

Vickers®

Cartridge Valves



Load Controls

Screw In Cartridge Valves

Pressures to 350 bar (5000 psi) – Flows to 190 l/min (50 USgpm)



VICKERS

Rev. 2/99

722

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Introduction

Load control valves

Vickers offers a broad range of load control valving including counterbalance, motion control and pilot operated check valves. The prime function of load controls is to prevent loads from running ahead of pump supply and/or to provide positive load holding. These valves provide precise and stable motion control. Load control valves are ideally suited for moving and positioning systems.

These products include both screw-in cartridge and in-line housing valves to meet the majority of load control requirements.

Load control application tips

3-ported counterbalance valves

These valves are used with an open center on/off directional valve for:

- precise control of overrunning loads
- protection from pump cavitation
- to prevent actuator from running ahead of the pump supply and
- providing load holding and hose failure safety

Vented (4-ported) counterbalance valves

These valves are used for:

- precise control of overrunning loads
- regenerative cylinder circuits
- meter out control and
- providing load holding and hose failure safety
- with proportional control valves

Pilot operated check valves

These valves are used for:

- position load locking
- as an alternative to counterbalance valves where neither the overrunning loads or release speed are factors in the application.

Counterbalance cartridges, 3-ported

The CBV are single cartridge type counterbalance valves that have:

- a check feature allowing free flow in one direction
- a relief feature controlling flow in the other direction
- a pilot signal that overrides the relief setting providing the counterbalance function.

The CBV*–10 series products are capable of handling flows up to 60 l/min (15 USgpm) and pressures up to 350 bar (5000 psi).

The CBV*–12 series products are capable of handling flows up to 114 l/min (30 USgpm) and pressures up to 350 bar (5000 psi).

These valves are available with 3:1, 4:1, 4.5:1, and 10:1 pilot ratios. As a general rule, a low pilot ratio will provide better motion control and stability in systems with higher capacitance (spongy) and inductance (high inertial loads). A high pilot ratio improves the efficiency of a hydraulic system, but motion control stability may suffer.

The 3-ported counterbalance valves are offered with a wide variety of standard housings with SAE and BSPP port options. Aluminum and steel housings are available in the following styles:

- In-line single
- In-line dual
- In-line dual, with integral shuttle
- SAE 4-bolt
- Close coupled, nipple mounted
- Gasket mounted single
- Gasket mounted dual

These valves are offered with two types of cavities:

Standard	C-*–3S
Special	CMM-*–3

Vented counterbalance cartridges, 4-ported

The VCB1-10 and VCB1-12 are single cartridge type counterbalance valves that:

- have a check feature that allows free flow in one direction
- have a relief feature that controls flow in the other direction and
- have a pilot signal that overrides the relief setting, providing the counterbalance function

The additional 4th port on this valve provides an external drain that makes the valve insensitive to back pressure at port 2, when the valve is piloted open. This is particularly useful in regenerative circuits, meter-out circuits, servo valves and proportional valves circuits. This valve is available with a 4:1 pilot ratio.

The 4-ported counterbalance valve is offered with a wide variety of standard housings with SAE and BSPP port options.

NOTE: For applications where the flow rate will not exceed 37,8 l/min (10 USgpm) for VCB1–10 and 95 l/min (25 USgpm) for VCB1-12, the standard C-*–4 housing can be used. For applications over those flows or those that require a reduced pressure drop, housings with the slot feature or a C-*–4U cavity is required.

Aluminum and steel housings are available in the following styles:

- In-line single
- In-line dual
- Gasket mounted single

Motion control valves

The new products are in-line housing type motion control or counterbalance valves that utilize separate cartridges to perform the counterbalance function as described in the 3-ported version. The 16 and 20 series valves are available in both single and dual functions. The 16 series is capable of handling flows up to 151 l/min (40 USgpm) and pressures up to 210 bar (3000 psi). The 20 series valves are capable of handling 190 l/min (50 USgpm) and pressures up to 210 bar (3000 psi). Both series offer a 10:1 pilot ratio.

Features and benefits of counterbalance & motion controls:

- Positive load holding in any position
- Thermal expansion relief protection
- Cartridge valves may be installed directly into cavities machined in the actuator body. This reduces the number of potential leak points and simplifies plumbing.
- Line mounting of single or dual functions can simplify installation of load control valves in many applications.
- Dual function models that can introduce low-pressure makeup flow to prevent cavitation can be line mounted in hydrostatic transmissions.
- When used with paired cylinders, counterbalance valves will help to balance the load by transferring part of the load from the heavily loaded cylinder to the less loaded cylinder.
- When used with an open center directional control valve, deceleration control can be provided.

Adjusting counterbalance cartridge valve pressure setting:

Counterbalance valves adjust in the opposite direction of other pressure control valves. Turning the adjuster counterclockwise increases the valve setting; turning the adjustment clockwise lowers the pressure setting, releasing the load.

1. Loosen the jam nut.
2. Turn the adjusting screw clockwise to reduce the pressure setting, or counterclockwise to increase the pressure setting.

DO NOT REMOVE THE SPRING WIRE FROM THE ADJUSTING SCREW

3. Tighten the jam nut to secure the desired pressure setting.



NOTE: CBV*-10 spring wire must not be removed. Removal will affect the minimum adjustment of the valve.



CAUTION: Care should be taken to ensure the load is supported by mechanical means when servicing or removing the cartridge valve.



NOTE: Hydraulically released "deadman" brakes should be used to lock static loads due to motor and cylinder leakage.



CAUTION: Counterbalance valves can be damaged by severe decompression shock. To help prevent shock damage, a restriction may be added between the cylinder and the counterbalance valve.



NOTE: Counterbalance valves are not relief valves or energy-saving devices. Stability problems may be encountered when system operating pressure goes below 50 bar (700 psi).

Pilot operated check valves

The POC*-10 and POC*-12 series of pilot-to-open check valves compliment the CBV*-10 and CBV*-12 counterbalance cartridges and are physically interchangeable with them. The POC's provide a low cost alternative to load control when the dynamics of neither overrunning loads nor load release speed are factors to be considered in the design of the hydraulic circuit for the load to be controlled.

The pilot-to-open valves positively lock a load from port 1 to port 2 until pilot pressure applied to port 3 is sufficient to unseat the valve. This then permits flow from port 1 to port 2. The load can also be released through means of an optional screw type override.

The POC*-10 covers flow up to 60 l/min (15 USgpm). The POC*-12 covers flow up to 114 l/min (30 USgpm). With infinite life qualification to a fatigue pressure rating of 310 bar (4500 psi), these POC valves are suitable for use in a broad range of load control applications with typical system operating pressures up to 350 bar (5000 psi). Tailoring of the circuit to gain energy savings while minimizing shock is obtained through the use of several standard cracking pressure ranges from 2,0 bar (30 psi) to 7 bar (100 psi). When anti-cavitation protection is required, the 0,30 bar (5 psi) spring should be used. For those applications where pilot pressure may not always be available, the valve can be ordered with an optional adjustable override.

Pilot-to-open valves are suitable for a wide range of applications including aerial work platforms, boom truck, machine tool and round bailer markets.

Features and benefits of pilot operated check valves:

- Simple load holding device. Low cost alternative to more complex solutions when overrunning loads are not present and / or control of load release speed is not required.
- Provides high operational efficiency and low spring settings.
- Valves are offered with a wide variety of standard housings with SAE and BSPP port options in the following configurations:

- In-line single
- In-line dual
- SAE, 4-bolt
- Close coupled, nipple mounted
- Gasket mounted single
- Gasket mounted dual

These valves fit into C*-3S and CMM*-3 cavities.

