Safety for Hydraulics
Leak-free Load Control Valve, series BBV 6 C

1. General description

- prevents a hydraulic cylinder from running ahead of the available oil supply when subjected to external driving forces i.e. negative, or overrunning, loads
- prevents uncontrolled cylinder movement in the event of a hose- or pipe-rupture
- leak-free load-holding in neutral

2. Advantages of the BBV 6 C load control valve

- zero-leakage load-holding
- 420 bar working pressure with 3-fold factor of safety
- thanks to the various pilot control styles, the valve can always be adapted to the system requirements
- the load pressure has very little influence on the pilot pressure required (area ratio 1:66)
- above 100 bar load pressure, it controls like a compensated 2-way flow controller
- load-control valve with initial decompression, and bypass check valve both combined in one axis
- compact design means small space requirements
- the valve is guaranteed to close, even with a broken spring
- hardened, ground and lapped seat valve components ensure permanent leaktightness and long service life
- very low hysteresis

3. Applications

- safety function for booms, derricking gear, stabilizers, etc.
- controlling the speed of cylinders, hydraulic motors and derricking gear.

4. Safety information

- this valve must only be used for the purpose for which it has been designed.
- it must only be adjusted by trained personnel
- before removing or disassembling the valve, all hydraulic pressure must be vented from the system - double check!
- the valve must not be opened without the express permission of the manufacturer.

5. Installation information

- observe the port markings
- protect seals and flange faces from damage
- use the correct tightening torques (see section 9., Dimensions)
- at commissioning, bleed all air from the hydraulic system
- use only the 46 A/F hex. to fit and remove the cartridge (see section 9. Dimensions)

6. Main characteristics (for applications outside these parameters, contact Bucher Hydraulics)

6.1 General

Type	prop. pilot-controlled seat valve, hydr. piloted
Mounting method	screw-in cartridge
Ports see sect. 9.	A, B = ø 8 mm X = ø 4 mm
Mounting attitude	unrestricted
Flow direction	A → B free flow B → A flow controllable by pressure at X
Weight	~0.7 kg
Opening ratio	$\frac{\text{pilot piston area}}{\text{pilot ball seat area}} = \frac{66}{1}$

6.2 Hydraulic characteristics

Nominal size	6
Max. flow rate	50 l/min.
Max. working pressure	dyn. 420 bar, static at B = 600 bar
Hydraulic fluid	mineral oil per DIN 51524 and DIN 51525 (HL/HLP) (other fluids – contact Bucher Hydraulics)
Fluid temperature range	-20°C...+80°C, (for application outside this range, contact Bucher Hydraulics)
Viscosity range	2.8 ... 1500 mm^2/s (cSt)
Filtration	NAS 1638 class 9, $\beta 10 \geq 75$.

7. Functional description, sectional view

7.1 Neutral position (load pressure at B, ports A and X depressurized)

In the neutral position, there is zero leakage from B to A. The valve is held closed by the check valve spring, which acts on the pilot valve ball and thus on the control spool, and also by the load pressure, which acts on the rear side of the pilot valve ball and the control spool.

7.2 The check valve function (flow from A → B)

To raise the actuator, pump pressure is applied via port A to the valve seat area of the control spool and causes the control spool together with the pilot ball to open, pushing against the check valve spring. Due to the small effective area of the pilot ball, when the control spool moves in the opening direction during the check valve function the pilot ball moves with it, and does not lift from its seat in the spool.

7.3 The "Lowering" function (flow from B → A)

Initial decompression

The pilot pressure at port X moves the pilot piston in opposition to the pilot spring, lifting the pilot ball from its seat in the control spool. The load pressure behind the control spool now decays as it escapes past the pilot ball seat to port A.

Opening the control spool

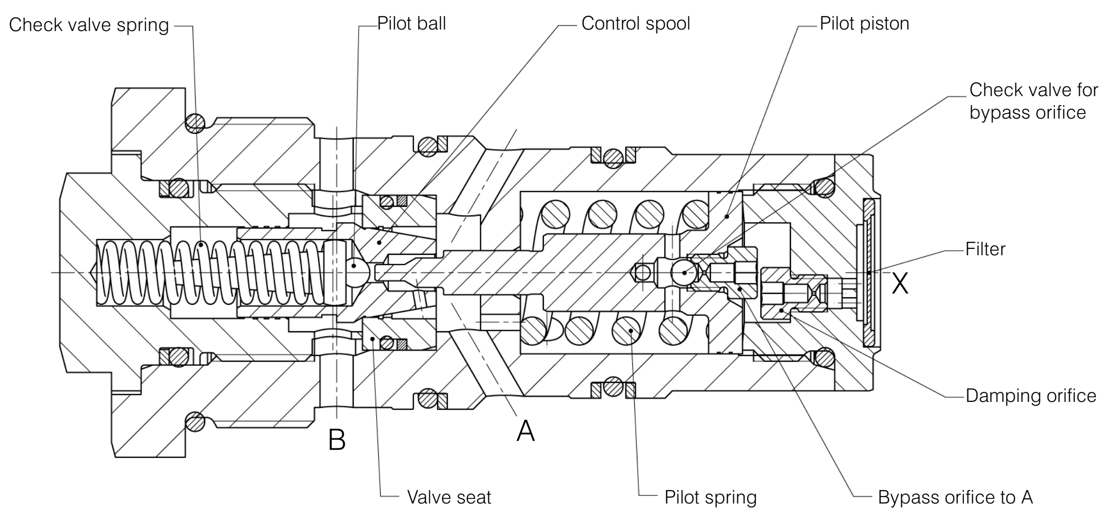
With further increase in the pilot pressure (X), the pilot piston compresses the pilot spring still more. It then makes direct contact with the control spool and pushes it open against the check valve spring.

