RE 21045
Edition: 2021-08

rexroth
A Bosch Company

2-way cartridge valves, pressure and directional functions

Type LCT (cartridge valve); type LFT (control cover)


H8178...8180

- High-pressure series
- Size 16 ... 63
- Component series 3X
- Maximum operating pressure 1000 bar
- Maximum flow 3500 l/min

Features

- Directional functions, throttle functions, pressure functions
- Valve poppet with or without damping nose
- 3 area ratios
- 2 different springs/cracking pressures
- Stroke limitation (throttle function)
- Control cover with external pilot oil supply
- Control cover for set-up of directional and pressure valves
- Shaft sealing by default
- Special control spools for check valve circuit

Contents

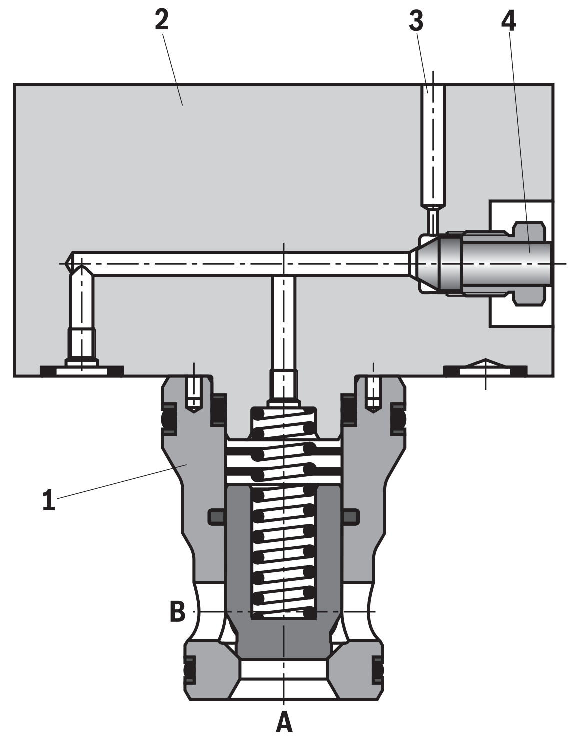
Valve assembly components

Cartridge valve
The cartridge valves are hydraulically controlled via the two working ports A and B and via the spring chamber (supply via the control cover or internally via control spool bore). These assemblies are available in NG16 to 63. All offered versions are fitted with shaft seals. This way, internal leakage between the spring chamber and port B is prevented.

Control cover
The control cover (2) can lead up to 2 pilot oil ports on the block side to internal components or additional externally mounted valve assemblies. Via the circuitry of the spring chamber of the cartridge valve (1), various circuit variations can be implemented.
All control covers have relief grooves at the bottom side. Failure of the internal seals is quickly and clearly indicated. On the top of the control cover, leakage at the HP fitting (4) can be identified at the leakage bore L (3) if applicable.

Pilot control valve (not included in the scope of delivery)
At control covers for set-up of a directional seat or pressure valve, the porting pattern is realized according to ISO 4401.

Multi-function cover "LFT_DBW"
By default, this cover is delivered with a connection surface for a pilot control valve. The connection surface is always closed with a pressure-tight blind plate.
By selection and assignment of the internal pilot oil channels, various switching functions can be implemented in addition to pressure functions.



Example:
Control cover: Type LFT 25 D-3X/1000J3F
Cartridge valve: Type LCT 25 A40E-3X/1000F

Function, section, symbol

2-way cartridge valves are elements that have been designed for a compact block design. The cartridge valve type LCT is inserted into a special receiving hole in the control block and closed by a control cover type LFT. The control cover establishes the connection between the spring chamber of the cartridge valve and the pilot control valves. This enables implementation of pressure, directional and throttle functions – also in combination.

The main components of 2-way cartridge valves are the cartridge valve (8) and the control cover (2) with different functionality.
The cartridge valve (8) consists of a socket (3) with sealing package (4), control spool (5) and closing spring (6).
The control cover (2) seals the cartridge valve to the outside.

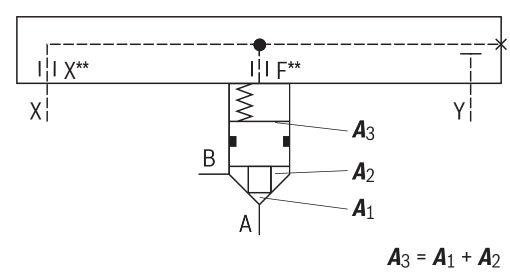
Besides simple control cover functions with external pilot oil supply, version "LFT. DBW2" is also suitable for complex switching functions thanks to its default directional valve connection surface. The connection surface is always closed pressure-tight (1). Suitable switching and proportional servo valves can be connected.
The relief pressure is set at the cartridge (7).

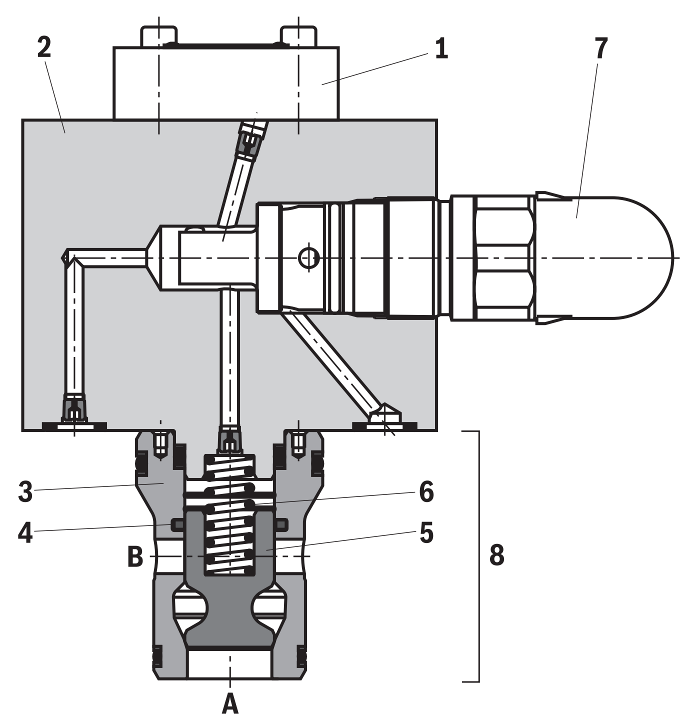
Due to structural-inherent requirements, some control cover versions feature high-pressure fittings leading to the outside. These are assigned a leakage bore L for indication of leakage at the HP fitting.
These ports are not suitable for external pilot oil supply.

Function
Passively controlled 2-way cartridge valves operate depending on the pressure ratio at working ports A and B. This results in three important pressurized surfaces for the function $\boldsymbol{A}_1$, $\boldsymbol{A}_2$, $\boldsymbol{A}_3$. The area at the valve seat $\boldsymbol{A}_1$ is defined as 100%. Depending on the version, the annulus area $\boldsymbol{A}_2$ realized by grading is 0%, 7% or 50% of area $\boldsymbol{A}_1$.
The area $\boldsymbol{A}_3$ is identical to the sum of areas $\boldsymbol{A}_1 + \boldsymbol{A}_2$.
At pressure function, the area is $\boldsymbol{A}_2 = 0$. Respectively, the area is $\boldsymbol{A}_3 = \boldsymbol{A}_1$.

For check valve circuits, a 7% control spool with internal pressure feedback is available This way, the set-up of the block becomes less complex as external pressure feedback into the spring chamber via the pilot oil port X is not required (see "Circuit examples")

In general, the following applies:
The areas $\boldsymbol{A}_1$ and $\boldsymbol{A}_2$ are effective in opening direction. The area $\boldsymbol{A}_3$ and the spring are effective in closing direction. The direction of action of the resulting force from the opening and closing forces determines the working position of the 2-way cartridge valve.