- Four standard cracking pressures permit energy savings, while tailoring the hydraulic system requirements to minimize shock.
- Unique dual spring design provides high operational efficiency and a low pressure spring option for effective anti-cavitation protection.
- Unique design provides compact package and low pressure drops that match or exceed current market expectations and provide for excellent repeatability and stability
- 3:1 pilot ratio satisfies simple load holding application requirements, while providing smooth operation and longer operating life.
- Optional adjustable override releases the load for situations where pilot pressure is not always available.



WARNING: Do not use Pilot-to-open check valves in load holding applications where either overrunning loads are possible or, load release speed is critical. Failure to observe these guidelines may result in bodily injury or damage to equipment.

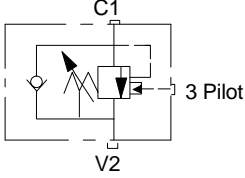


WARNING: For pressure over 210 bar (3000 psi) use steel housings.

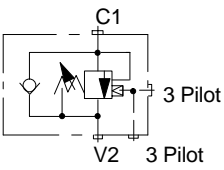
Functional Symbols

CBV cartridges in housings

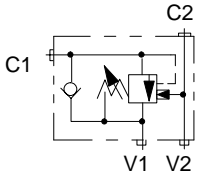
I – Inline Mounted



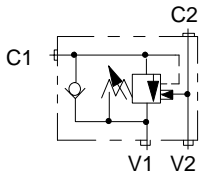
B – 4-Bolt Pad (Size 12 only)



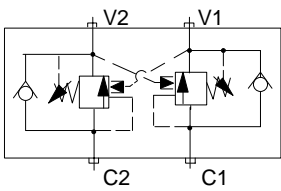
N – Close Coupled, Nipple Mounted



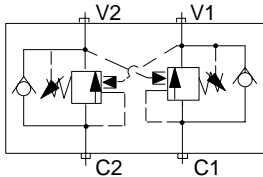
G – Gasket Mounted, Single



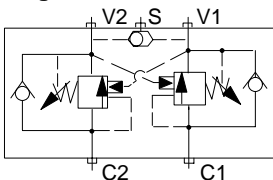
D – Dual Line Mounted



P – Dual Gasket Mounted

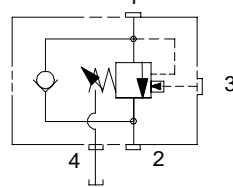


M – Dual Counterbalance Line Mounted w/Integral Shuttle

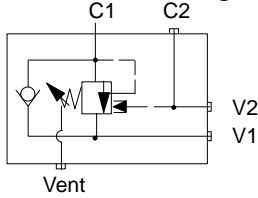


VCB cartridges in housings

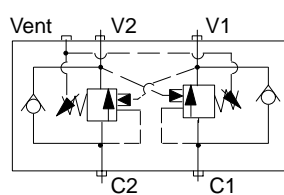
I – Inline Mounted



G – Gasket Mounted, Single



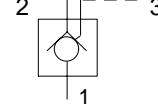
D – Dual Line Mounted



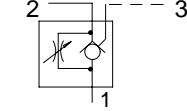
POC cartridges in housings

I – Inline Mounted

F Type

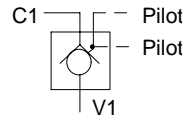


S Type

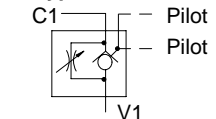


B – 4-Bolt Pad (Size 12 only)

F Type

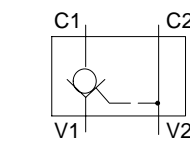


S Type

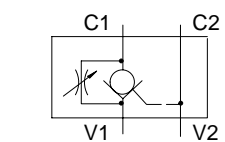


N – Close Coupled, Nipple Mounted

F Type

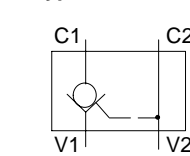


S Type

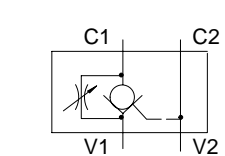


G – Gasket Mounted, Single

F Type

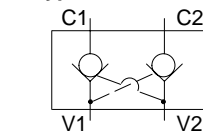


S Type

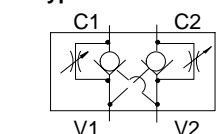


D – Dual Line Mounted

F Type

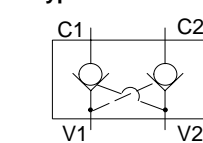


S Type

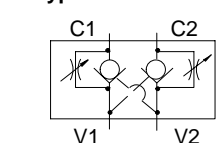


P – Dual Gasket Mounted

F Type



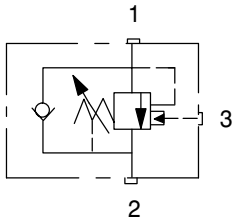
S Type



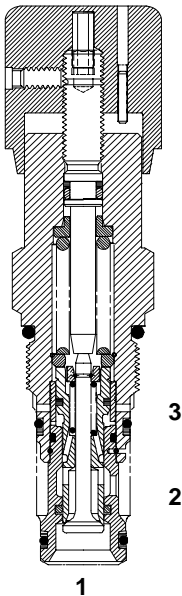
CBV1/2-10

Counterbalance valve

Functional Symbol



Sectional View



Description

The CBV*-10 is a 3-ported, externally piloted, screw-in cartridge type counterbalance valve.

Operation

The CBV counterbalance valve allows free flow from port 2 (inlet) to port 1 (load). Flow from port 1 to port 2 is blocked until either the predetermined pressure setting has been reached or sufficient pilot pressure has been applied to port 3 (pilot)

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	350 bar (5000 psi)*
Cartridge fatigue pressure (infinite life)	350 bar (5000 psi)
Rated flow	60 l/min (15 USgpm)
Cracking pressure @ 1 l/min (0.25 USgpm)	30 – 62–210 bar (900–3000 psi)
	50 – 186–350 bar (2700–5000 psi)
Internal leakage	5 drops / min. max. Port 1 to Port 2 @77% of crack pressure
Temperature range	–40 to 120° C (–40° to 248° F)
Cavity	C–10–3S (See page 29)
Pilot ratio	4:1, 10:1
Fluids	All general purpose hydraulic fluids such as: MIL–H–5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing materials	Aluminum or steel
Weight cartridge only	0,23 kg (0.50 lb.)
Seal kit	02–173019 Buna–N 02–173020 Viton®



* Caution: Adjustments exceeding 350 bar (5000 psi) may damage the body.
Warning: For pressure over 210 bar (3000 psi) use steel housing.

Viton is a registered trademark of E.I.DuPont

Pressure Drop Curves

Cartridge only

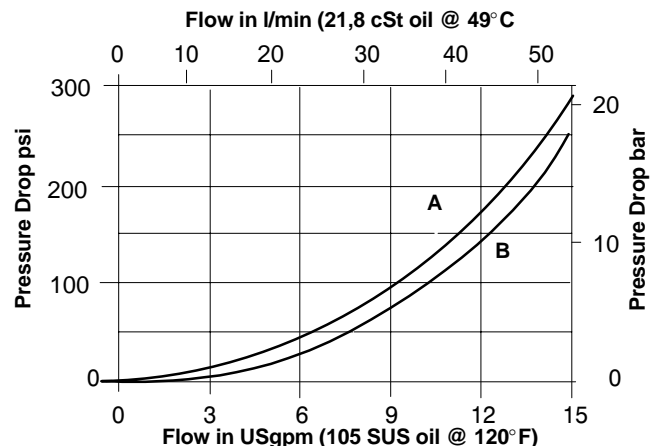
For 4:1 Ratio

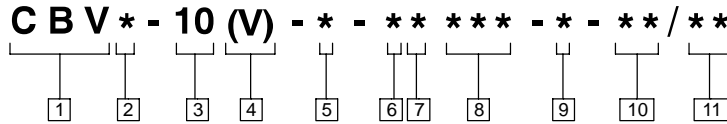
$$\text{Pilot pressure, nominal at port 3} = \frac{\text{Cracking pressure} + (5 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{4}$$