The pilot pressure acting on the pilot piston therefore controls the open metering area of the control spool, and consequently the flow rate from B to A.

Damping

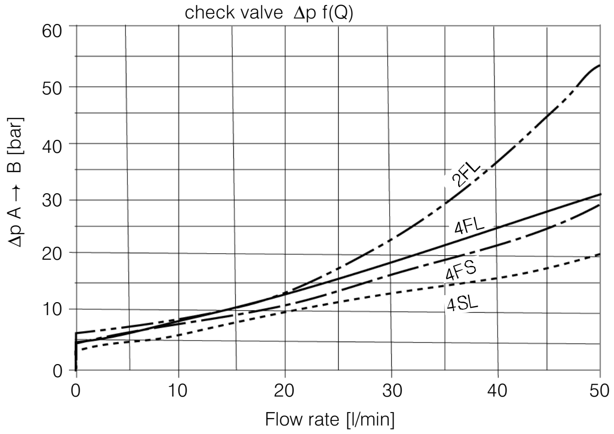
The system can be protected against oscillations by using suitable damping orifices. The effect of the bypass orifice from X to A is to make it necessary to use higher pilot pressures (pressure divider function) and this improves the damping behaviour.

The orifices are protected against contamination by a mesh filter at port X and a check valve that prevents flow from A.

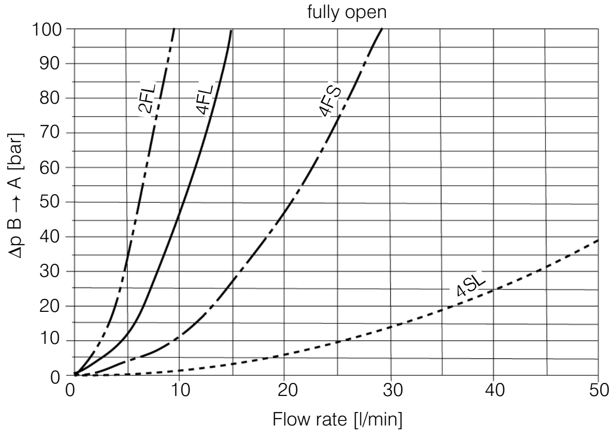


8. Performance curves (measured at 33 mm^2/s [cSt])

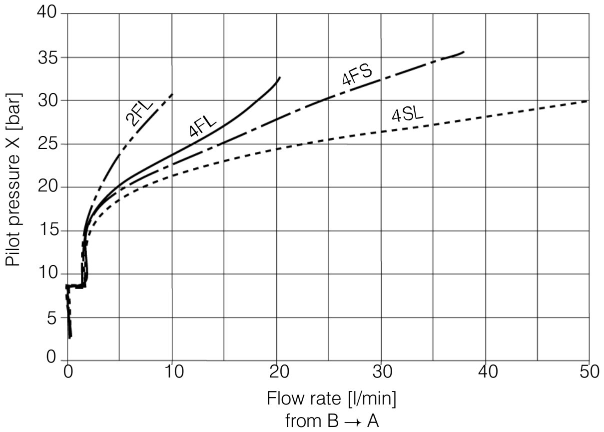
Δp A → B
check valve Δp f(Q)



Δp B → A
fully open



Pilot pressure X (with damping orifice, without bypass orifice)
at 200 bar load pressure



8.1 Table of opening pressures

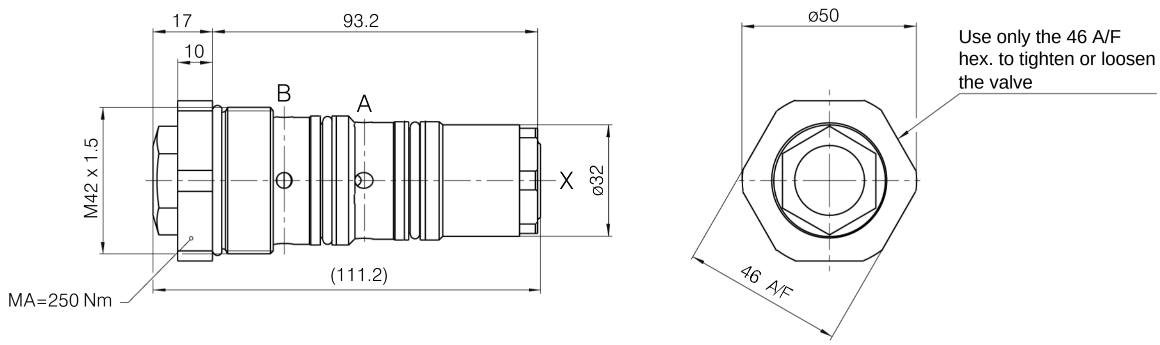
Opening pressures at 200 bar load pressure (theoretical values)