Example:
Control cover: Type LFT 25 DBW2-3X/1000J3F
Cartridge valve: Type LCT 25 DB40D-3X/700F

Ordering code: Cartridge valve – **directional function**

01	02	03	04	05	06		07	08	09
LCT					**3X**	**/**	**1000**		**F**

01	Cartridge valve	**LCT**

02	Size 16	**16**
	Size 25	**25**
	Size 32	**32**
	Size 40	**40**
	Size 50	**50**
	Size 63	**63**

Control spool design (area ratio see section on page 3)

03	$\boldsymbol{A}_1 : \boldsymbol{A}_2$ = 2 : 1 ($\boldsymbol{A}_2$ = 50%)	**A**
	$\boldsymbol{A}_1 : \boldsymbol{A}_2$ = 14.3 : 1 ($\boldsymbol{A}_2$ = 7%)	**B**

04	Cracking pressure approx. 2 bar	**20**
	Cracking pressure approx. 4 bar (preferred)	**40**
	Other cracking pressures upon request	

Poppet-shaped

05	Valve poppet **without** damping nose	**E**
	Valve poppet **with** damping nose (only version "A")	**D**

06	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

07	Maximum operating pressure 1000 bar	**1000**

Control spool bore (B ↔ spring chamber; check valve circuit; only version "B.E")

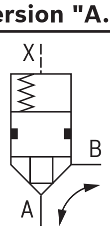
08	Without control spool bore	**no code**
	Size 16	**B30**
	Size 25	**B40**
	Size 32	**B50**
	Size 40	**B60**
	Size 50	**B70**
	Size 63	**B80**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

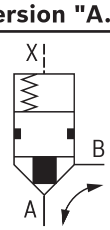
09	FKM seals (preferred)	**F**
	(Other seal materials upon request)	

Symbols

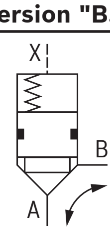
Version "A.E"



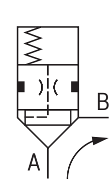
Version "A.D"



Version "B.E"



Version "B.E./.B..."



Ordering code: Cartridge valve – **pressure function**

01	02	03	04	05	06		07	08
LCT		**DB**	**40**	**D**	**3X**	**/**	**700**	**F**

01	Cartridge valve	**LCT**

02	Size 25	**25**
	Size 32	**32**
	Size 40	**40**
	Size 50	**50**

Control spool design (area ratio see section on page 3)

03	$\boldsymbol{A}_1$ = 100%; $\boldsymbol{A}_2$ = 0%	**DB**

04	Cracking pressure approx. 4 bar	**40**

Poppet-shaped

05	Seat valve	**D**

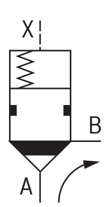
06	Component series 30 … 39 (30 … 39: unchanged installation and connection dimensions)	**3X**

07	Maximum operating pressure 700 bar	**700**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

09	FKM seals (preferred)	**F**
	(Other seal materials upon request)	

Symbols



Technical data
(For applications outside these values, please consult us!)

General								
Size		16	25	32	40	50	63
Ambient temperature range	°C	–30 … +60 (NBR seals) –20 … +60 (FKM seals)					
$MTTF_D$ values according to EN ISO 13849	years	150 … 1200 (for more information see data sheet 08012)					
Conformity ▶ RoHS directive		2011/65/EU [1]					

[2] The product fulfills the substance requirements of the RoHS directive 2011/65/EU.

Technical data
(For applications outside these values, please consult us!)

Hydraulic			
Maximum Operating pressure	▶ Type LCT "A" and "B"	bar	1000
	▶ Type LCT "DB"	bar	700
	▶ Type LFT "D" and "H2"	bar	1000
	▶ Type LFT "DBW"	bar	700 (relief pressure)
Maximum flow		l/min	3500 (depending on size and type)
Hydraulic fluid			see table below
Hydraulic fluid temperature range		°C	–30 ... +80 (NBR seals) –20 ... +80 (FKM seals)
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 [1]

Hydraulic fluid		Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils		HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	FKM	ISO 15380	90221
		HEES	FKM		
	▶ Soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	FKM	ISO 12922	90222
		HFDU (ester base)	FKM		
		HFDR	FKM		
	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	NBR	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.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **Bio-degradable and flame-resistant – containing water:** If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.
- ▶ **Flame-resistant – containing water:**
  - – Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
  - – Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, a maximum duty cycle of 50% in continuous operation has to be set for on/off valves (measuring time 300 s). If this is impossible due to the function, an energy-reducing control of these components is recommended, e.g. via a PWM plug-in amplifier.

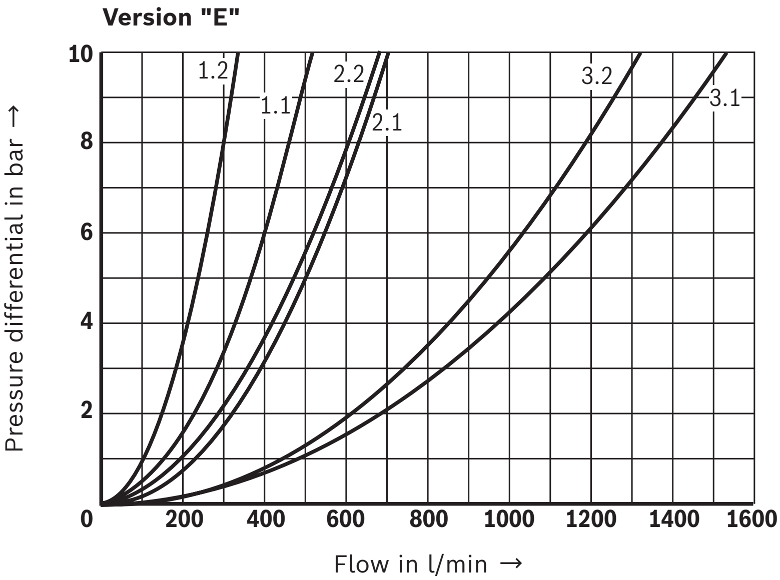
[1] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

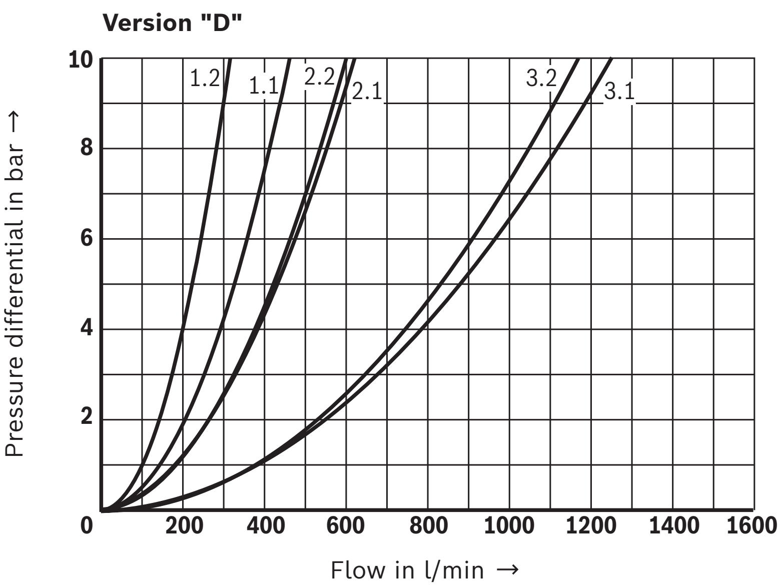
Technical data: Cartridge valve

Control spool surface		Version	Size 16	25	32	40	50	63
A$_1$	cm²	LCT.A...	2.54	3.53	7.54	12.06	16.39	24.88
	cm²	LCT.B...	3.53	4.99	10.57	16.97	22.98	34.92
	cm²	LCT.DB...	–	5.31	11.34	18.09	19.63	–
A$_2$	cm²	LCT.A...	1.26	1.78	3.80	6.03	8.23	12.49
	cm²	LCT.B...	0.27	0.32	0.76	1.11	1.64	2.45
	cm²	LCT..DB...	–	0	0	0	0	–
A$_3$	cm²	LCT.A...	3.80	5.31	11.34	18.09	24.62	37.37
	cm²	LCT.B...	3.80	5.31	11.34	18.09	24.62	37.37
	cm²	LCT.DB...	–	5.31	11.34	18.09	19.63	–
Stroke	cm	LCT.A.E...	8.0	10.0	15.0	17.0	20.0	23.0
	cm	LCT.B.E...	7.0	8.5	13.0	15.0	18.5	21.0
	cm	LCT.A.D...	10.0	11.5	15.0	17.5	20.5	23.0
	cm	LCT.DB...	–	8.8	12.9	13.0	14.0	–
Pilot volume	cm³	LCT.A.E...	30.4	53.1	170.1	307.5	492.4	859.5
	cm³	LCT.B.E...	26.6	45.1	147.4	271.4	455.5	784.8
	cm³	LCT.A.D...	38.0	61.1	170.1	316.6	504.7	859.5
	cm³	LCT.DB...	–	46.7	146.2	234.2	274.8	–
Cracking pressure (Direction of flow A to B)	bar	LCT.A20...	1.93	1.98	1.93	1.95	1.86	2.07
	bar	LCT.A40...	4.17	3.97	3.72	4.07	3.82	3.81
	bar	LCT.B20...	1.39	1.40	1.38	1.39	1.33	1.48
	bar	LCT.B40...	3.00	2.81	2.66	2.89	2.72	2.71
	bar	LCT.DB20...	–	–	–	–	–	–
	bar	LCT.DB40...	–	2.82	2.66	2.93	4.29	–
Cracking pressure (Direction of flow B to A)	bar	LCT.A20...	3.89	3.93	3.83	3.89	3.70	4.10
	bar	LCT.A40...	8.41	7.87	7.36	8.11	7.55	7.55
	bar	LCT.B20... [1]	18.15	21.88	19.08	21.08	18.54	20.90
	bar	LCT.B40... [1]	39.26	43.75	36.71	43.96	37.87	38.49
Control spool weight	g	LCT.A.E...	60	111	426	763	1417	2823
	g	LCT.A.D...	65	128	461	823	1541	3043
	g	LCT.B.E...	65	118	436	826	1467	2928
	g	LCT.B.E..B...	60	110	426	786	1417	2868
	g	LCT.DB...	–	110	463	788	1140	–

