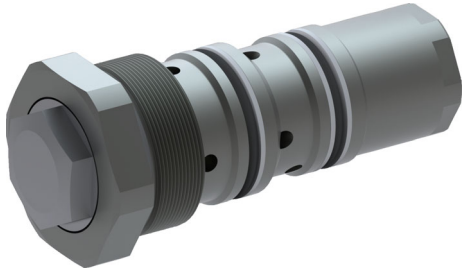


# Leak-Free Load-Control Cartridge Valve, Size 6

$Q_{\max} = 50 \text{ l/min (13 gpm)}$ ,  $p_{\max} = 420 \text{ bar (6000 psi)}$   
leak-proof, pilot operated, cartridge design  
Series BBV 6 C-...



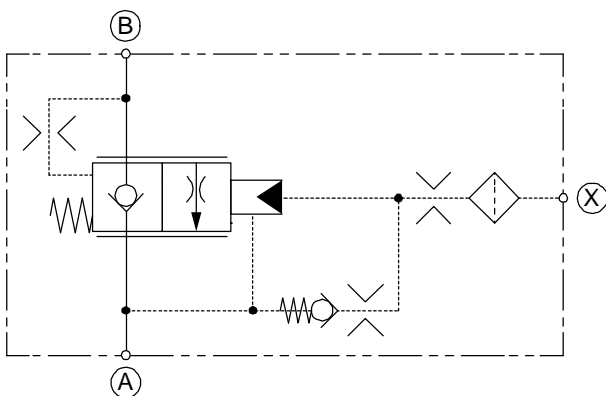
- Compact design for cavity type according to Bucher standard – M42x1.5
- Two-stage load-control valve and bypass check valve are functionally combined in one coaxial valve assembly
- Leak-free load holding
- The load pressure has very little influence on the pilot pressure required → area ratio 1:66
- Guaranteed closing force for the load-control assembly → reliable shut-off even with a broken spring
- Thanks to the various pilot control styles, the valve can always be adapted to the system requirements
- Hardened, ground and lapped seat valve components ensure permanent leaktightness and long service life
- All external parts with zinc-nickel coating according to DIN EN ISO 19598

## 1 Description

Leak-Free load-control valves in this series prevent hydraulic actuators from running ahead of the available oil supply. In one valve, they combine the functions of load-holding, safety and pipe-rupture protection. These hydraulic load-control cartridge valves from the series BBV 6 C-... are size 6, pilot operated, high performance screw-in cartridges with an M42x1.5 mounting thread. They are ideally suited for use in high-pressure applications up to 420 bar (6000 psi). Thanks to the various pilot control vari-

ants, the cartridge can be optimally adapted to the system requirements. The compact design allows for minimum installation space. All external parts of the cartridge are zinc-nickel plated, and are thus suitable for use in the harshest operating environments. The screw-in cartridges mainly used in mobile and stationary applications (e.g. for speed control of cylinders, hydraulic motors or on the luffing mechanisms).

## 2 Symbol



### 3 Technical data

General characteristics		Description, value, unit	
Designation		leak-free load-control cartridge valve	
Design		leak-proof, hydraulically pilot operated, cartridge design	
Size		size 6	
Mounting method		screw-in cartridge – M42x1.5	
Tightening torque		250 Nm ± 10 %	(184.4 ft-lbs ± 10 )
Main ports	A, B	Ø 8 mm	(Ø .314 inch)
Control port	X	Ø 4 mm	(Ø .157 inch)
Weight		0.7...0.8 kg	(1.54...1.76 lbs)
Mounting attitude		unrestricted	
Ambient temperature range		-25 °C ... +80 °C	(-13 °F ... +176 °F)
		(others on application)	
Surface corrosion protection		all external parts with zinc-nickel coating according to DIN EN ISO 19598	

Hydraulic characteristics		Description, value, unit	
Maximum operating pressure		420 bar	(6000 psi)
Maximum pressure at port B (static)		600 bar	(8700 psi)
Maximum flow rate		50 l/min	(13 gpm)
Flow direction		A → B, free flow through check valve B → A, controlled flow	
Operator type		hydraulic proportional	
Opening pilot ratio		1:66	
Hydraulic fluid		HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER	
Hydraulic fluid temperature range		-25 °C ... +80 °C	(-13 °F ... +176 °F)
Temperature rating of seals	NBR	-25 °C ... +100 °C	(-13 °F ... +212 °F)
	FKM	-20 °C ... +200 °C	(-4 °F ... +392 °F)
	MIL	-55 °C ... +80 °C	(-67 °F ... +176 °F)
Viscosity range		2.8...1500 mm <sup>2</sup> /s (cSt), recommended 10...380 mm <sup>2</sup> /s (cSt)	
Minimum fluid cleanliness Cleanliness class to ISO 4406 : 1999		class 20/17/14	

## 4 Construction and function

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

In the neutral position, there is zero leakage from B → A. The valve is held closed by the check valve spring, which acts 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.