For 10:1 Ratio

$$\text{Pilot pressure, nominal at port 3} = \frac{\text{Cracking pressure} + (11 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{10}$$

- A – Piloted open port 1 to port 2
- B – Free flow port 2 to port 1





1 Valve function

CBV – Counterbalance valve

2 Pilot ratio

- 1 – 4:1
- 2 – 10:1

3 Valve size

10 – Size 10

4 Seals

- Blank**–Buna-N
- V** – Viton

5 Adjustment options

- S** – Screw with locknut
- C** – Cap over screw
- K** – Hand knob

6 Cartridge/valve housing

- O** – Cartridge only
- I** – Inline body
- N** – Close coupled – nipple mounting
- G** – Gasket mounted – single
- D** – Dual counterbalance – line mtd
- M** – Dual counterbalance – line mtd with integral shuttle valve
- P** – Dual counterbalance – gasket mtd



Aluminum housings can be used for pressures up to 210 bar (3000 psi)

Steel housings **must** be used for operating pressures **above** 210 bar (3000 psi)

7 Valve housing material

- A** – Aluminum
- S** – Steel

8 Housing port sizes

I – Inline Body

Aluminum, Light duty	Aluminum, fatigue rated	Steel	Port size
6T	6H	6T ..	SAE6
N/A	8H	8T ..	SAE8
N/A	N/A	10T ..	SAE10
N/A	2G	N/A ..	1/4"BSPP
3B	3G	3G ..	3/8"BSPP
N/A	N/A	4G ..	1/2"BSPP

N – Nipple Mounting

Aluminum, fatigue rated	Steel	Port size
6H	6T	SAE6
3G	3G	3/8"BSPP

G – Gasket Mounted (Single)

Aluminum, fatigue rated	Steel	Port size
6H	6T	SAE6
3G	3G	3/8"BSPP

D – Dual Line Mounted

Aluminum, fatigue rated	Steel	Port size
6H	6T	SAE6
8H	8T	SAE8
10H	10T	SAE10
2G	2G	1/4"BSPP
3G	3G	3/8"BSPP
4G	4G	1/2"BSPP

See pages 32–35 for housing dim.
See page 44 for housing part numbers

8 Housing port sizes (cont'd)

M–Dual Line Mounted w/ integral shuttle

Aluminum, fatigue rated	Steel	Port size
6H	6T	SAE 6
8H	8T	SAE8
10H	10T	SAE10
2G	2G	1/4"BSPP
3G	3G	3/8"BSPP
4G	4G	1/2"BSPP

P–Dual Gasket Mounted

Aluminum, Fatigue rated	Steel	Port size
6H	6T	SAE6
3G	3G	3/8"BSPP

See pages 32–35 for housing dim.

9 Free flow crack pressure

- A** – 1,4 bar (20 psi) (standard)
- B** – 0,28 bar (4 psi) (anti-cavitation)

10 Pressure range

- 30** – 62–210 bar (900–3000 psi)
- 50** – 186–350 bar (2700–5000 psi)

11 Pressure setting (optional)

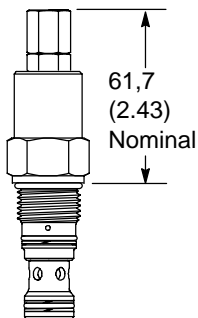
(Specified by customer in 100 psi increments) for example:

- 20** – 140 bar (2000 psi)
- 35** – 240 bar (3500 psi)

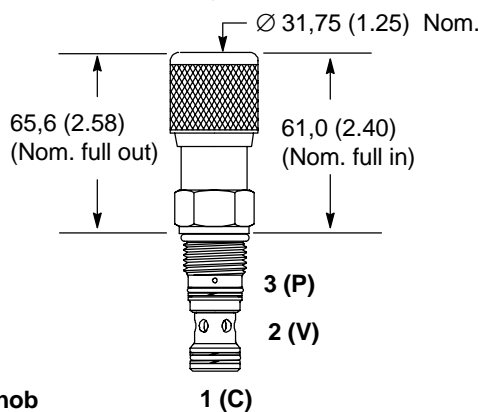
Installation Dimensions

mm (inch)

“C” Adjustment (Cap over screw)



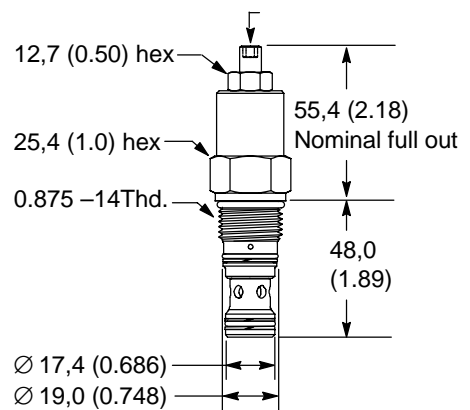
“K” Adjustment (Handknob)



Torque cartridge in housing

- A – 47–54 Nm (35–40 lbf ft)*
- S – 68–75 Nm (50–55 lbf ft)*

“S” Adjustment (Screw w/locknut)

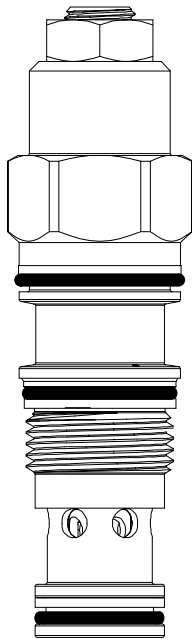
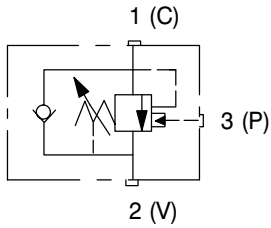


NOTE: Turn screw or knob clockwise to reduce pressure setting and release load.

CBV7/8/9-10

Counterbalance valve

Functional Symbol



Description

The CBV*-10 is a 3-ported, externally piloted, screw-in cartridge type counterbalance valve.

Operation

The CBV counterbalance valve allows free flow from port 2 (inlet) to port 1 (load). Flow from port 1 to port 2 is blocked until either the predetermined pressure setting has been reached or sufficient pilot pressure has been applied to port 3 (pilot).

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	CBV7 – 280 bar (4000 psi)
.....	CBV8 & 9 – 350 bar (5000 psi)
Cartridge fatigue pressure (infinite life)	CBV7 – 280 bar (4000 psi)
.....	CBV8 & 9 – 350 bar (5000 psi)
Rated flow	60 l/min (15 USgpm)
Cracking pressure @1 l/min (0.25 USgpm)	Refer to model code
Reseat pressure	More than 85% of crack pressure
Internal leakage	5 drops / min. max. Port 1 to Port 2 @85% of crack pressure
Temperature range	–40 to 120° C (–40° to 248° F)
Cavity	CMM-10-3 (See page 28)
Pilot ratio	CBV7-10 3:1
.....	CBV8-10 4.5:1
.....	CBV9-10 10:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing materials	Aluminum or steel
Weight cartridge only	0,15 kg (0.34 lb.)
Seal kit	02-184784 Buna-N 02-184785 Viton®

Viton is a registered trademark of E.I.DuPont

Pressure Drop Curves

Cartridge only

For 3:1 Ratio

$$\frac{\text{Cracking pressure} + (4 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{3}$$