[1] Not for control spool with control spool bore

Characteristic curves: Directional function (simulated with HLP46, ϑ_{oil} = 40 ±5 °C)



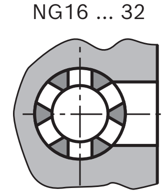


1.1 Size 16 (A → B)
1.2 Size 16 (B → A)
2.1 Size 25 (A → B)
2.2 Size 25 (B → A)
3.1 Size 32 (A → B)
3.2 Size 32 (B → A)

Notice:
The specified characteristic curves were simulated with 100% control spool stroke and recommended socket alignment (see drawing) and validated by measurement result.
The basis was an installation geometry with ØD3* (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

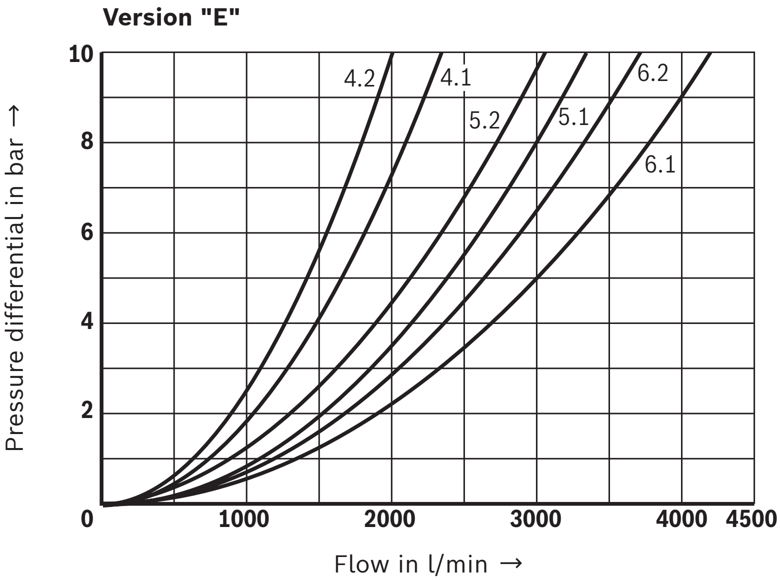
Recommended socket alignment:

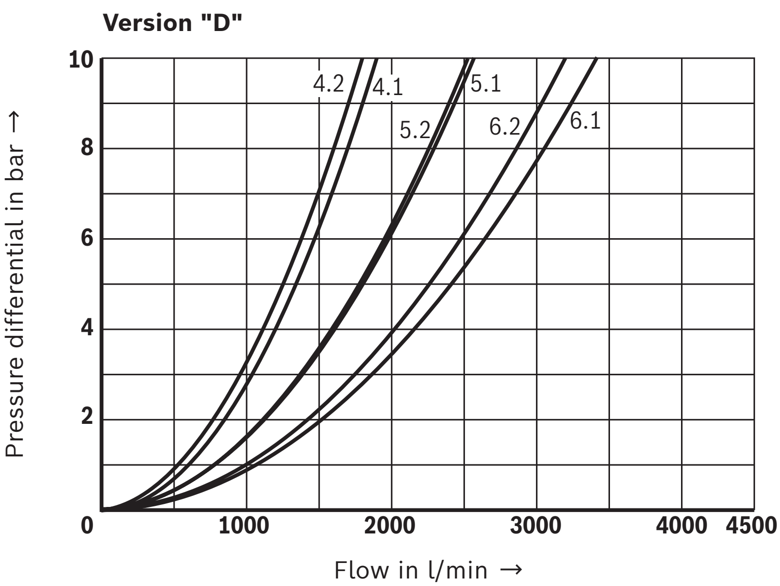
NG16 ... 32



Bar on bore

Characteristic curves: Directional function (simulated with HLP46, ϑ_{oil} = 40 ±5 °C)



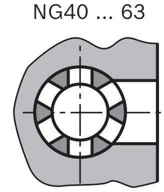


4.1	Size 40 (A → B)
4.2	Size 40 (B → A)
5.1	Size 50 (A → B)
5.2	Size 50 (B → A)
6.1	Size 63 (A → B)
6.2	Size 63 (B → A)

Notice:
The specified characteristic curves were simulated with 100% control spool stroke and recommended socket alignment (see drawing) and validated by measurement result.
The basis was an installation geometry with ØD3* (see installation bore page 23) and a simulation model according to ISO 4411/2008-10-01.

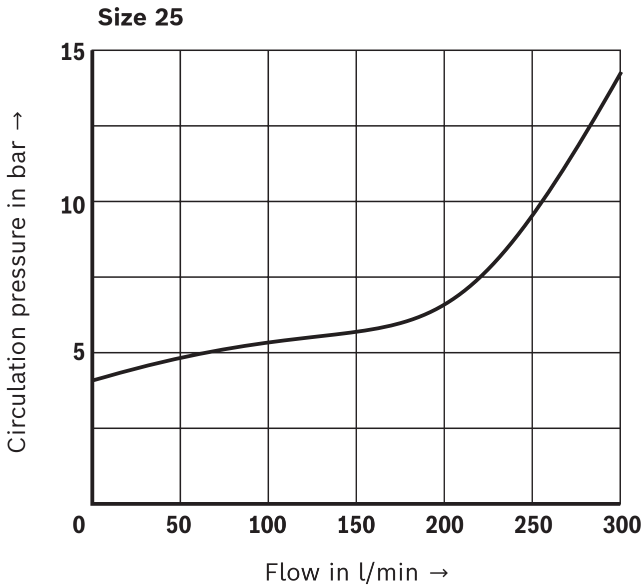
Recommended socket alignment:

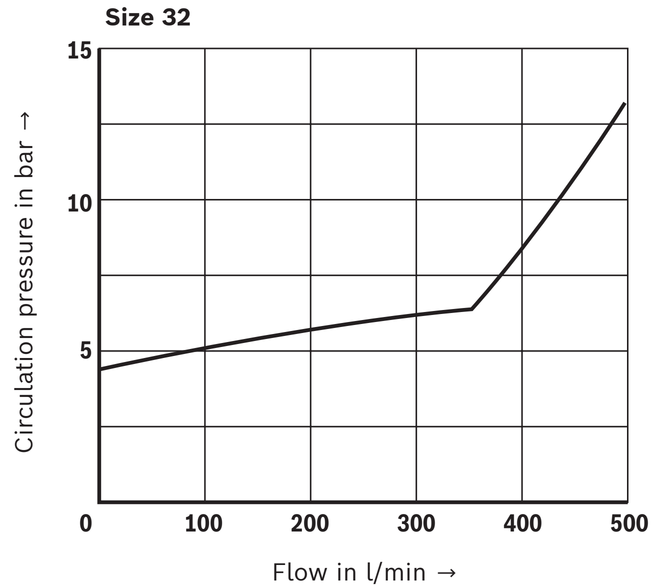
NG40 ... 63

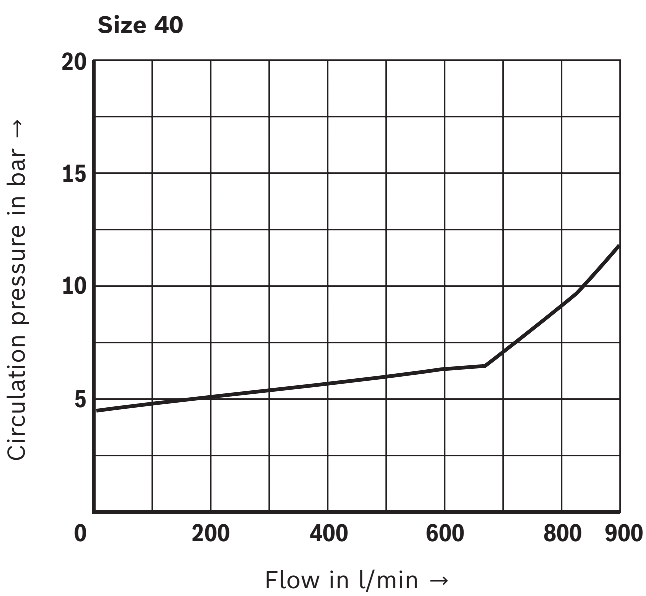


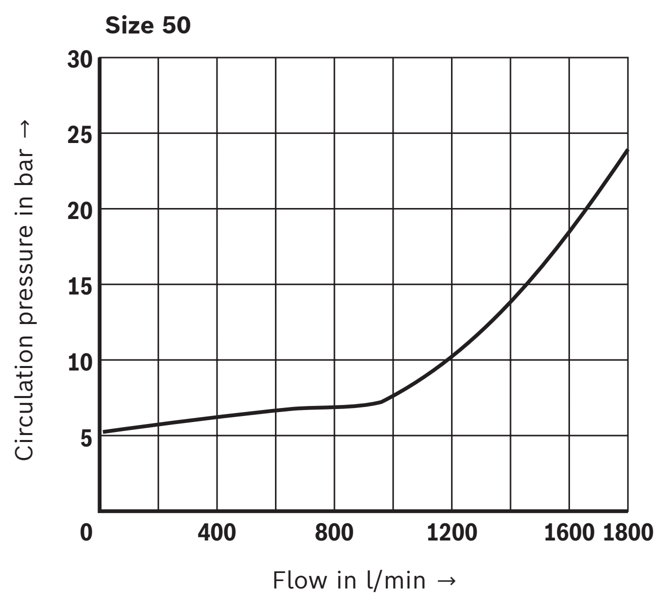
Bar on bore

Characteristic curves: Pressure function
(simulated with HLP46, ϑ_{oil} = 40 ±5 °C)





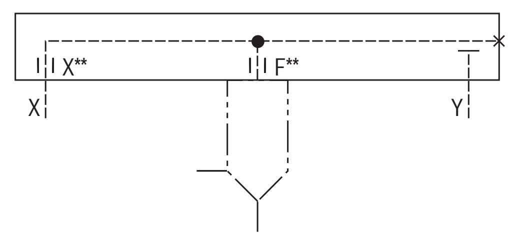




Notice:
- For selection of the size, please note that the recommended maximum flow velocities of downstream components (e.g. pipe and hose lines) must be complied with.
- The illustrated characteristic curves show the minimum circulation pressure with unloaded spring chamber.

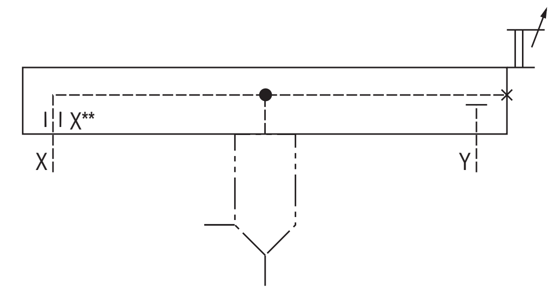
Symbols

Version "D" (NG16 ... 63)
Control cover with pilot oil supply "X"



Page 12 and 13

Version "H2" (NG16 and 25)
Control cover with stroke limitation and pilot oil supply "X"



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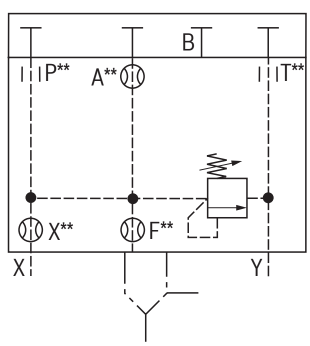
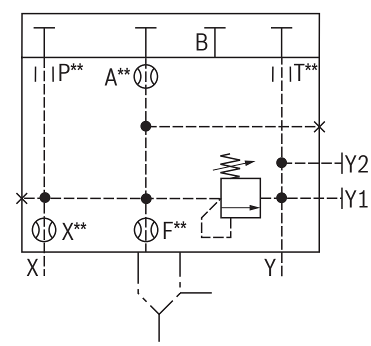
Version "DBW2" (NG25 and 32)
Control cover with maximum pressure relief and
HP directional valve connection surface NG6



Page 16 and 17

Version "DBW2" (NG40 and 50)
Control cover with maximum pressure relief and
HP directional valve connection surface NG6



Page 16 and 17

Control cover "D" with pilot oil supply "X"

01	02	03		04		05	06	07	08
LFT		**D**	**–**	**3X**	**/**	**1000**		**J3**	**F**

01	Control cover	**LFT**

02	Size 16	**16**
	Size 25	**25**
	Size 32	**32**
	Size 40	**40**
	Size 50	**50**
	Size 63	**63**

Control cover type

03	Control cover with pilot oil supply "X"	**D**

04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

05	Maximum operating pressure 1000 bar	**1000**

Nozzle fitting 1)

06	Without nozzle (preferred)	**no code**
	Nozzles in pilot oil channel (nozzles can only be selected in pairs; identical nozzle diameters are recommended)	**X**F****

Corrosion resistance

07	Corrosion protection (240 h salt spray test according to EN ISO 9227)	**J3**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

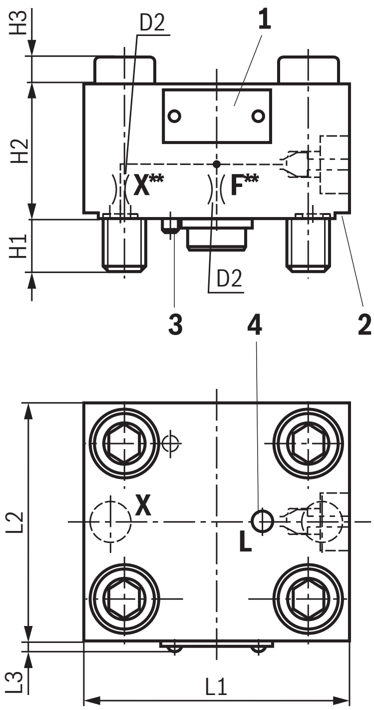
08	FKM seals (preferred)	**F**
	(Other seal materials upon request)	

1) Order example:
** = Ø in 1/10 mm
e.g. nozzle selection Ø1.2 mm → Ordering code **"X12F12"**

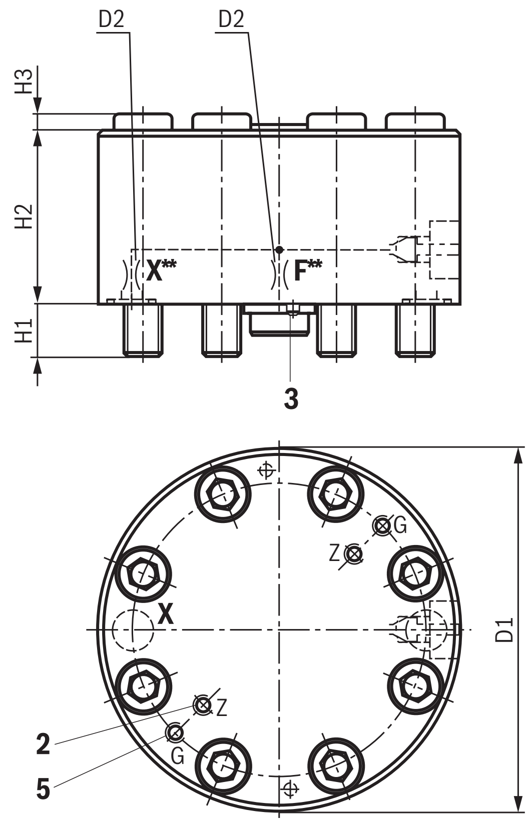
Notice:
- By default, control covers are not fitted with nozzles.
- For series control of nozzles, observe the resulting nozzle diameter.
- All nozzles are designed as screw-type nozzles.
- For further information on nozzles, see page 21

Control cover "D" with pilot oil supply "X" (dimensions in mm)

NG16 … 32



NG40 … 63



NG	16	25	32	40	50	63
D1	–	–	–	195	230	285
D2 [2)]	M6	M6	M8 x1	M8 x1	M8 x1	M8 x1
H1	28	32	49	36	48	56
H2	55	65	95	80	95	115
H3	14	15	27	18	27	35
L1	95	120	160	–	–	–
L2	85	100	140	–	–	–
L3	2	2	2	–	–	–
G	–	–	–	M8	M8	M8
Z	–	–	–	M8	M8	M10

2) For ordering code of nozzles, see page 21.

