/filter

www.boschrexroth.com/spc

Notes

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