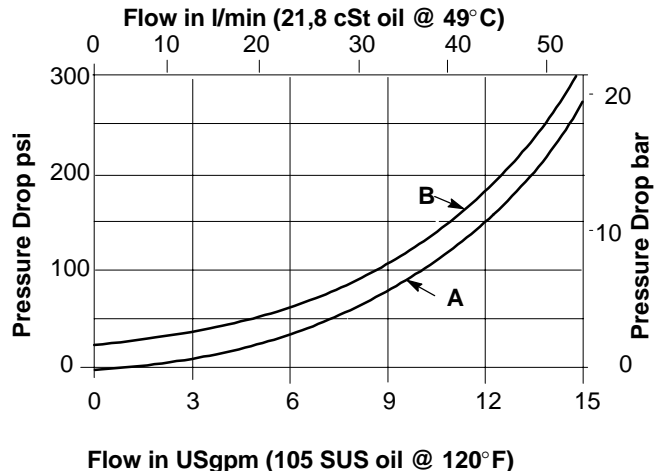
For 4.5:1 Ratio

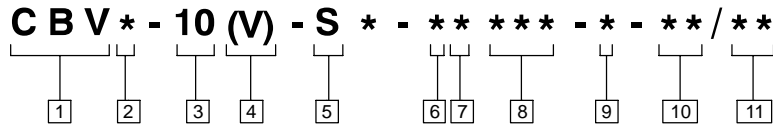
$$\frac{\text{Cracking pressure} + (5.5 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{4.5}$$

For 10:1 Ratio

$$\frac{\text{Cracking pressure} + (11 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{10}$$

- A** – Piloted open port 1 to port 2
B – Free flow port 2 to port 1





- 1 Valve function**
CBV – Counterbalance valve

- 2 Pilot ratio**
7 – 3:1
8 – 4.5:1
9 – 10:1

- 3 Valve size**
10 – Size10

- 4 Seals**
Blank–Buna-N
V – Viton

- 5 Adjustment**
S – Screw with locknut

- 6 Cartridge / valve housing**
O – Cartridge only
I – Inline body
D – Dual counterbalance – line mounted



Aluminum housings can be used for pressures up to 210 bar (3000 psi)
Steel housings **must** be used for operating pressures **above** 210 bar (3000 psi)

- 7 Valve housing material**
A – Aluminum
S – Steel

 - 8 Housing port & Valve bodies**
I – Inline body
Aluminum, Steel
fatigue rated Port sizes
4T 4T .. SAE 4
6T 6T .. SAE 6
8T 8T .. SAE 8
10T 10T .. SAE 10
2B 2G .. 1/4" BSPP
3B 3G .. 3/8" BSPP
4B 4G .. 1/2" BSPP

 - D –Dual Line Mounted**
Aluminum, Steel
fatigue rated Port sizes
6T 6T .. SAE 6
8T 8T .. SAE 8
10T 10T .. SAE 10
2B 2G .. 1/4" BSPP
3B 3G .. 3/8" BSPP
4B 4G .. 1/2" BSPP
- (See page 31 for housing dimensions.)
See page 44 for housing part numbers

- 9 Free flow crack pressure**
A – 2,0 bar (25 psi) (standard)
B – 0,30 bar (4 psi) (anti-cavitation)

- 10 Pressure range**
CBV7 15 – 25–100 bar (400–1500 psi)
Std setting 70 bar (1000 psi)
40–70–280 bar (1000–4000 psi)
Std setting 210 bar (3000 psi)

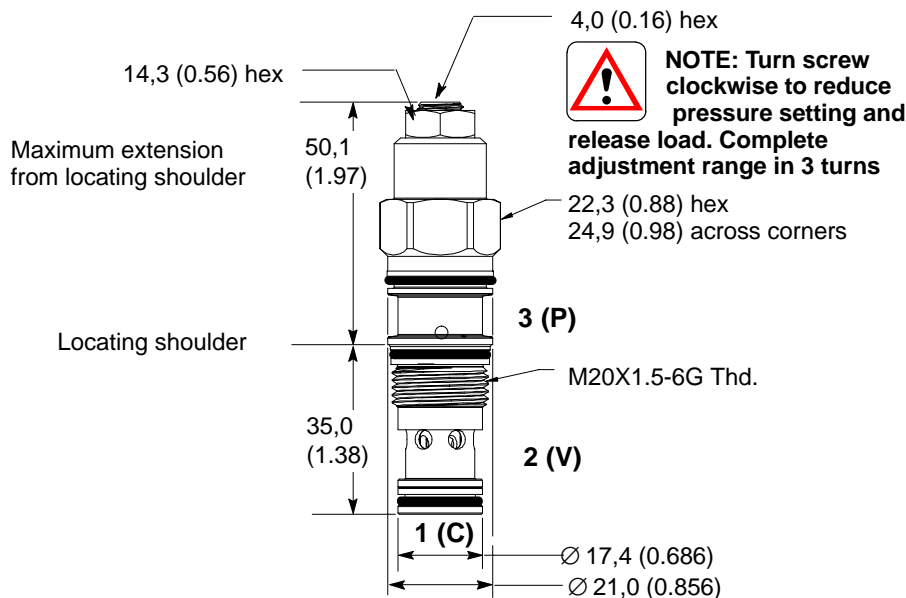
- CBV8 & 9**
25 – 70–175 bar (1000–2500 psi)
Std setting 140 bar (2000 psi)
50 – 140–350 bar (2000–5000 psi)
Std setting 210 bar (3000 psi)

- Setting must be 1.3 times load induced pressure*

- 11 Pressure setting (optional)**
(Specified by customer in 100 psi increments) for example:
20 – 140 bar (2000 psi)
35 – 240 bar (3500 psi)

Dimensions
mm (in.)

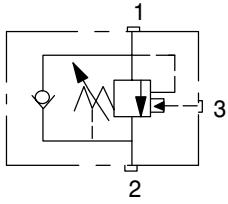
*Torque cartridge in housing:
40–47 Nm (30–35 lbf ft)*



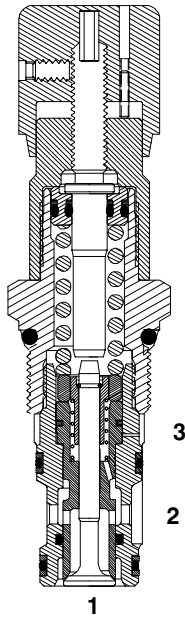
CBV1/2-12

Counterbalance valve

Functional Symbol



Sectional View



Description

The CBV*-12 is a 3 ported, externally piloted, screw-in cartridge type counterbalance valve.

Operation

The counterbalance valve allows free flow from port 2 to port 1. Flow from port 1 to port 2 is blocked until either the predetermined pressure setting has been reached or sufficient pilot pressure has been applied to port 3 (pilot).

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	350 bar (5000 psi)
Cartridge fatigue pressure (infinite life)	350 bar (5000 psi)
Rated flow	114 l/min (30 USgpm)
Cracking pressure @ 1 l/min (0.25 USgpm)	30 – 62–210 bar (900–3000 psi)
	50 – 186–350 bar (2700–5000 psi)
Internal leakage	5 drops / min. max. Port 1 to Port 2 @77% of crack pressure
Temperature range	–40 ° to 120 °C (–40 ° to 248 °F)
Cavity	C–12–3S (See page 29)
Pilot ratio	4:1, 10:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum or steel
Weight Cartridge only	0,36 kg (0.79 lb.)
Seal kits	02-180095 Buna-N 02-165887 Viton®

Viton is a registered trademark of E.I.DuPont

Pressure drop curve

Cartridge only

For 4:1 Ratio

Pilot pressure, nominal at port 3 =

$$\frac{\text{Cracking pressure} + (5 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{4}$$

