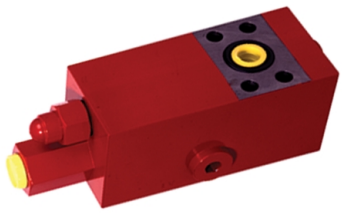
Safety for Hydraulics
Leak-free Load Control Valve, series BBV 6



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 over-running, loads
- prevents uncontrolled cylinder movement in the event of a hose- or pipe-rupture
- leak-free load-holding in neutral
- the integral, pilot-operated pressure relief valve protects the work cylinder against over-pressure

2. Advantages of the BBV 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, 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 only mounting bolts of the correct strength class (12.9).
- use the correct tightening torques (see section 11. Dimensions)
- at commissioning, bleed all air from the hydraulic system

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

6.1 General

Type	prop. pilot-controlled seat valve, hydr. piloted
Mounting method	flanged SAE 6000 psi or pipe-mounted
Ports see sect. 11.	A, A1 = G3/8” B = SAE 1/2 6000 psi (models with sec. PRV) = G3/8” (models without secondary PRV) B1 = G3/8” (models without secondary PRV) X = G1/4
Mounting attitude	unrestricted
Flow direction	A → B free flow B → A flow controllable by pressure at X
Weight	with secondary PRV = 2.9 kg without secondary PRV = 2.0 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	420 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 mm²/s (cSt)
Filtration	NAS 1638 class 9, $\beta 10 \geq 75$.

7. Adjusting the secondary pressure relief valve

(Allen screw 4 A/F hex. skt., lock nut 13 A/F)

To increase the pressure	⇨	clockwise	↻
To reduce the pressure	⇨	counter-clockwise	↺
Rate of pressure change	⇨	approx. 240 bar / full rotation	

After adjusting the pressure setting, always lock the adjusting screw with the lock nut (max. tightening torque 20 Nm)

8. Functional description, sectional view

8.1 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.

8.2 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.

8.3 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.

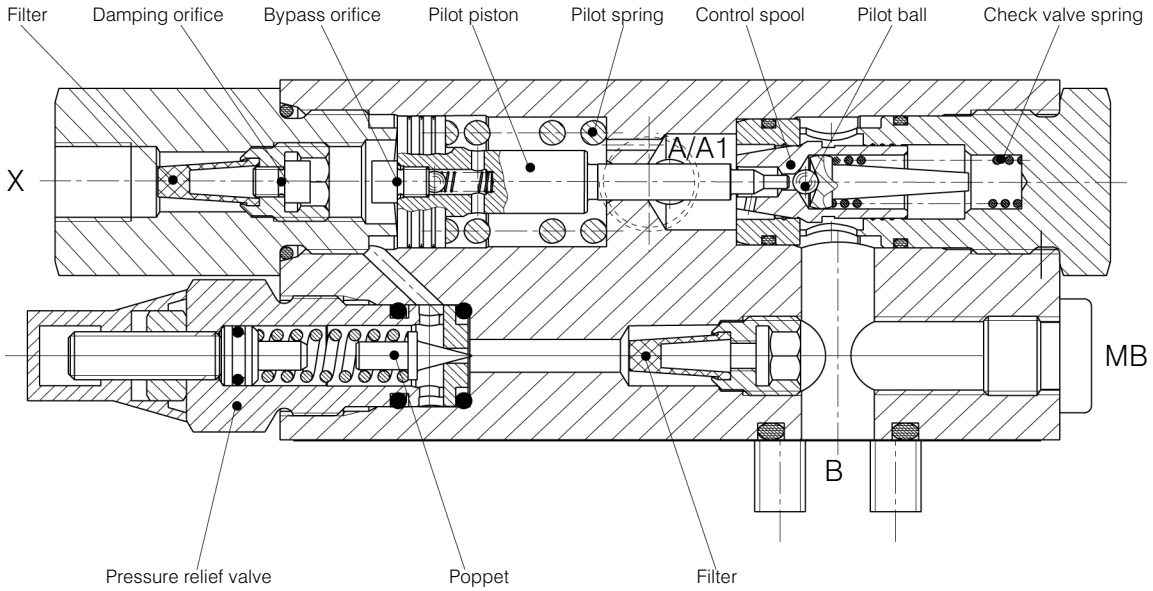
Damping

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.

