

# Double Pilot Operated Cartridge Check Valve, Size 10

$Q_{max} = 100 \text{ l/min (26 gpm)}$ ,  $p_{max} = 350 \text{ bar (5000 psi)}$

pilot operated, two-stage, spring-closed cartridge-type poppet valve

Series DERV 10...



- Compact design for cavity type according to Bucher standard – M40x1.5
- Load pressure closing cone poppet valve
- Two-stage principle (decompression / main opening)
- Virtually leak-free in no-flow direction
- Hardened and ground seat and poppet
- Prevents creep of hydraulically clamped actuators
- Suitable bodies with threaded ports or a combination of threaded/manifold ports are available

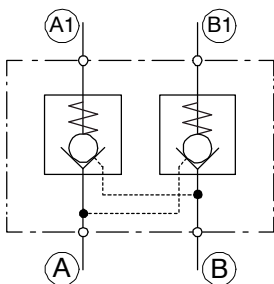
## 1 Description

These double pilot-operated check valves are size 10, two stage, high performance screw-in cartridges with an M40x1.5 mounting thread. The conical-seat design ensures that the cartridges are leak-tight from A1 → A and B1 → B. The check function can be overridden by applying

a suitable pressure on the other side.

In the A → A1 and B → B1 direction, flow can pass freely through the valve (opening pressure = 3.0 bar). These screw-in cartridges are predominantly used in certain mobile and industrial applications.

## 2 Symbol



## 3 Technical data

General characteristics	Description, value, unit
Designation	double pilot operated cartridge check valve
Design	hydraulically pilot operated, two-stage, spring-closed poppet valve
Mounting method	screw-in cartridge – M40x1.5
Tightening torque	250 Nm ± 10 % (185 ft-lbs ± 10 %)
Size	size 10
Weight	0.92 kg (2.02 lbs)
Mounting attitude	unrestricted
Ambient temperature range	-25 °C ... +80 °C (-13 °F ... +176 °F)
Surface corrosion protection	browned

Hydraulic characteristics	Description, value, unit	
Maximum operating pressure	350 bar	(5000 psi)
Maximum operating pressure static	500 bar	(7100 psi)
Maximum flow rate	100 l/min	(26 gpm)
Flow direction	A → A1, B → B1 check-valve function A1 → A, B1 → B shut-off direction, leak-free (flow is enabled by pressure in the opposite line)	
Opening pressure	(load pressure / 18) + 3 bar	
Geometric opening ratio	1:18	
Closing pressure	3 bar	(40 psi)
Hydraulic fluid	HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER	
Hydraulic fluid temperature range	-20 °C ... +80 °C	(-4 °F ... +176 °F)
Temperature rating of seals	NBR FKM MIL	-25 °C ... +100 °C (-13 °F ... +212 °F) -20 °C ... +200 °C (-4 °F ... +392 °F) -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 20/18/15	

## 4 Construction and function

### 4.1 Neutral position (load pressure at A1 or B1, ports A and B depressurized)

The control spool and pilot ball are closed from A1 → A and B1 → B, free of leaks, by the force of the compression spring and the load pressure that acts on the rear side of the pilot ball and control spool.

### 4.2 Check valve position (flow from A → A1, B → B1)

If pressure is applied to the valve seat of the control spool via port A or B, the control spool, together with the pilot ball, is opened against the yielding compression spring. When this check valve operates, the control spool moves in the opening direction but the pilot ball valve, due to its small effective area, does not open.

### 4.3 Hydraulic piloting (flow from A1 → A, B1 → B)

#### Decompression

When control pressure A or B is being built up, the pilot piston is forced against the pilot ball. If the opening force is greater than the sum of the compression-spring force and the load pressure at the pilot seat, the pilot ball opens and decompresses the pressure behind the control spool.

#### Opening the control spool

Due to the pressure decay (decompression) behind the control spool, the pilot piston now only acts against the yielding compression spring. This means that the control spool is opened by the pilot piston without any great increase in control pressure. Flow from A1 → A or from B1 → B is guaranteed.

#### Closing the control spool

When the control pressure is relieved at the pilot piston, the control spool is closed by the force of the spring and the  $\Delta p$  of the decompression fluid flowing through. This means that the closing pressure remains almost constant for all load pressures.