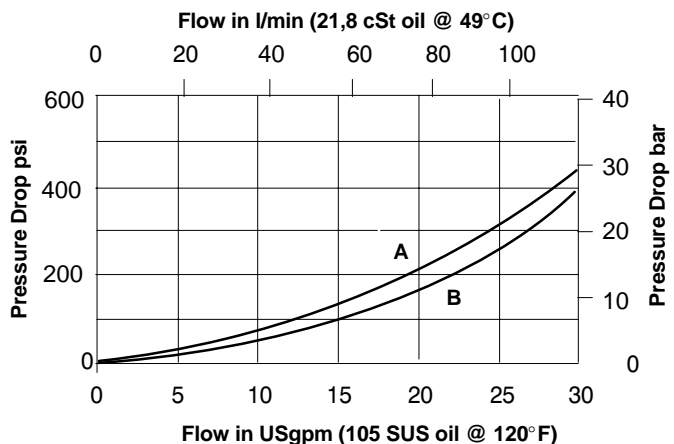
For 10:1 Ratio

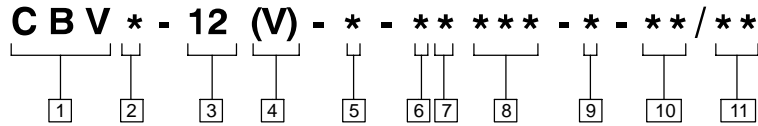
Pilot pressure, nominal at port 3 =


$$\frac{\text{Cracking pressure} + (11 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{10}$$

A – Piloted open port 1 to port 2

B – Free flow port 2 to port 1

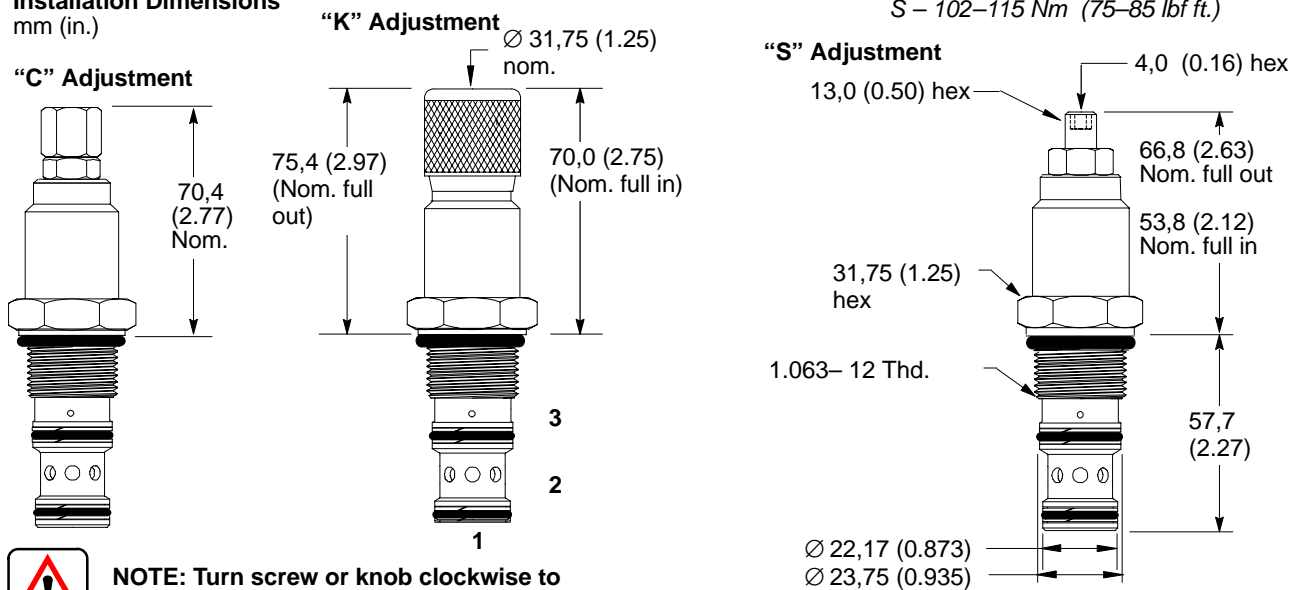





- | | | |
|--|---|---|
| <p>1 Valve function
CBV – Counterbalance valve</p> <hr/> <p>2 Pilot ratio
1 – 4:1
2 – 10:1</p> <hr/> <p>3 Valve size
12 – Size 12</p> <hr/> <p>4 Seals
Blank – Buna-N
V – Viton</p> <hr/> <p>5 Adjustment
S – Screw with locknut
C – Cap over screw
K – Hand knob</p> <hr/> <p>6 Cartridge / valve housing
O – Cartridge only
I – Inline body
B – SAE-4-Bolt pad
N – Close coupled – nipple mounting
G – Gasket mounted, single
D – Dual counterbalance – line mounted
M – Dual counterbalance – line mounted with integral shuttle valve
P – Dual counterbalance – gasket mounted</p> | <p>7 Valve housing material
A – Aluminum
S – Steel</p> <hr/> <p>8 Housing–port sizes
I – Inline body, fatigue rated
10T – SAE 10
12T – SAE 12
4G – 1/2" BSPP
6G – 3/4" BSPP
B – 4-Bolt pad
6T – 3/4" SAE-Code 61
N – Close coupled, nipple mounting
8T – SAE 8
4G – 1/2" BSPP
G – Gasket mounted, single
8T – SAE 8
4G – 1/2" BSPP
D – Dual – line mounted
10T – SAE 10
12T – SAE 12
4G – 1/2" BSPP</p> <p>(See page 36–39 for housing dim.)</p> <p> Aluminum housings can be used for pressures up to 210 bar (3000 psi)
Steel housings must be used for operating pressures above 210 bar (3000 psi)</p> | <p>8 Housing–port sizes (cont'd)
M – Dual counterbalance – line mounted with integral shuttle valve
10T – SAE 10
12T – SAE 12
4G – 1/2" BSPP
P – Dual counterbalance – gasket mounted
8T – SAE 8
4G – 1/2" BSPP</p> <p>(See pages 36–39 for housing dim.)</p> <p>9 Free flow crack pressure
A – 2,0 bar (25 psi) (Standard)
B – 030 bar (4 psi) (anti-cavitation)</p> <hr/> <p>10 Pressure range
30 – 62–210 bar (900–3000 psi)
50 – 186–350 bar (2700–5000 psi)</p> <hr/> <p>11 Pressure setting (optional)
(Specified by customer in 100 psi increments) for example:
20 – 140 bar (2000 psi)
35 – 240 bar (3500 psi)</p> |
|--|---|---|

Installation Dimensions

mm (in.)

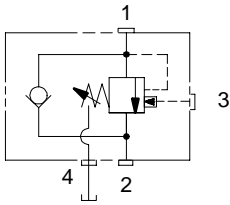


 **NOTE:** Turn screw or knob clockwise to reduce pressure setting and release load.

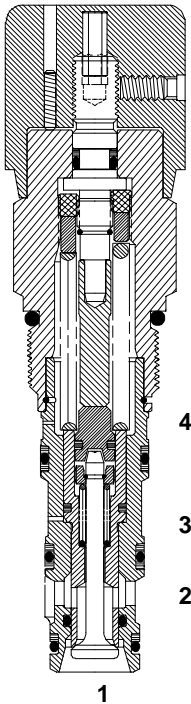
VCB1-10

Vented counterbalance valve

Functional Symbol



Sectional View



NOTE: Valve should be set 1.3 times load induced pressure



* Caution: Adjustments exceeding 350 bar (5000 psi) may damage the body.

Viton is a registered trademark of E.I.DuPont

Description

The VCB1-10 is a 4 ported, externally piloted, screw-in cartridge type counterbalance valve with the separate vent. This separate vent makes the valve insensitive to back pressure at port 2.

Operation

The VCB1-10 counterbalance valve will allow free flow from port 2 to port 1 through a built in check valve. Flow from port 1 to port 2 is blocked until either a predetermined pressure setting has been reached or sufficient pilot pressure has been sensed on port 3 (pilot). Port 4 is vented to tank.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F).