Mounting screws (separate order, see page 22)

1 Name plate
2 Removing aid
3 Locating pin
4 Leakage bore L
5 Transport thread

Notice:
- The dimensions are nominal dimensions which are subject to tolerances.
- The leakage bore L of the HP fitting must not be closed.
- In case of leakage of hydraulic fluid at the leakage bore L, the HP fitting must be checked immediately. Further operation is not admissible.

Control cover "H2" with stroke limitation and pilot oil supply "X"

01	02	03		04		05	06	07	08
LFT		**H2**	**–**	**3X**	**/**	**1000**		**J3**	**F**

01	Control cover	**LFT**

02	Size 16	**16**
	Size 25	**25**
	Other sizes upon request.	

Control cover type

03	Control cover with stroke limitation and pilot oil supply "X"	**D**

04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

05	Maximum operating pressure 1000 bar	**1000**

Nozzle fitting

06	Without nozzle (preferred)	**no code**
	Nozzle in pilot oil channel	**X****

Corrosion resistance

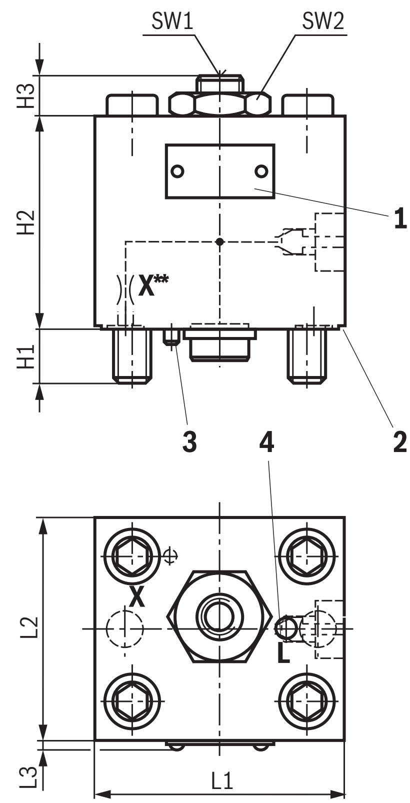
07	Corrosion protection (240 h salt spray test according to EN ISO 9227)	**J3**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

08	FKM seals (preferred)	**F**
	(Other seal materials upon request)	

Notice:
- Stroke adjustment should only be used with reduced operating pressure.
- In case of mechanical blocking of the "closed" position, the spring chamber of the screw-in cartridge valve should be continuously supplied with pilot pressure. This way, the control spool of the screw-in cartridge valve is hydraulically pressed into basic position and the stroke adjustment provides additional mechanical protection against opening.
- If the screw-in cartridge valve is not hydraulically supplied in a mechanically closed position, the forces acting in opening direction may cause slight leakage at the seat due to settlement and despite mechanical clamping.
- A mechanically blocked "closed" position should either be released in depressurized condition or with a pressurized spring chamber to enable release of the adjustment spindle with reduced force
- Nozzle fitting for adjustment of the actuating time must be realized in the block. Arrangement of two nozzles with sufficient distance in between is recommended.
- For further information on nozzles, see page 21

Control cover "H2" with stroke limitation and pilot oil supply "X" (dimensions in mm)



NG	16	25
H1	27	32
H2	90	90
H3 max	21^{+2}	23^{+2}
L1	95	120
L2	85	100
L3	2	2
SW1	12	12
SW2	36	36

Mounting screws (separate order, see page 22)

1 Name plate
2 Removing aid
3 Locating pin
4 Leakage bore L

Notice:
- The dimensions are nominal dimensions which are subject to tolerances.
- The leakage bore L of the HP fitting must not be closed.
- In case of leakage of hydraulic fluid at the leakage bore L, the HP fitting must be checked immediately. Further operation is not admissible.

Control cover "DBW2" with maximum pressure relief and HP directional valve connection surface NG6

01	02	03		04		05	06	06	06	06	06	07	08
LFT		**DBW2**	**–**	**3X**	**/**	**700**						**J3**	**F**

01	Control cover	**LFT**

02	Size 25	**25**
	Size 32	**32**
	Size 40	**40**
	Size 50	**50**

Control cover type

03	Control cover with maximum pressure relief and HP directional valve connection surface NG6	**DBW2**

04	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

05	Maximum operating pressure 700 bar	**700**

Nozzle fitting [1)]

06	Nozzle in channel X (without specification: standard fitting, see below)	**X****
	Nozzle in channel F (without specification: standard fitting, see below)	**F****
	Nozzle in channel A (without specification: standard fitting, see below)	**A****
	Nozzle in channel P	**P****
	Nozzle in channel T	**T****

Corrosion resistance

07	Corrosion protection (240 h salt spray test according to EN ISO 9227)	**J3**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

08	FKM seals (preferred)	**F**
	(Other seal materials upon request)	

[1)] Order example:
** = Ø in 1/10 mm
e.g. nozzle selection in channel T Ø1.2 mm → Ordering code **"T12"**
Plug: Specification of "99" (e.g. "A99")
Not fitted: Specification of "00" (e.g. "A00")

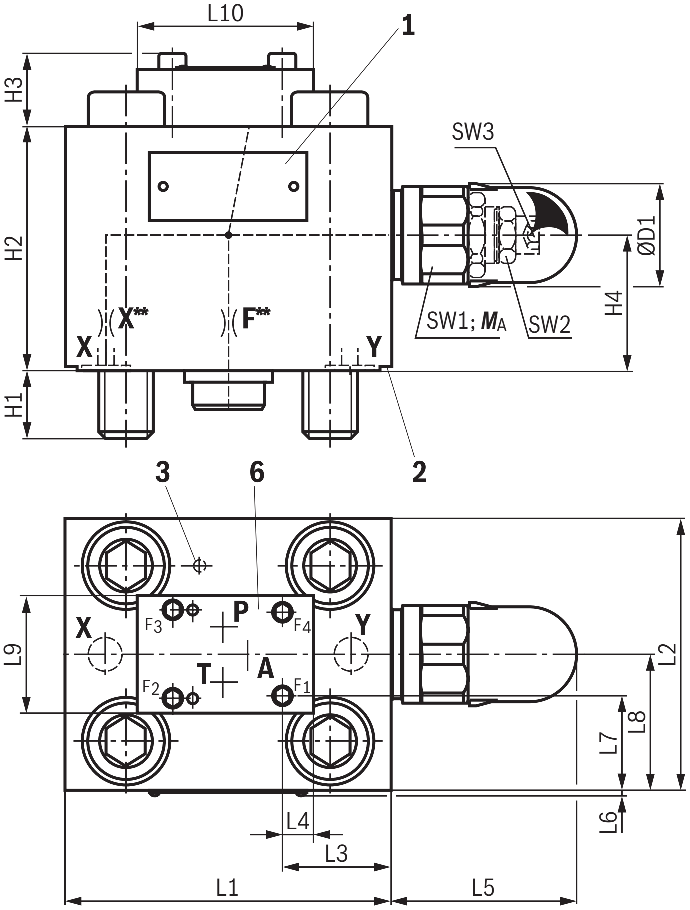
Notice:
- On delivery, the control covers feature standard nozzle fitting (X, F, A). Nozzle specification in the type key is not necessary.
- Special operating conditions may require adjustment of the nozzle size. These must be specified in detail.
- All nozzles are designed as screw-type nozzles.
- For further information on nozzles, see page 21

Standard nozzle fitting (Ø in 1/10 mm)

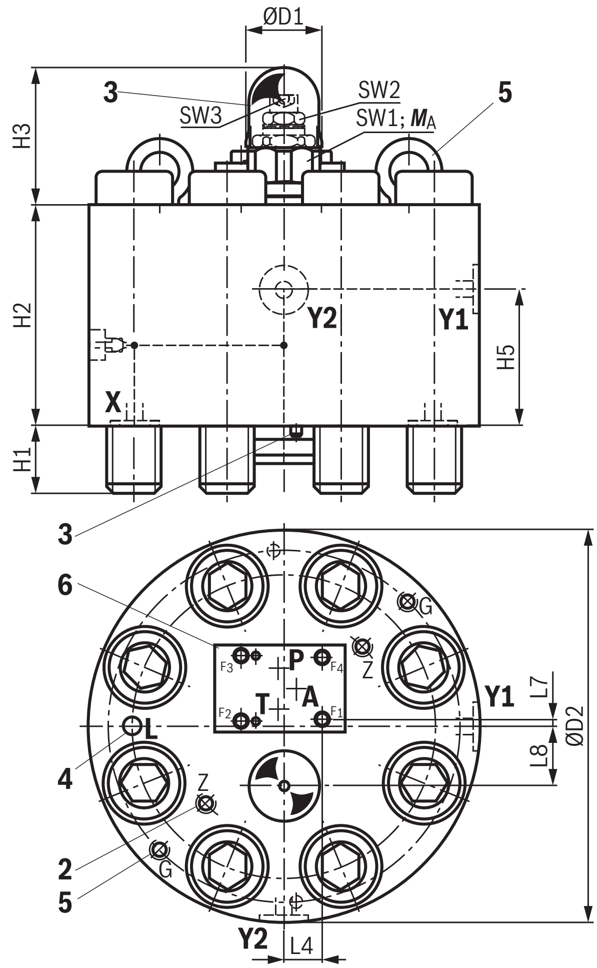
NG	Channel				
	X	**F**	**A**	**P**	**T**
25	10	10	10	–	–
32	12	12	12	–	–
40	12	12	12	–	–
50	12	15	15	–	–