### 4.2 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.

### 4.3 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, 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 → A.

#### Damping

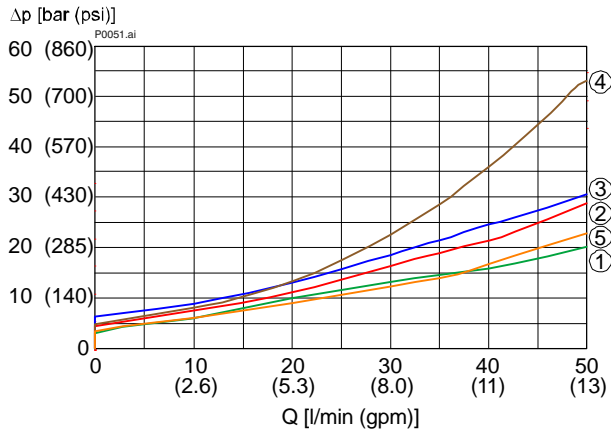
The system can be protected against oscillations by using suitable damping orifices. The effect of the bypass orifice from X → A is to make it necessary to use higher pilot pressures (pressure divider function) and this improves the damping behaviour.

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

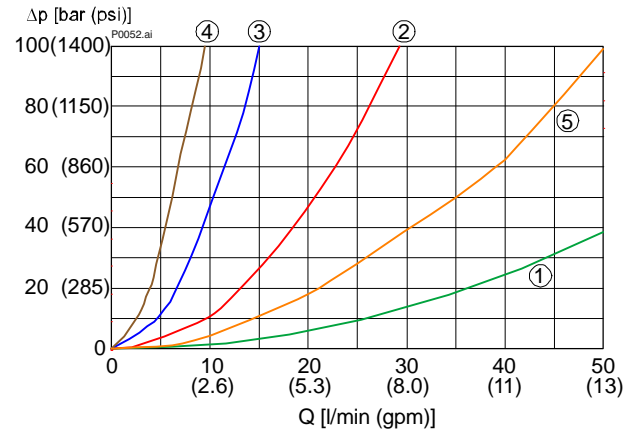
## 5 Performance graphs

measured with oil viscosity 33 mm<sup>2</sup>/s (cSt)

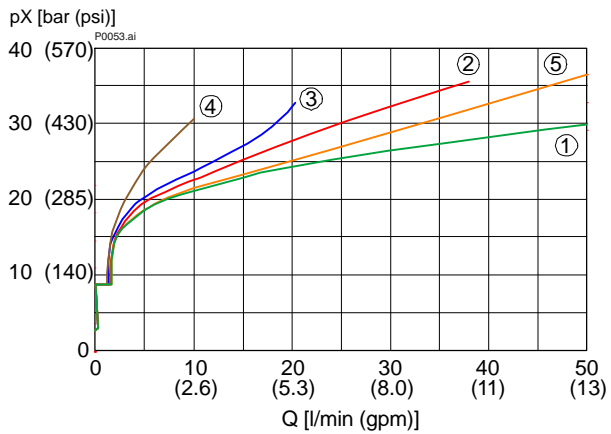
$\Delta p = f(Q)$  Pressure drop - Flow rate characteristic  
Check valve function, A → B



$\Delta p = f(Q)$  Pressure drop - Flow rate characteristic  
Lowering function, B → A, fully open



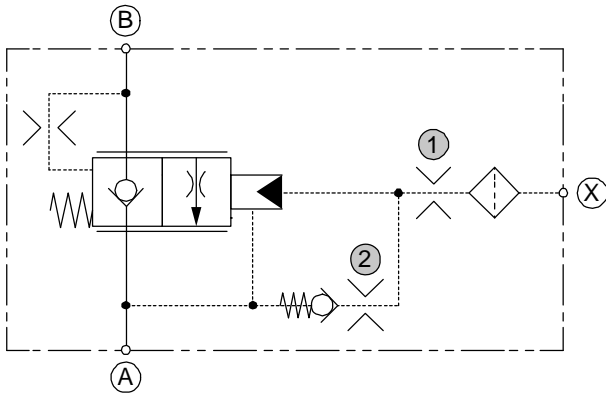
$p = f(Q)$  Pressure - Flow rate characteristic  
Pilot pressure pX @ 200 bar load pressure, B → A  
(with damping orifice, without bypass orifice)