Typical application pressure (all ports)	350 bar (5000 psi)*
Cartridge fatigue pressure (infinite life)	350 bar (5000 psi)
Rated flow	60 l/min (15 USgpm)
Cracking pressure @ 1 l/min (0.25 USgpm)	30 – 62–210 bar (900–3000 psi)
	50 – 186–350 bar (2700–5000 psi)
Internal leakage	5 drops / min. max. Port 1 to Port 2 @77% of crack pressure
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Cavity	C-10-4 or C-10-4U (See page 30)
Pilot ratio	4:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum or steel
Weight Cartridge only	0,36 kg (0.79 lb.)
Seal kits	889625 Buna-N 566080 Viton®

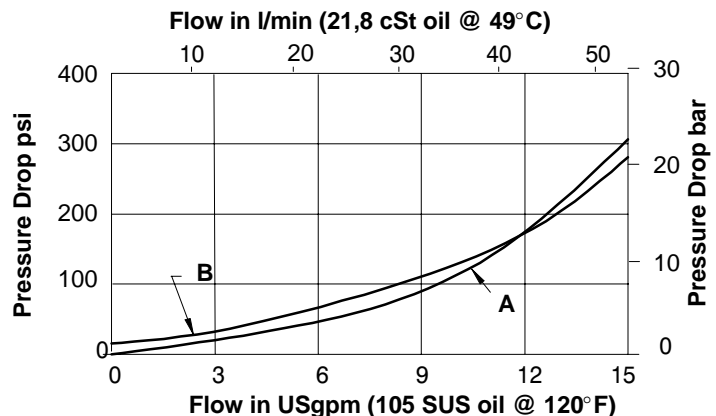
Pressure drop curve

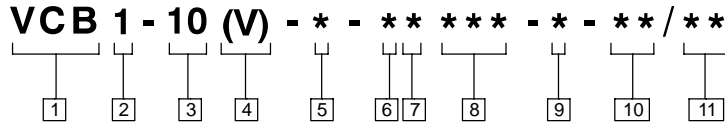
Cartridge only

For 4:1 Ratio

$$\text{Pilot pressure} = \frac{\text{Relief setting} - \text{Load pressure}}{\text{Pilot ratio}}$$

- A – Piloted open port 1 to port 2
- B – Free flow port 2 to port 1





- 1 Valve function**
VCB– Vented counterbalance valve


- 2 Pilot ratio**
1 – 4:1

- 3 Valve size**
10 – Size 10

- 4 Seals**
Blank–Buna-N
V – Viton

- 5 Adjustment**
S – Screw with locknut
C – Cap over screw
K – Hand knob

- 6 Cartridge / valve housing**
O – Cartridge only
I – Inline body
G – Gasket mounted, single
D – Dual counterbalance, line mounted

- 7 Valve housing material**
A – Aluminum
S – Steel
 Aluminum housings can be used for pressures up to 210 bar (3000 psi)
Steel housings **must** be used for operating pressures **above** 210 bar (3000 psi)

- 8 Housing–port sizes**
‡ Housings with slot
I – Inline body
Aluminum, Steel
light fatigue duty rated
Port sizes
6T 6H 6T ... SAE6
N/A 8H‡ 8T‡ ... SAE8
N/A 10H‡ N/A ... SAE10
N/A 2G N/A ... 1/4"BSPP
N/A 3G‡ 3G‡ ... 3/8"BSPP

- G – Single Gasket Mounted**
Aluminum, Steel
fatigue rated
Port sizes
6H 6T SAE6
8H‡ 8T‡ SAE8
3G 3G‡ 3/8"BSPP

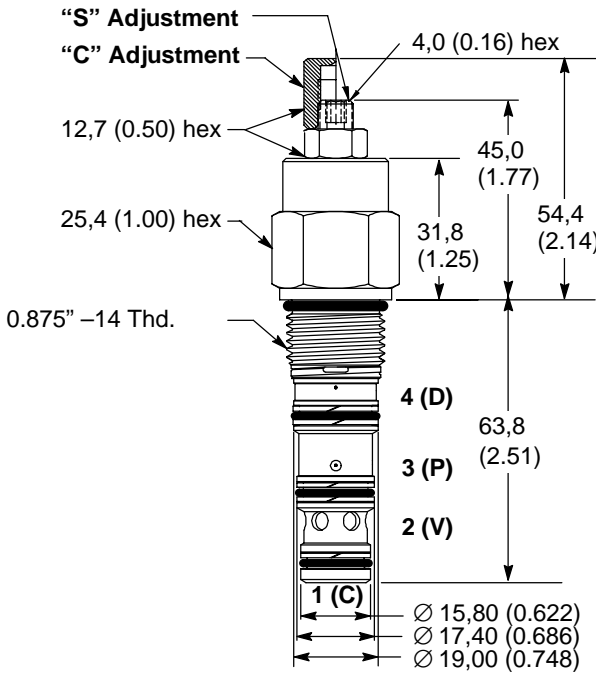
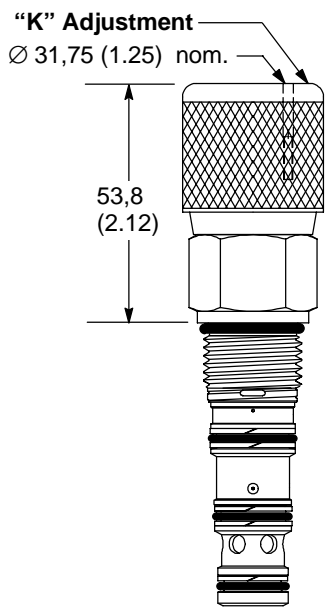
- 8 Housing–port sizes(cont'd)**
D – Dual Line Mounted
Aluminum, Steel
fatigue rated
Port sizes
6H 6T ... SAE6
8H‡ 8T‡ ... SAE8
N/A 10T ... SAE10
3G‡ 3G‡ ... 3/8"BSPP
See pages 40–41 for housing dim.
See page 45 for housing part numbers

- 9 Free flow crack pressure**
A – 1,4 bar (20 psi) (Standard)
B – 0,28 bar (4 psi) (anti-cavitation)


- 10 Pressure range**
30 – 62–210 bar (900–3000 psi)
50 – 186–350 bar (2700–5000 psi)

- 11 Pressure setting (optional)**
(Specified by customer in 100 psi increments) for example:
20 – 140 bar (2000 psi)
35 – 240 bar (3500 psi)

Installation Dimensions
mm (in.)



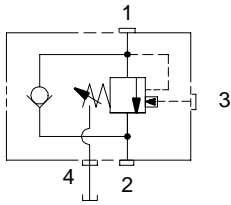
Torque cartridge in housing:
A – 47–54 Nm (35–40 lbf ft.)
S – 68–75 Nm (50–55 lbf ft.)

 **NOTE:**
Turn screw or knob clockwise to reduce pressure setting and release load.

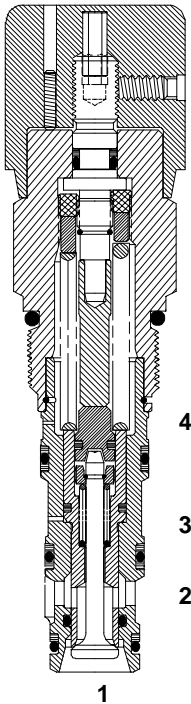
VCB1-12

Vented counterbalance valve

Functional Symbol



Sectional View



Description

The VCB1-12 is a 4 ported, externally piloted, screw-in cartridge type counterbalance valve with the separate vent. This separate vent makes the valve insensitive to back pressure at port 2.