Control cover "DBW2" with maximum pressure relief and HP directional valve connection surface NG6 (dimensions in mm)

NG25 … 32



NG40 … 50



NG	25	32	40	50
D1	38	38	38	38
D2	–	–	195	230
H1	32	48	36	48
H2	90	125	110	125
H3	27	27	69	69
H4	50	70	–	–
H5	–	–	68	83
L1	120	160	–	–
L2	100	140	–	–
L3	40	55	–	–
L4	11	11	19	20
L5	69	69	–	–
L6	2	2	–	–
L7	34	52	-2	2
L8	50	70	30	40
L9	44	44	–	–
L10	64	64	–	–

2) For ordering code of nozzles, see page 21.

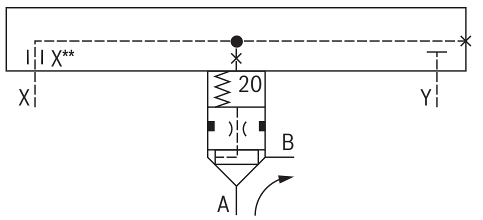
Mounting screws (separate order, see page 22)

1 Name plate
2 Removing aid
3 Locating pin
4 Leakage bore L
5 Transport thread M8, eyelet
6 Porting pattern according to ISO 4401, ISO 8752 and ISO 6264 (mounting thread M6)

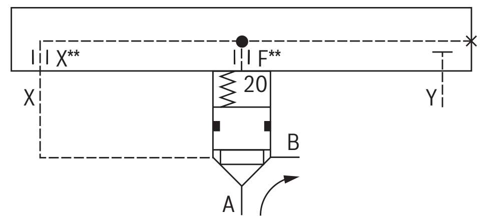
☞ **Notice:**
- The dimensions are nominal dimensions which are subject to tolerances.
- The leakage bore L of the HP fitting must not be closed.
- In case of leakage of hydraulic fluid at the leakage bore L, the HP fitting must be checked immediately. Further operation is not admissible.
- Remove eyelets (G) after transport or assembly/disassembly.
- By attachment of a pilot control valve, other valve functions can be realized.

Circuit examples

Check valve (RV1)

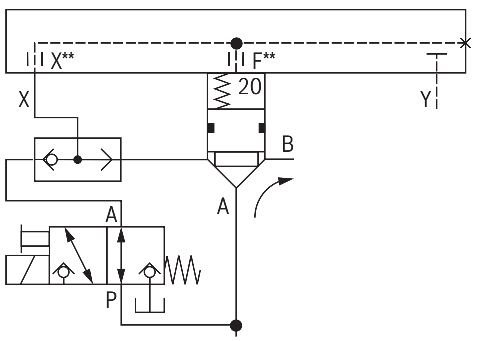


Check valve (RV2)



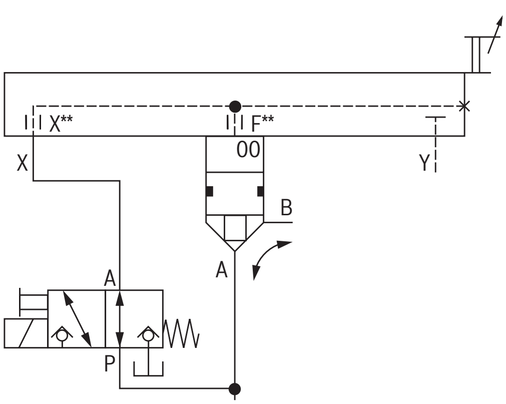
- RV1 does not require an additional pilot oil bore X for spring chamber supply.
- At RV1, the $\boldsymbol{\Delta p}$-$\boldsymbol{q}_V$ characteristic curve is flatter.

Check valve (RV3)

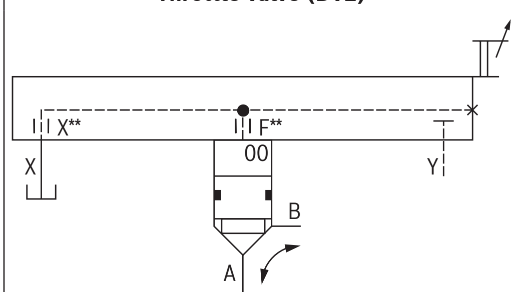


- RV3 permanently blocked in direction B → A
- Flow A → B can be blocked
- No internal leakage thanks to shaft sealing (standard)
- The locking pressure (channel P) can also be fed in externally.

Throttle valve (DV1)



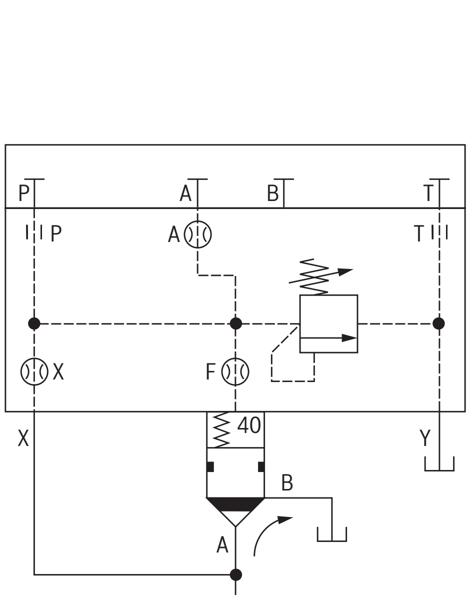
Throttle valve (DV2)



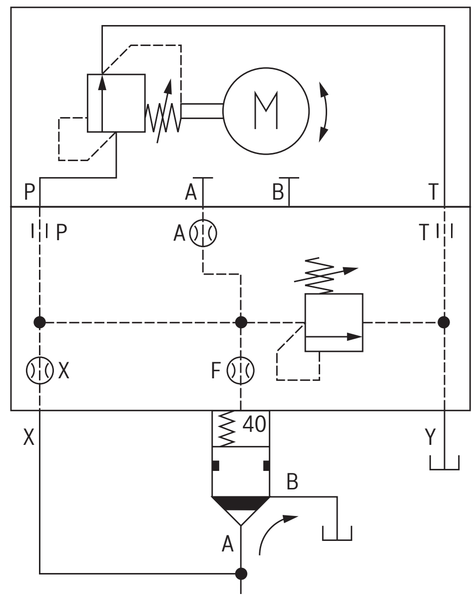
- DV1 and DV2 can be operated without spring for minimum cracking pressure; no closing force support.
- The spring chamber must be hydraulically connected (unloaded).
- At connection of the pressure supply on side "B", the mechanical load of the adjustment spindle is reduced if closed.
- In comparison to DV1, the mechanical load of the adjustment spindle at connection of the pressure supply on side "A" is higher at DV2.
- The adjustment should only be loosened (= opening the valve) at $\boldsymbol{p}$ = 0 bar or with pressurized spring chamber.
- The required torque of adjustment when closing the valve is defined by the applied operating pressure. For this reason, adjustment should only be regarded as additional mechanical protection. Ideally, the spring chamber should be supplied with operating pressure from the pressure supply while it is kept closed (see DV1).