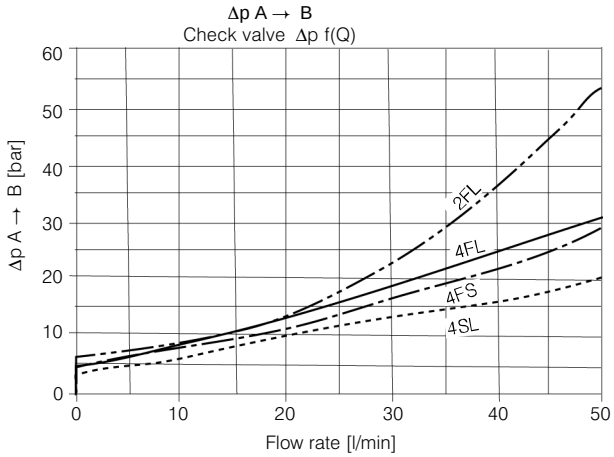
The orifices are protected against contamination by a mesh filter at port X and a check valve that prevents flow from A.

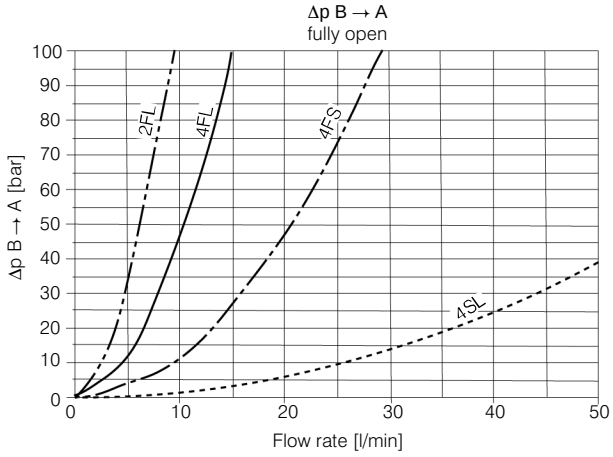
8.4 Secondary pressure relief valve

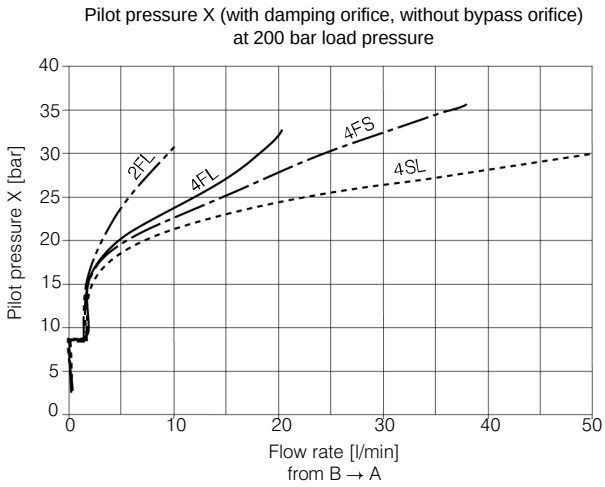
The secondary pressure relief valve is connected directly to the cylinder port B. When the pressure setting (which is externally adjustable) is reached, the relief valve poppet opens to create a flow path to the pilot chamber X. This causes the pressure in the pilot chamber to rise, which moves the pilot piston in the opening direction. The excess pressure in B is now relieved to A though the open control spool.