Operation

The VCB1-12 counterbalance valve will allow free flow from port 2 to port 1 through a built in check valve. Flow from port 1 to port 2 is blocked until either a predetermined pressure setting has been reached or sufficient pilot pressure has been sensed on port 3 (pilot). Port 4 is vented to tank.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	350 bar (5000 psi)*
Cartridge fatigue pressure (infinite life)	350 bar (5000 psi)
Rated flow	114 l/min (30 USgpm)
Cracking pressure @ 1 l/min (0.25 USgpm)	30 – 35–210 bar (500–3000 psi)
	50 – 175–350 bar (2500–5000 psi)
Internal leakage	5 drops / min. max. Port 1 to Port 2 @77% of crack pressure
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Cavity	C-12-4 or C-12-4U (See page 30)
Pilot ratio	4:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum or steel
Weight Cartridge only	0,37 kg (0,81 lb.)
Seal kits	02-160979 Buna-N
	02-160980 Viton®

Viton is a registered trademark of E.I.DuPont



* Caution: Adjustments exceeding 350 bar (5000 psi) may damage the body.

Pressure drop curve

Cartridge only

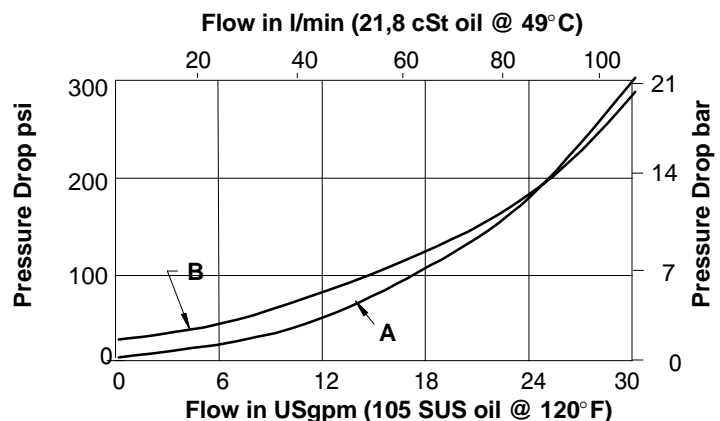
For 4:1 Ratio

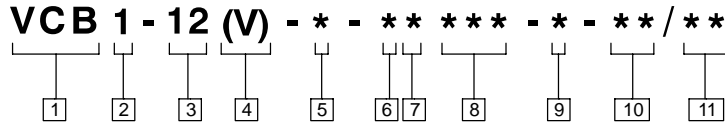
$$\text{Pilot pressure} = \frac{\text{Relief setting} - \text{Load pressure}}{\text{Pilot ratio}}$$



NOTE: Valve should be set 1.3 times load induced pressure

- A – Piloted open port 1 to port 2
- B – Free flow port 2 to port 1





1 Valve function

VCB – Vented counterbalance valve

2 Pilot ratio

1 – 4:1

3 Valve size

12 – Size 12

4 Seals

Blank – Buna-N
V – Viton

5 Adjustment

S – Screw with locknut
C – Cap over screw
K – Hand knob

6 Cartridge / valve housing

O – Cartridge only
I – Inline body
G – Gasket mounted, single
D – Dual counterbalance, line mounted

7 Valve housing material

A – Aluminum
S – Steel



Aluminum housings can be used for pressures up to 210 bar (3000 psi)
Steel housings **must** be used for operating pressures **above** 210 bar (3000 psi)

8 Housing–port sizes

‡ Housings with slot

I – Inline body

Aluminum, fatigue rated
10T – SAE 10
12T – SAE 12 ‡
4G – 1/2" BSPP

Steel, fatigue rated
10T – SAE 10
12T – SAE 12 ‡
4G – 1/2" BSPP ‡

G – Single Gasket Mounted

Aluminum and Steel
8T – SAE 8 ‡
4G – 1/2" BSPP ‡

8 Housing–port sizes(cont'd)

D – Dual Line Mounted

Aluminum and Steel

10T – SAE 10
12T – SAE 12 ‡
4G – 1/2" BSPP

See pages 42–43 for housing dim.
See page 45 for housing part numbers

9 Free flow crack pressure

A – 1,7 bar (25 psi) (Standard)
B – 0,28 bar (4 psi) (anti-cavitation)

10 Pressure range

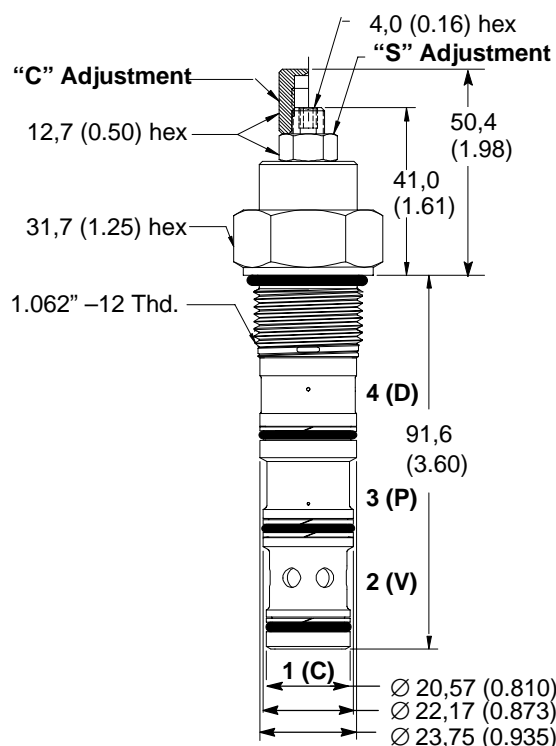
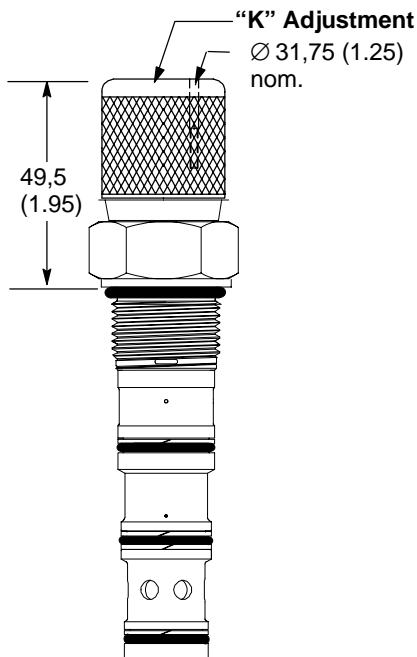
30 – 35–210 bar (500–3000 psi)
50 – 175–350 bar (2500–5000 psi)

11 Pressure setting (optional)

(Specified by customer in 100 psi increments) for example:
20 – 140 bar (2000 psi)
35 – 240 bar (3500 psi)

Installation Dimensions

mm (in.)



Torque cartridge in housing:
A – 81–95 Nm (60–70 lbf ft.)
S – 102–115 Nm (75–85 lbf ft.)

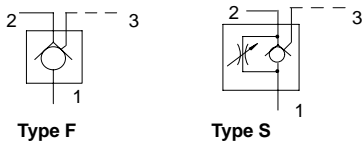


NOTE:
Turn screw or knob clockwise to reduce pressure setting and release load.

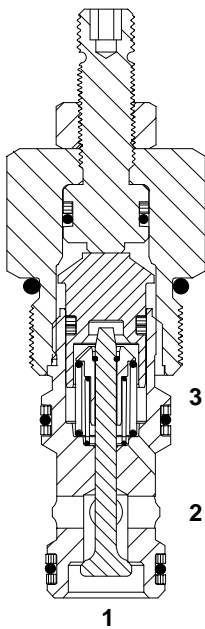
POC1-10

Pilot operated check valve

Functional Symbol



Sectional View



Description

The POC1-10 is a pilot-to-open, screw-in cartridge type check valve.