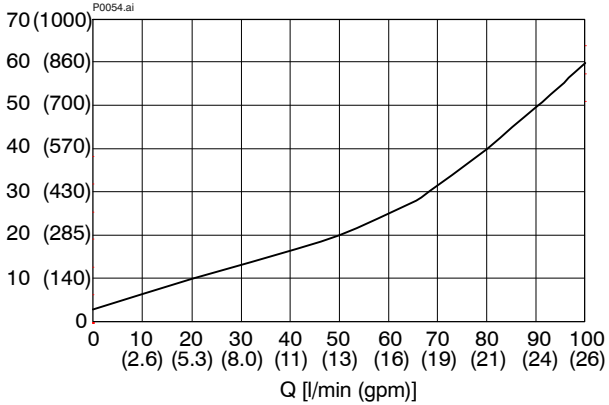
## 5 Performance graphs

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

$\Delta p = f(Q)$  Pressure drop - Flow rate characteristic

A → A1 / B → B1

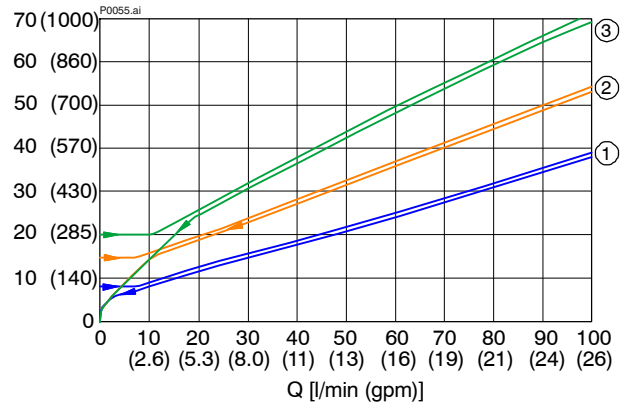
$\Delta p$  [bar (psi)]



$p = f(Q)$  Pressure - Flow rate characteristic

A1 → A / B1 → B

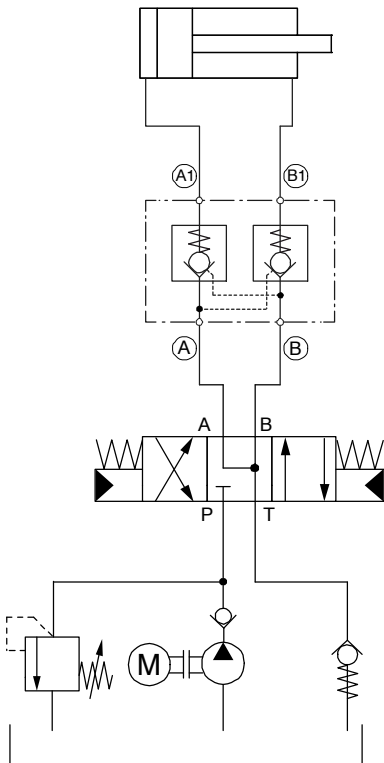
$p_{s1}$  [bar (psi)]



1	$P_{Load} = 100$ bar
2	$P_{Load} = 200$ bar
3	$P_{Load} = 300$ bar

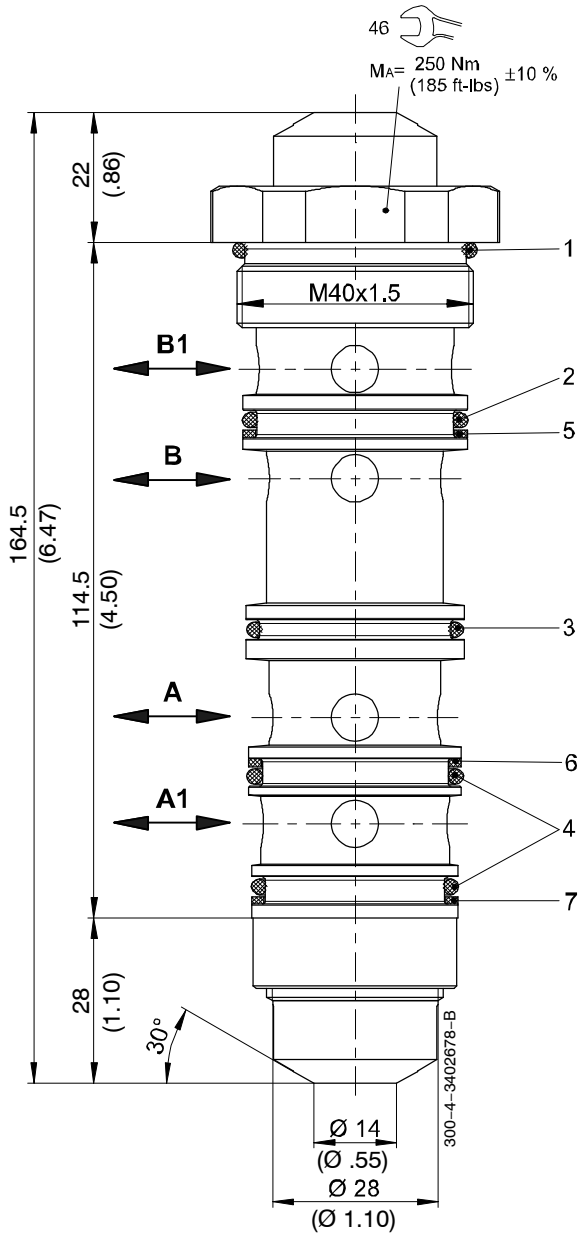
## 6 Application examples

### 6.1 Cylinder application



## 7 Dimensions & sectional view

Example for the dimensional units:  
 0.79 = 0.79 mm [Millimeter]  
 (.031) = 0.031" [inch]