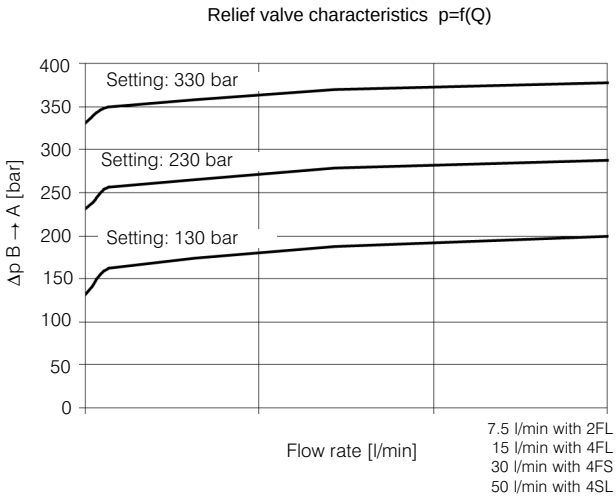


9. Performance curves (measured at 33 mm²/s [cSt])









9.1 Table of opening pressures

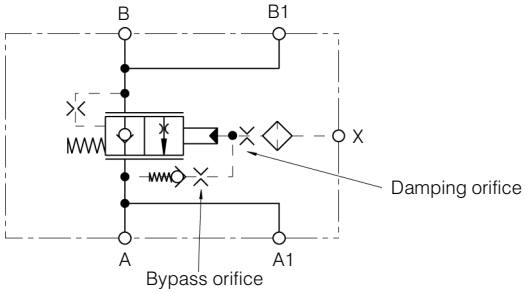
Opening pressures at 200 bar load pressure (theoretical values)

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

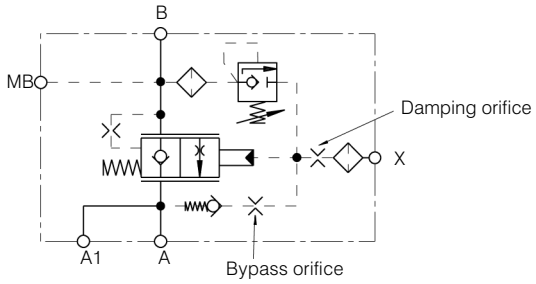
The opening pressure can be modified by changing the orifices