pX: pre-opening [bar]	pX: start of opening [bar]	pX: fully open [bar]	Bypass orifice ø	Damping orifice ø
9	16	33	closed	0.25 - 0.40
12	21	45	0.3	0.40
14	25	52.5	0.3	0.35
14	25	54	0.35	0.40
18	32	67.5	0.30	0.30
18	32	67.5	0.35	0.35
18	32	67.5	0.40	0.40
23	42	88.5	0.45	0.40
24	43	91.5	0.40	0.35
26	46	97.5	0.35	0.30
28	49	105	0.30	0.25
34	60	126	0.45	0.35
37	67	141	0.40	0.30
44	78	165	0.35	0.25
54	97	205.5	0.45	0.30
68	121	258	0.40	0.25
103	184	390	0.45	0.25

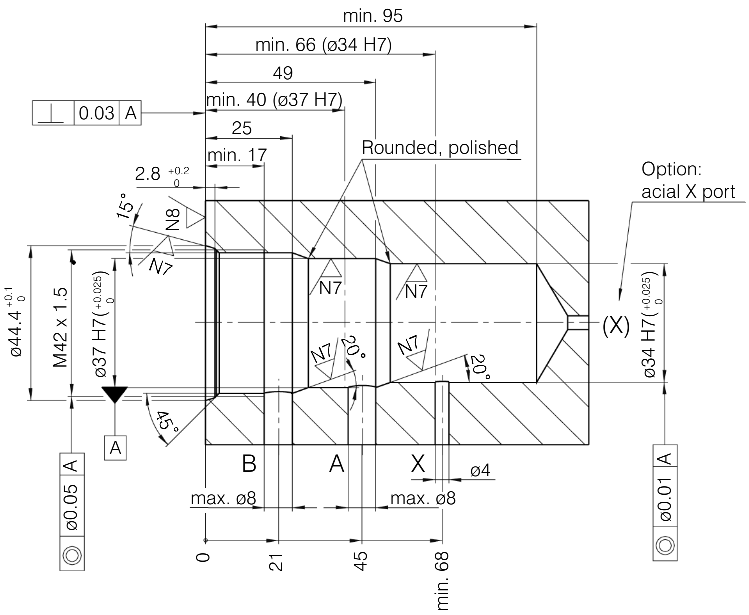
The opening pressure can be modified by changing the orifices

9. Dimensions, cavity

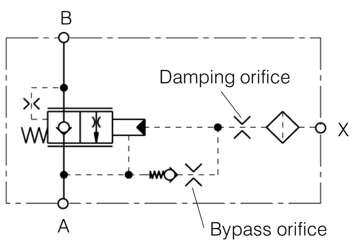
9.1 Dimensions

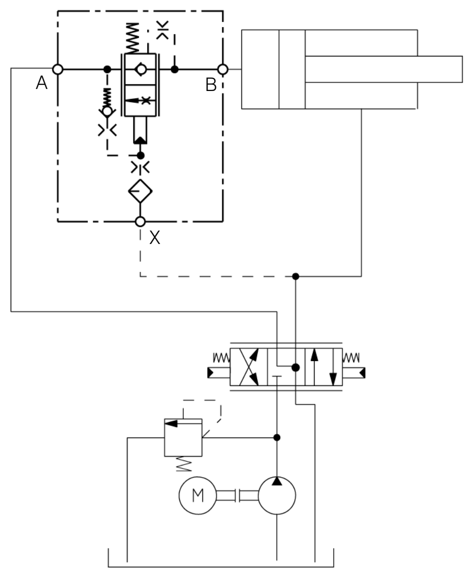


9.2 Cavity



10. Symbol, circuit example





11. Model code key

BBV | 6 | C – [ ] / [ ] / BY – [ ] / [ ]

Load control valve

BBV 6 = BBV

Nominal size

6 = 6

Type

Cartridge = C

Spool type

2FL = 2FL
4FL = 4FL
4FS = 4FS
4SL = 4SL

Damping orifice

orifice ø0.25 = 0.25
orifice ø0.30 = 0.30
orifice ø0.35 = 0.35
orifice ø0.40 = 0.40

Bypass

BY= With bypass

Bypass orifice

0.00 = closed
0.30 = orifice ø0.30
0.35 = orifice ø0.35
0.40 = orifice ø0.40
0.45 = orifice ø0.45

Seal material

N = Nitrile (standard)
V = Viton
T = Low-temperature

Seal material	NITRILE	VITON	LOW–TEMP.
Art. No. for basic valve (without specific features)	300 6010668.....	300 6010668.....	300 6010668.....

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