**Legend:**  
(applies to all characteristic curves)

1	piston type 4SL
2	piston type 4FS
3	piston type 4FL
4	piston type 2FL
5	piston type 8FS

## 5.1 Orifice names



1	damping orifice
2	bypass orifice

## 5.2 Table of opening pressures

Opening pressure at 200 bar load pressure (theoretical values).

pX pre-opening [bar / (psi)]	pX start of opening [bar / (psi)]	pX fully open [bar / (psi)]	Bypass orifice [mm]	damping orifice [mm]
9.0 / (130.5)	16.0 / (232.0)	33.0 / (478.6)	Ø 0.00	Ø 0.25...0.40
12.0 / (174.0)	21.0 / (304.5)	45.0 / (652.6)	Ø 0.30	Ø 0.40
14.0 / (203.0)	25.0 / (362.5)	52.5 / (761.4)	Ø 0.30	Ø 0.35
14.0 / (203.0)	25.0 / (362.5)	54.0 / (783.2)	Ø 0.35	Ø 0.40
18.0 / (261.0)	32.0 / (464.1)	67.5 / (979.0)	Ø 0.30	Ø 0.30
18.0 / (261.0)	32.0 / (464.1)	67.5 / (979.0)	Ø 0.35	Ø 0.35
18.0 / (261.0)	32.0 / (464.1)	67.5 / (979.0)	Ø 0.40	Ø 0.40
23.0 / (333.5)	42.0 / (609.1)	88.5 / (1283.5)	Ø 0.45	Ø 0.40
24.0 / (348.0)	43.0 / (623.6)	91.5 / (1327.0)	Ø 0.40	Ø 0.35
26.0 / (377.0)	46.0 / (667.1)	97.5 / (1414.1)	Ø 0.35	Ø 0.30
34.0 / (493.1)	60.0 / (870.2)	126.0 / (1827.4)	Ø 0.45	Ø 0.35
37.0 / (536.6)	67.0 / (971.7)	141.0 / (2045.0)	Ø 0.40	Ø 0.30
54.0 / (783.2)	97.0 / (1406.8)	205.5 / (2980.5)	Ø 0.45	Ø 0.30



### IMPORTANT!:

The opening pressure can be adjusted to the system by changing the orifices.



### IMPORTANT!:

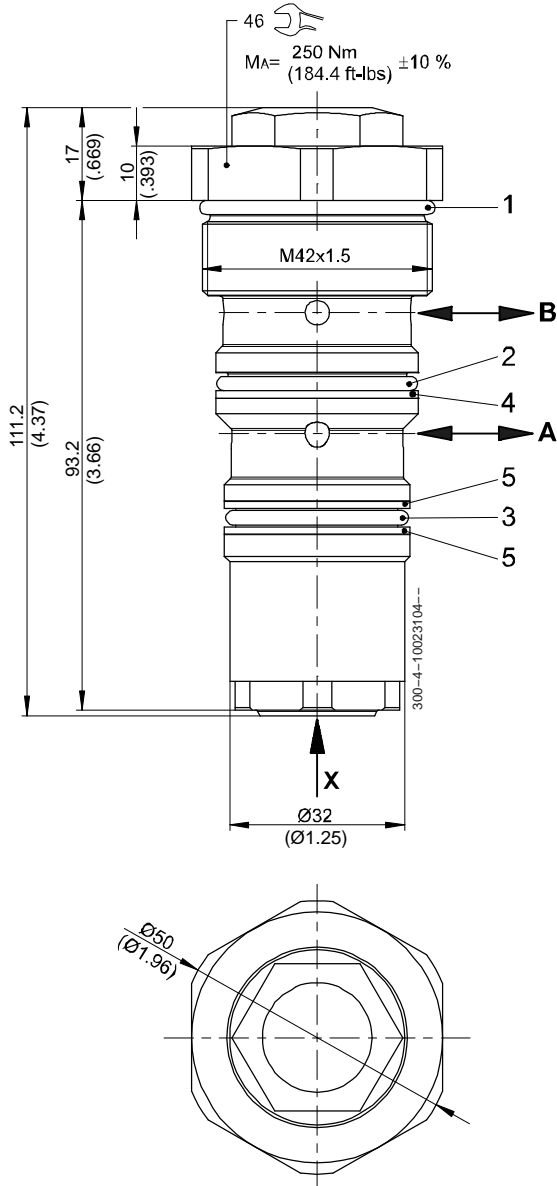
Further orifice combinations available in consultation with Bucher Hydraulics.