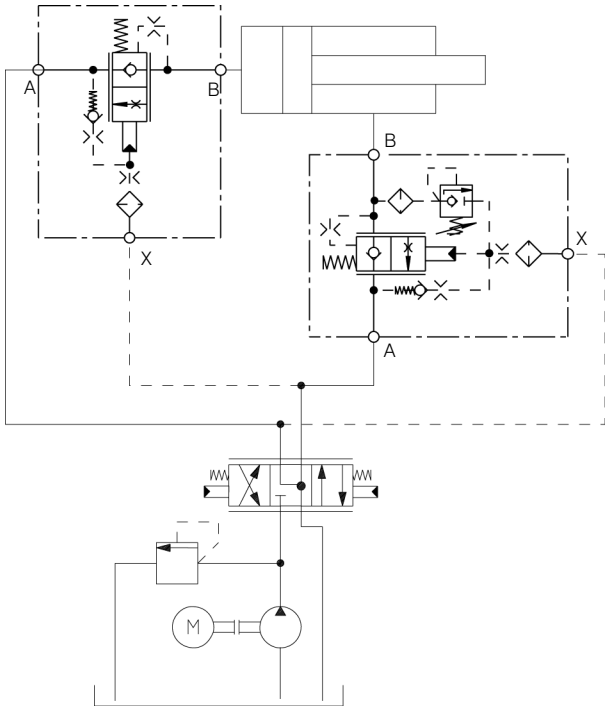
10. Symbol, circuit example

without secondary pressure relief valve



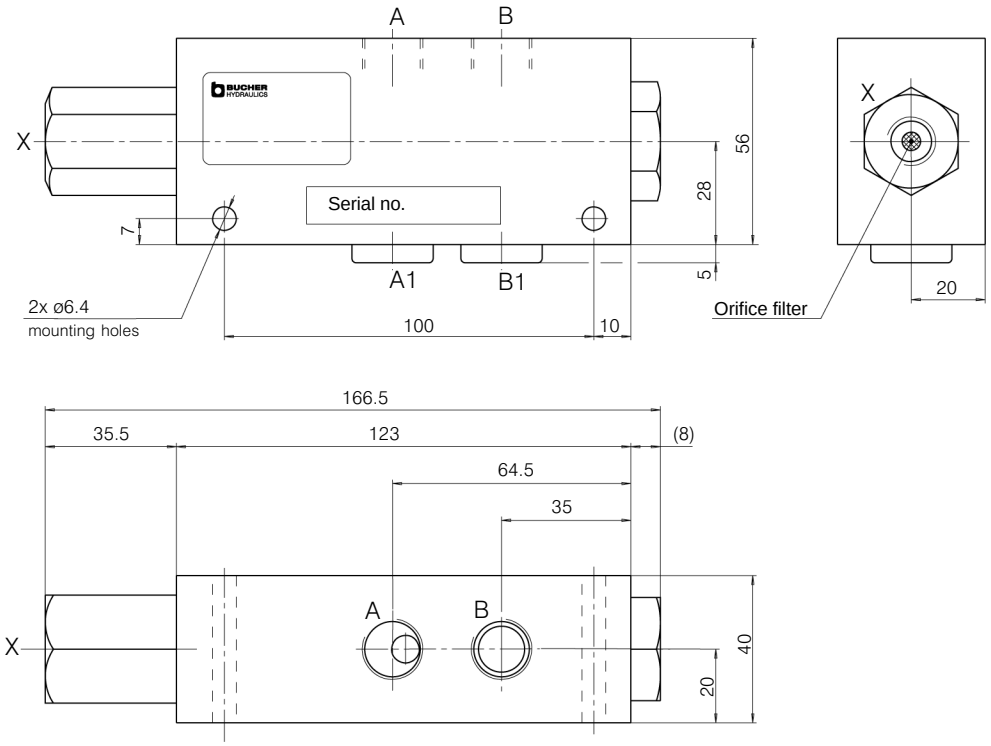
with secondary pressure relief valve



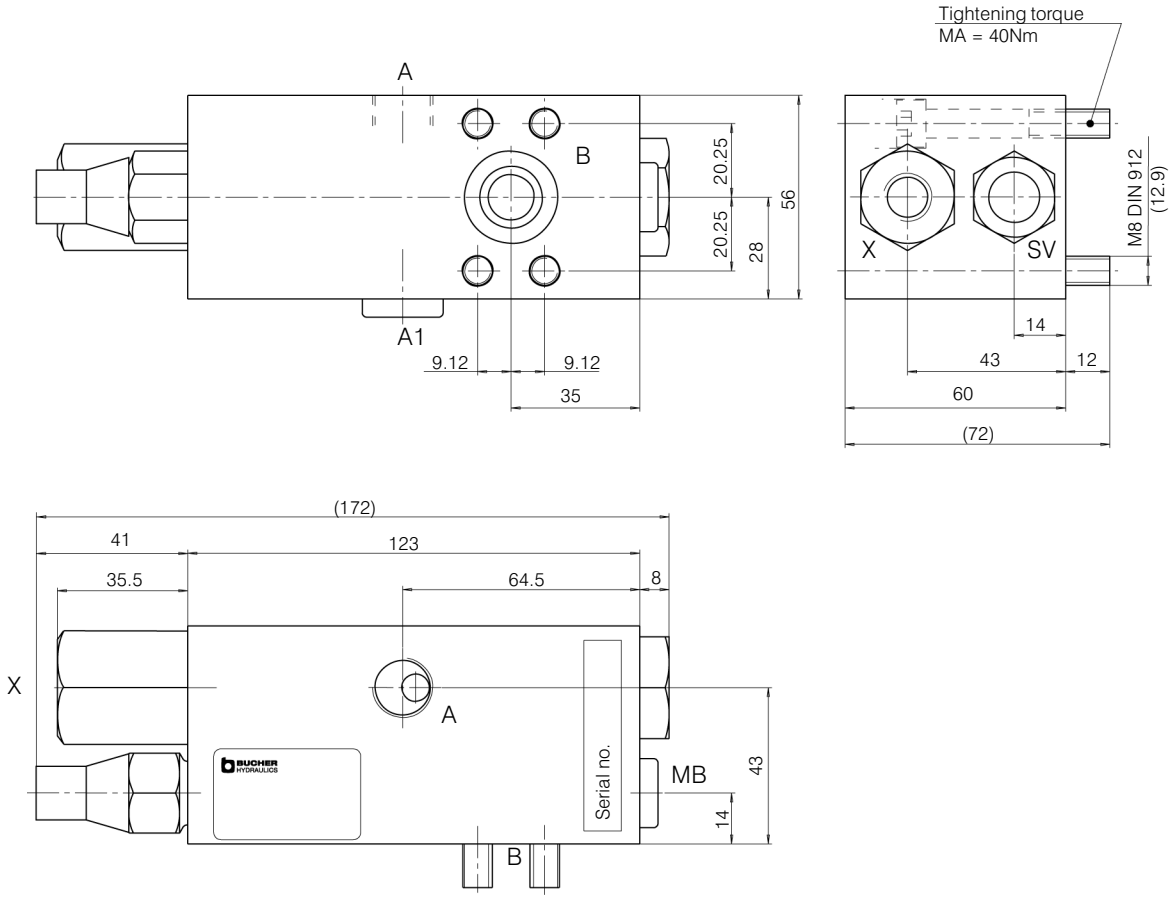


11. Dimensions

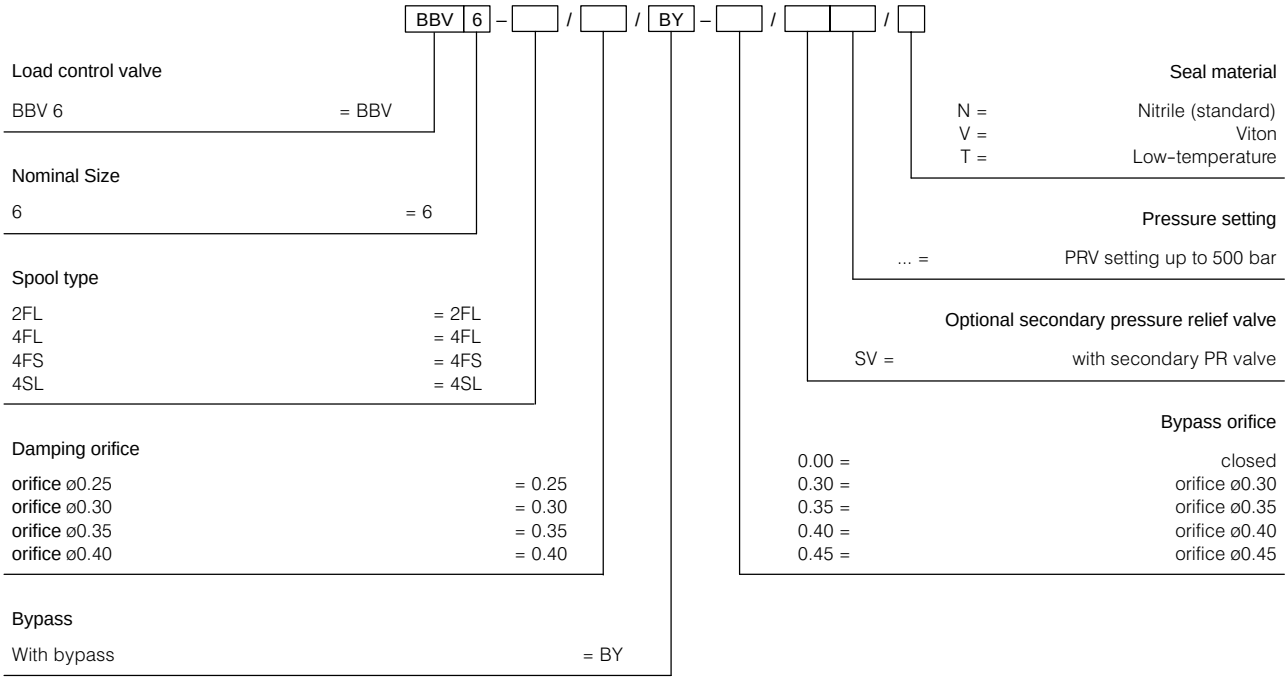
11.1 Without secondary pressure relief valve (with threaded port G3/8")



11.2 With secondary pressure relief valve (port B= SAE 1/2" 6000 psi)



12. Model code key



Seal material	NITRILE	VITON	LOW–TEMP.
Art. No. for basic valve without secondary PRV (without specific features)	300 0008828.....	Contact Bucher Hydraulics	Contact Bucher Hydraulics
Art. No. for basic valve- with secondary PRV (without specific features)	300 0008816.....	Contact Bucher Hydraulics	Contact Bucher Hydraulics

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