Circuit examples

Pressure limitation (DB1)

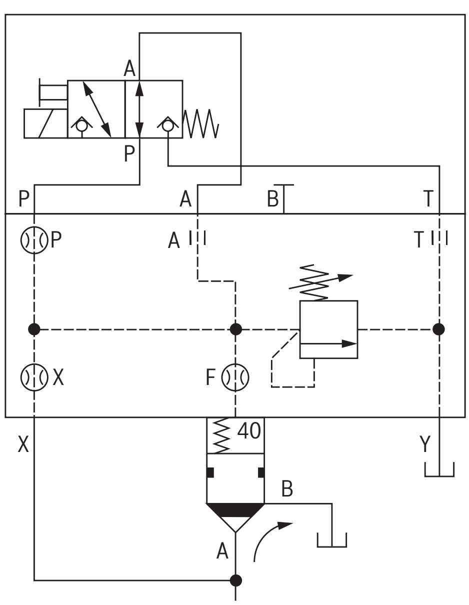


Pressure limitation (DB2)

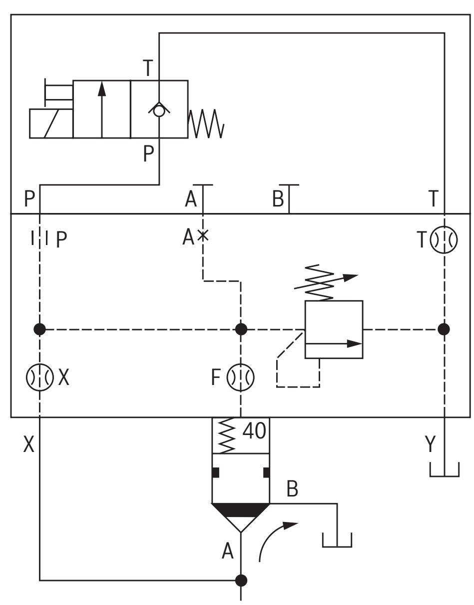


- DB1 with pressure-tight closed valve connection surface
- DB2 with proportional pressure adjustment and maximum pressure relief
- No internal leakage thanks to shaft sealing (standard)

Pressure limitation (DB3)

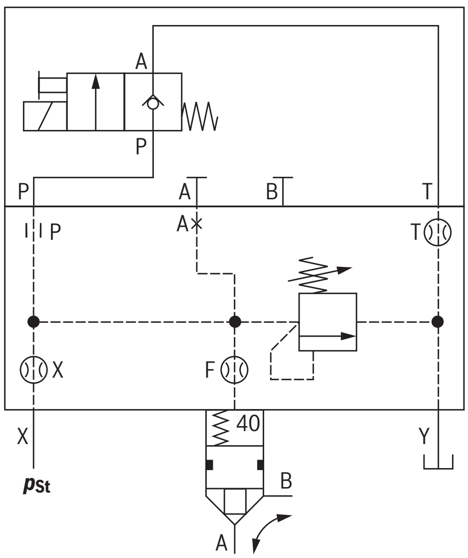


Pressure limitation (DB4)



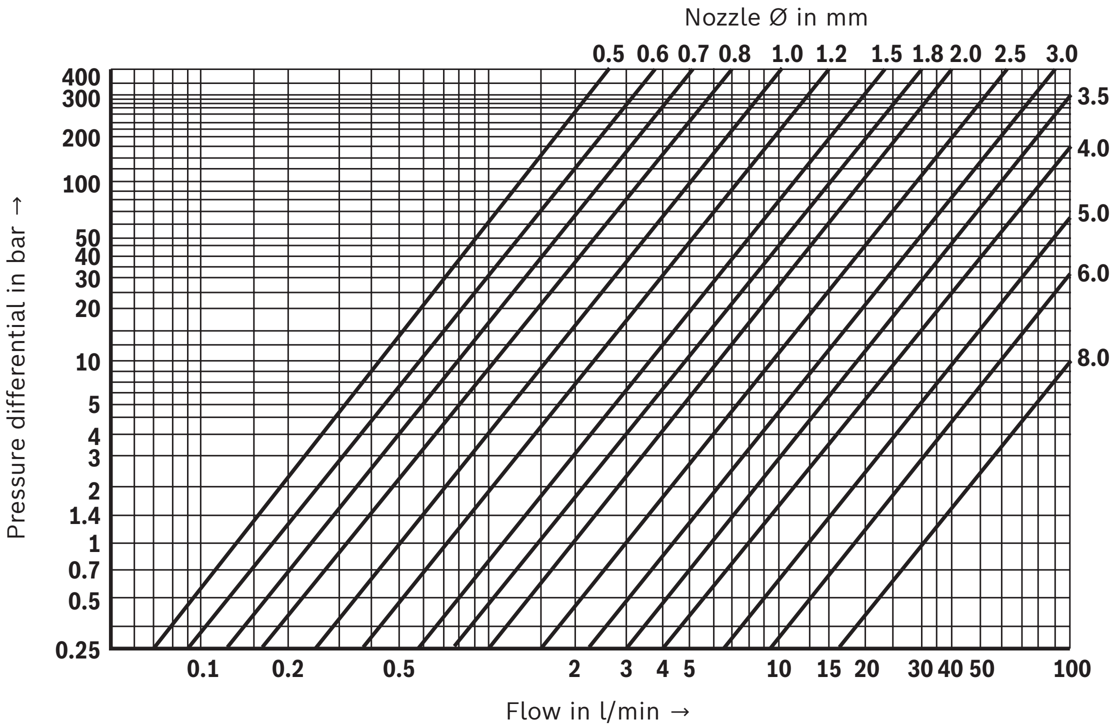
- DB3 and DB4 with set-up of a seat valve for "depressurized circulation" operating mode
- Frequent use of the pressure relief function ($\boldsymbol{p}_{max}$ = to T) increases the risk for cavitation erosion and early wear of the block installation bore
- At DB4, pressurisation of the pilot control valve is reduced by the 2/2-way pilot control valve if port A is closed on the cover side.
- The nozzle in port T reduces the effects of pressure surges in channel Y.

Circuit examples

Combination function	
	▶ Combination function with LCT directional application ▶ Keeps the cartridge valve closed even at $p_{pilot} < p_A$ or $p_{pilot} < p_B$ as long as a closing force is generated by the balance of forces acting on the control area of the control spool. ▶ For closing and keeping closed with p_{pilot}, the surface and pressure ratios must be observed. ▶ No internal leakage thanks to shaft sealing by default ▶ By adjustment of the pressure relief valve to pmax, the function can be deactivated (if $p_{pilot} < p_{max}$)

Notice:
- When switching on/off the directional valve, observe the occurring pressure ratios in main port A.
- In case of application, relief of the spring chamber "F" while p_{max} is applied may lead to a pressure surge on the load side or abrupt pressure relief.

Nozzles and **plug screws**



Nozzles

Nozzle Ø in mm	**Ordering information**	**Material number**	
		NG16 ... 25 (M6 conical)	**NG32 ... 63** (M8 x 1 conical)
–	**00**	–	–
0.8	**08**	R913029447	R913017614
1.0	**10**	R913019186	R913017621
1.2	**12**	R913040362	R913017627
1.5	**15**	R913028337	R913017637
1.8	**18**	R913030186	R913017644
2.0	**20**	R913029870	R913017651
2.5	**25**	R913032543	R913035796
3.0	**30**	R913040368	R913017661
3.5	**35**	–	R913017667
4.0	**40**	–	R913017670
Plug	**99**	R913019128	R913019129

HP plug screws

Size	**Type**	**Wrench size** in mm	**Tightening torque** M_A in Nm
16 ... 25	21(G/P) 6M	16	$41^{\pm4}$
32 ... 63	21(G/P) 9M	24	$75^{\pm7.5}$

Mounting screws: Control cover LFT (separate order)

Hexagon socket head cap screws ISO 4762 - 10.9-flZn/nc/480h/C

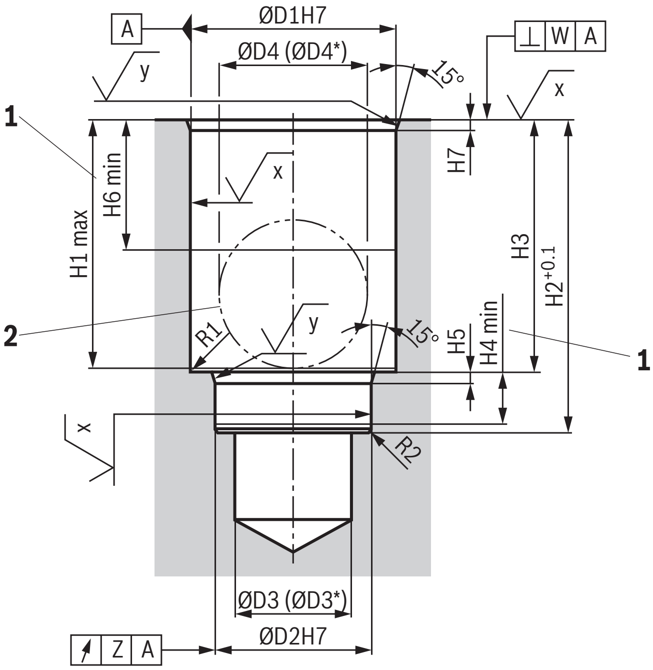
Size	Dimension			Material number	Tightening torque M_A in Nm
	"D"	"H2"	"DBW2"		
16	M16 x 80	–	–	R913015667	$240^{\pm 24}$
	–	M16 x 100	–	R913015640	
25	M20 x 90	–	–	R913009160	$480^{\pm 48}$
	–	M20 x 100	M20 x 100	R913015670	
32	M30 x 140	–	M30 x 140	R913015747	$1600^{\pm 160}$
40	M24 x 120	–	–	R913014541	$800^{\pm 80}$
	–	–	M24 x 110	R913015709	
50	M30 x 140	–	M30 x 140	R913015747	$1600^{\pm 160}$
63	M36 x 170	–	–	R913015776	$2300^{\pm 230}$