## 6 Dimensions & sectional view

Example for the dimensional units:

0.79 = 0.79 mm [millimeter]

(.031) = 0.031" [inch]



Item	Qty.	Description
1	1	O-Ring $\varnothing 37.77 \times 2.62$
2	1	O-Ring $\varnothing 31.42 \times 2.62$
3	1	O-Ring $\varnothing 28.24 \times 2.62$
4	1	Backup ring $\varnothing 37.00 / 32.80 \times 1.30$
5	2	Backup ring $\varnothing 34.00 / 29.90 \times 1.30$



### IMPORTANT!

Item No. 3000306312 = seal kit NBR (Nitril)

Item No. 3000307037 = seal kit FKM (Viton)

Item No. 3000306511 = seal kit MIL (low temp.)

## 7 Installation information



### IMPORTANT!

Designing load-control valves requires specialist technical knowledge and product knowledge.

Safety applications must be verified by adequate tests to ensure safety in actual use.



### IMPORTANT!

The valve may only be used for its intended purpose within its nominal rating. If you plan to use it outside the nominal rating, you must contact the valve manufacturer.

The ultimate responsibility for safety in the installation and use rests with the end-machine manufacturer of the mobile application.



### IMPORTANT!

When fitting the cartridges, use the specified tightening torque. No adjustments are necessary, since the cartridges are set in the factory.



### ATTENTION!

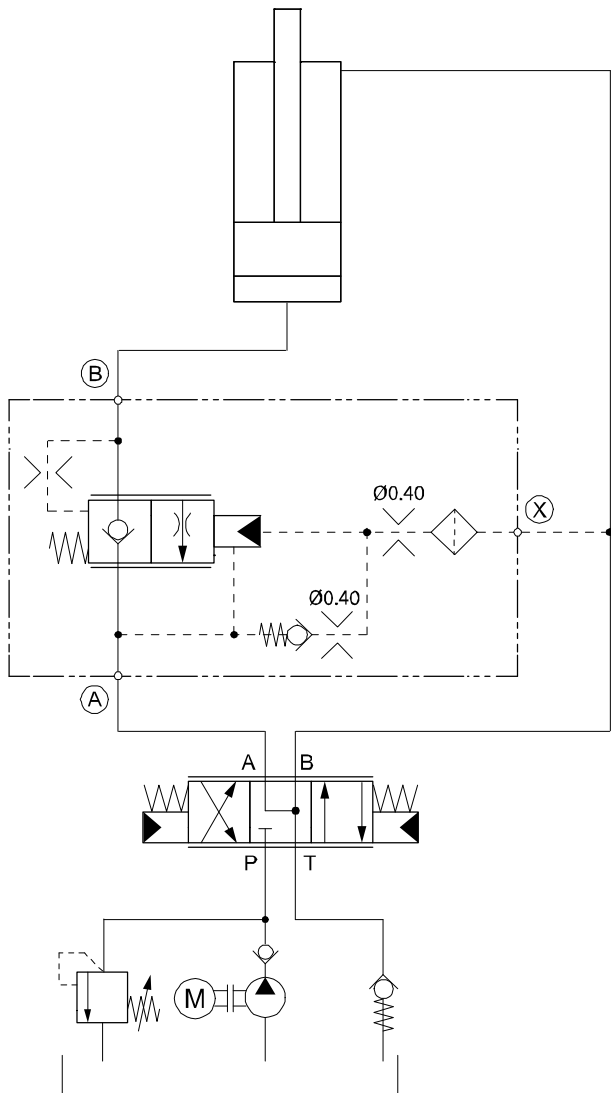
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.



### ATTENTION!

The valve may only be mounted or tightened using the SW 46 hexagon!

## 8 Application examples



### 9 Ordering code

e.g. **BBV** **6** **C** - **2FL** / **0.30** / **BY** - **0.00** / **N**

BBV	= load control valve
6	= size 6
C	= cartridge design
2FL	= piston type 2FL
4FL	= piston type 4FL
4FS	= piston type 4FS
4SL	= piston type 4SL
8FS	= piston type 8FS
0.25	= damping orifice Ø 0.25
0.30	= damping orifice Ø 0.30
0.35	= damping orifice Ø 0.35
0.40	= damping orifice Ø 0.40
BY	= with bypass (standard)
0.00	= bypass orifice Ø 0.00 (closed)
0.30	= bypass orifice Ø 0.30
0.35	= bypass orifice Ø 0.35
0.40	= bypass orifice Ø 0.40
0.45	= bypass orifice Ø 0.45
N	= NBR (Nitrile) seals (standard)
V	= FKM (Viton) seals
T	= MIL (low temperature) seals (special seals - please contact BUCHER)