## 8 Installation information



### 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.

Item	Qty.	Description
1	1	O-Ring $\varnothing 36.17 \times 2.62$
2	1	O-Ring $\varnothing 32.99 \times 2.62$
3	1	O-Ring $\varnothing 31.42 \times 2.62$
4	2	O-Ring $\varnothing 29.82 \times 2.62$
5	1	Backup ring $\varnothing 38.00 / 33.80 \times 1.30$
6	1	Backup ring $\varnothing 36.00 / 31.80 \times 1.30$
7	1	Backup ring $\varnothing 35.00 / 30.80 \times 1.30$



### IMPORTANT!

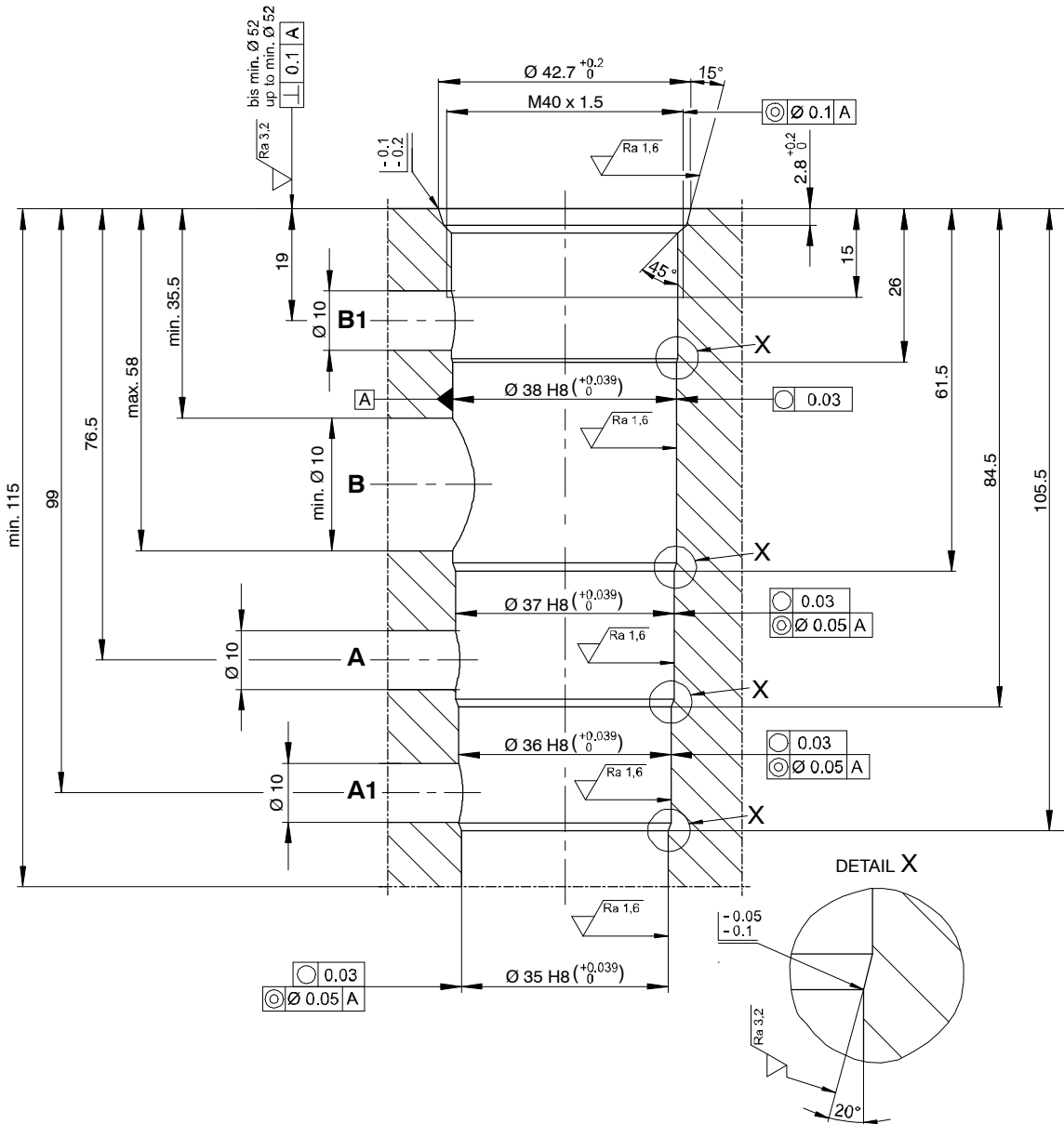
Item No. 30003013120 = seal kit NBR (Nitril)  
 other seals on request

## 9 Ordering code

DERV 10 - N

- DERV = double pilot operated cartridge check valve
- 10 = size 10
- N = NBR (Nitrile) seals (standard)
- V = FKM (Viton) seals
- T = MIL (low temperature) seals  
 (special seals - please contact BUCHER)

## 10 Cartridge cavity



Tolerances according to: DIN ISO 2768-mK

	$\sqrt[3]{Ra\ 6,3}$	$\sqrt[3]{Ra\ 1,6}$	$\sqrt[3]{Ra\ 3,2}$	$\sqrt[3]{Ra\ 6,3}$
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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