Tightening torques

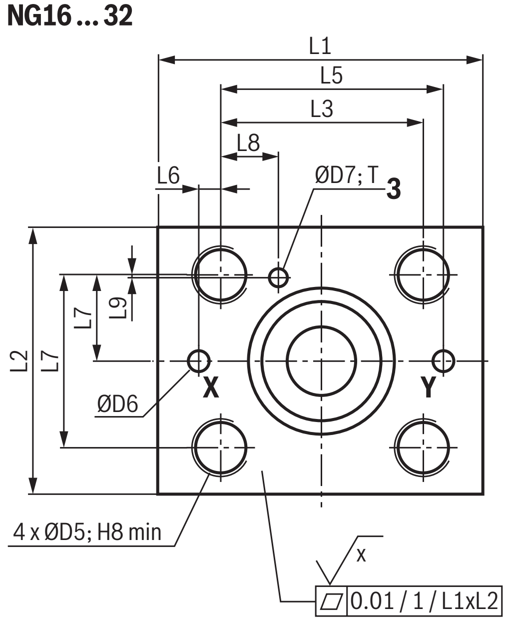
Assembly	Tightening torque M_A in Nm
Pressure relief valve Type DBDS10...700	$200^{\pm 20}$
Cover plate type HSA06	$12.5^{\pm 1.5}$

Notices:
- The tightening torques stated are guidelines when using screws with the specified friction coefficients and when using a manual torque wrench (tolerance ± 10%).
- The specified tightening torques were calculated with total friction coefficient μ = 0.09 ... 0.14; adjust in case of modified surfaces.

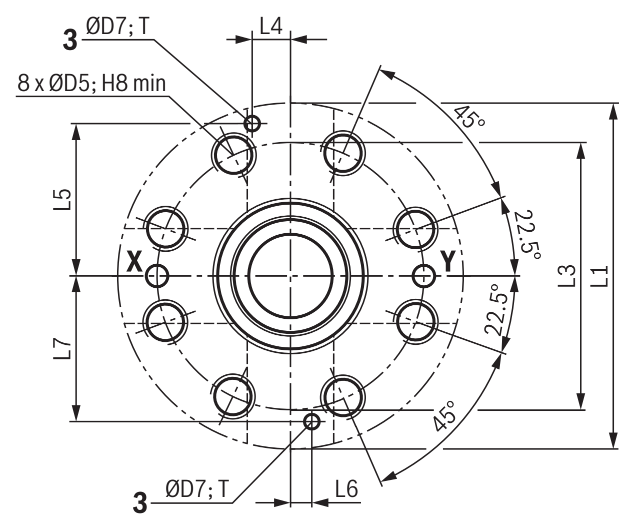
Installation bore and connection dimensions
(dimensions in mm)



NG16 ... 32

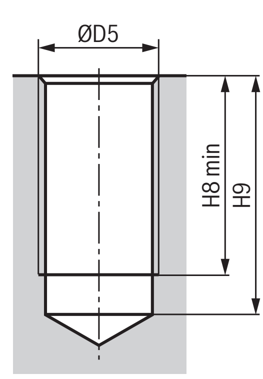


NG40 ... 63



√x = √Rz1max 8

√y = √0.0025- / Pt max 16



1 Depth of fit

4 Port B can be positioned around the central axis of port A. However, it must be observed that the mounting bores and the control bores are not damaged and that sufficient distance (wall thickness) is ensured.

3 Bore for locating pin

Installation bore and connection dimensions
(dimensions in mm)

NG	16	25	32	40	50	63
ØD1H6	44	54	75	94	115	140
ØD2H6	34	44	68	75	105	130
ØD3 max	16	25	32	40	50	63
ØD4 max [1]	25	32	40	50	63	80
ØD5	M16	M20	M30	M24	M30	M36
ØD6 max	7	8	8	10	13	15
ØD7	7	7	7	7	7	7
H1 max	43	57	86.5	100.5	130.5	156
H2$^{+0.1}$	59	72	110	120	155	185
H3$^{+0.5}$	45	58	88	102	132	157
H4 min	12	12	19	16	20	24
H5$^{+0.5}$	2.5	2.5	3	3	4	5
H6 min	18	18	25	25	25	32
H7$^{+0.2}$	1.8	2.5	3	4	4	5.5
H8 min	28	33	50	37	50	58
H9^{+1}	38	45	62	45	62	72
L1	95	120	160	195	230	285
L2	85	100	140	–	–	–
L3	60$^{\pm0.2}$	75$^{\pm0.2}$	105$^{\pm0.2}$	150$^{\pm0.3}$	175$^{\pm0.3}$	220$^{\pm0.3}$
L4$^{\pm0.2}$	50	65	85	15	20	20
L5$^{\pm0.2}$	64.5	82.5	112.5	90	105	130
L6$^{\pm0.2}$	4.5	7.5	7.5	20	25	30
L7$^{\pm0.2}$	25	32.5	42.5	90	105	130
L8$^{\pm0.2}$	14	21.5	22.5	–	–	–
L9$^{\pm0.2}$	5	-0.5	0	–	–	–
W	0.05	0.05	0.05	0.05	0.05	0.05
Z	0.01	0.01	0.01	0.01	0.01	0.02
R1 [2]	2	2	2	2	2	2
R2 [2]	1	1	1	1	1	1
T^{+1}	8	8	8	8	8	8

1) By selection of the bore diameter ØD4 max., the pressure loss in direction of flow A → B can be reduced. The characteristic curves in this data sheet were calculated with ØD4 max.

2) Maximum dimension (should be utilized)

Project planning information

- 2-way cartridge valves may only be assembled and commissioned by trained specialists.
- The special HP fittings are required for manufacturing reasons. Due to its special shape, their installation bore is not suitable for additional external connections. If necessary, please consult us.
- All control covers type LFT feature leakage indicators at the bottom as well as a special leakage bore L at the top of the cover. This enables simplified identification and diagnosis in case of leakage at one of the following components:
  - Pilot oil seal
  - Radial seal of cartridge valve type LCT
  - HP fitting
- Leakage bores L must not be closed. In case of leakage of hydraulic fluid, the HP fitting is defective.
- Eyelets for transport and assembly of control covers are installed by default as of NG40. It is recommended to remove the eyelets after assembly and reinsert them before disassembly.
- The essential valve components are coordinated with each other at the factory and marked accordingly. In case of faults, the complete valve assembly must be replaced.
- Use of the "depressurized circulation" function for decompression tasks is somewhat limited and should not be activated at maximum operating pressure.
- All control covers can be combined with directional and pressure cartridge valves. Pressure functions (particularly for pressure control) can only be implemented with version "LCT. DB".
- If nozzles are used, sufficient distance to downstream components must be ensured (jet erosion). Series control of nozzles (with staged pressure reduction) is preferred over single nozzles.

Further information

▶ 2-way cartridge valves - directional functions	Data sheet 21010
▶ 2-way cartridge valves - pressure functions	Data sheet 21050
▶ 2-way cartridge valves, pressure and directional functions - high pressure series	Data sheet 21030
▶ 2-way cartridge valve, actively controllable, type LC2A	Data sheet 21040
▶ 2-way cartridge valves, pressure limiting function, type-examination tested	Data sheet 21055
▶ Directional seat valve type SEW 6	Data sheet 22058
▶ Pressure relief valve, direct operated; type DBGT	Data sheet 29143
▶ Hydraulic fluids on mineral oil basis	Data sheet 90220
▶ Environmentally compatible hydraulic fluids	Data sheet 90221
▶ Flame-resistant, water-free hydraulic fluids	Data sheet 90222
▶ Reliability characteristics according to EN ISO 13849	Data sheet 08012
▶ Hydraulic valves for industrial applications	Operating instructions 07600-B
▶ Information on available spare parts	www.boschrexroth.com/spc

Notes

Notes

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