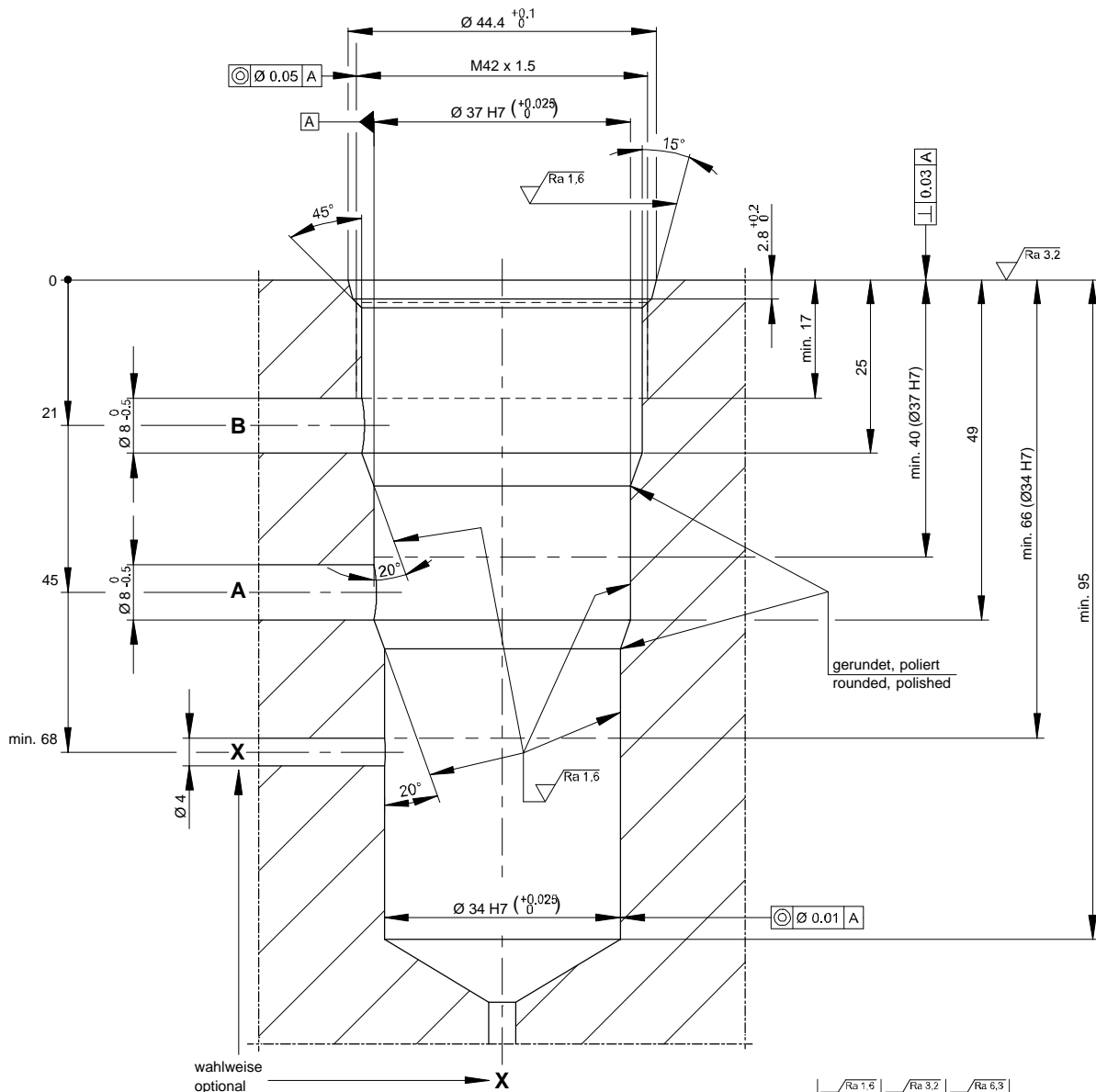


#### IMPORTANT!:

Further orifice combinations available in consultation with Bucher Hydraulics.



## 10 Cartridge cavity



Toleranzen nach:  
Tolerances according to: DIN ISO 2768-mK

	$\sqrt{\text{Ra 1.6}}$	$\sqrt{\text{Ra 3.2}}$	$\sqrt{\text{Ra 6.3}}$
Rauheitsklasse Roughness class	N7	N8	N9
Rz [ $\mu\text{m}$ ]	10	20	40



### ATTENTION!

You must maintain the specified positional and diametral tolerances. To ensure trouble-free operation of the screw-in cartridges, we strongly recommend that pilot drilling, boring, reaming and cavity thread-cutting are always performed in one setup.

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