Operation

The POC1-10 will positively lock a load from port 1 to port 2, but will release the load by applying pressure to port 3 (pilot). The load can also be released by adjusting the optional override.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	350 bar (5000 psi)
Cartridge fatigue pressure (infinite life)	310 bar (4500 psi)
Rated flow	60 l/min (15 USgpm)
Pilot ratio	3:1
Internal leakage	Port 1 to 2 Less than 5 drops / min maximum @ 350 bar (5000 psi).
Free flow cracking Pressure @ 1.0 l/min (0.25 USgpm)	0,3 bar (5 psi); 2 bar (30 psi); 5 bar (75 psi); 7 bar (100 psi)
Hysteresis	less than 3 bar (45 psi)
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Cavity	C-10-3S (See page 29)
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum or steel
Weight	
Cartridge w/out override	0,10 kg (0.23 lb.)
Cartridge w/override	0,17 kg (0.36 lb.)
Seal kits	889650 Buna-N 889652 Viton®

Viton is a registered trademark of E.I.DuPont

Pressure drop curve

Cartridge only



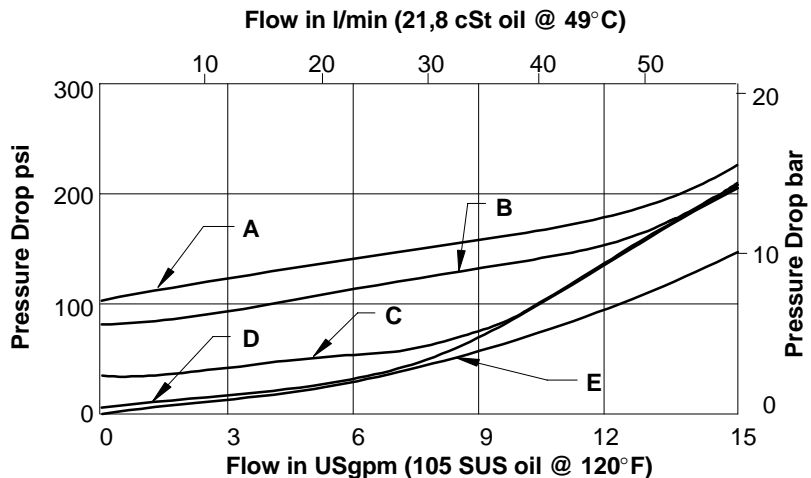
WARNING: Do not use Pilot-to-open check valves in load holding applications where either overrunning loads are possible or, load release speed is critical. Failure to observe these guidelines may result in bodily injury or damage to equipment.

- A - 7 bar (100 psi)
- B - 5 bar (75 psi)
- C - 2 bar (30 psi)
- D - 0,3 bar (5 psi)
- E - Full pilot

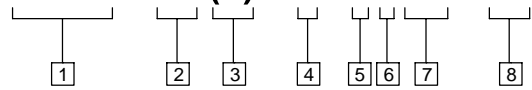
Pilot ratio 3:1

Pilot pressure, nominal at Port 3 =

$$\frac{\text{Crack Pressure} + \text{Port 1 Pressure} - \text{Port 2 Pressure}}{3} + \text{Port 2 Pressure}$$



POC1 - 10 (V) - * - * * *** - ***



1 Valve function

POC1—Pilot operated check valve

2 Valve size

10— Size 10

3 Seals

Blank – Buna-N
V – Viton

4 Override option

F – Fixed
S – Adjustable override

5 Cartridge / valve housing

O – Cartridge only
I – Inline body
N – Close coupled – nipple mounting
G – Gasket mounted – single
D – Dual P.O. check – line mounted
P – Dual P.O. check – gasket mounted

6 Valve housing material

A – Aluminum
S – Steel



Aluminum housings can be used for pressures up to 210 bar (3000 psi)

Steel housings **must** be used for operating pressures **above** 210 bar (3000 psi)

7 Housing-Port sizes

I – Inline body

Aluminum, light duty	Aluminum, fatigue rated	Steel	Port sizes
6T	6H	6T	SAE6
N/A	8H	8T	SAE8
N/A	N/A	10T	SAE 10
N/A	2G	N/A	1/4"BSPP
3B	3G	3G	3/8"BSPP
N/A	N/A	4G	1/2" BSPP

N – Close coupled – nipple mounting

Aluminum, fatigue rated	Steel	Port sizes
6H	6T	SAE6
3G	3G	3/8"BSPP

G – Gasket mounted – single

Aluminum, fatigue rated	Steel	Port sizes
6H	6T	SAE6
3G	3G	3/8"BSPP

(See pages 32–35 for housing dimensions)

7 Housing–port sizes(cont'd)

D – Dual line mounted

Aluminum, fatigue rated	Steel	Port Size
6H	6T	SAE6
8H	8T	SAE8
10H	10T	SAE10
2G	2G	1/4"BSPP
3G	3G	3/8"BSPP
4G	4G	1/2" BSPP

P – Dual check, gasket mounted

Aluminum, fatigue rated	Steel	Port Size
6H	6T	SAE6
3G	3G	3/8"BSPP

(See pages 32–35 for housing dimensions)

8 Free flow crack pressure

005 – 0,3 bar (5 psi)
(anti-cavitation)
030 – 2,0 bar (30 psi)
075 – 5,0 bar (75 psi)
100 – 7,0 bar (100 psi)

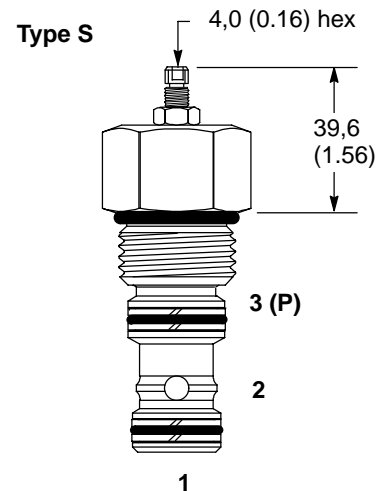
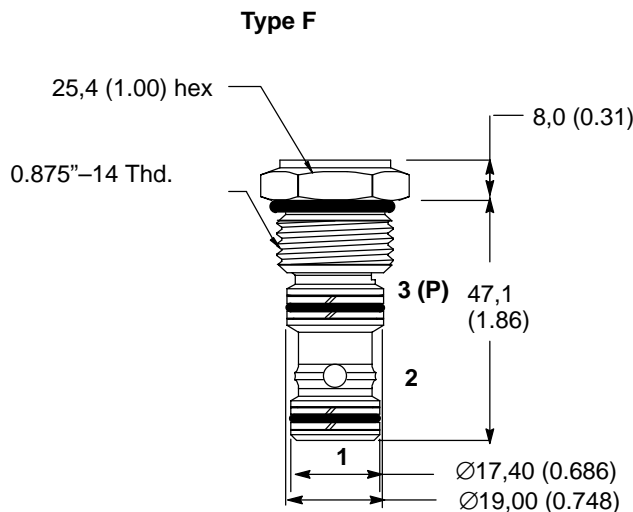
Installation Dimensions

mm (in.)

Torque cartridge in housing

A – 47-54 Nm (35-40 lbf ft.)

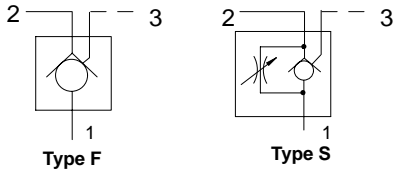
S – 68-75 Nm (50-55 lbf ft.)



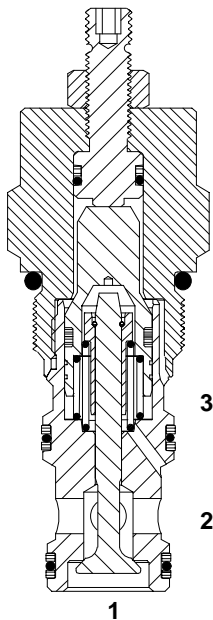
POC1-12

Pilot operated check valve

Functional Symbol



Sectional View



Description

The POC1-12 is a pilot-to-open, screw-in cartridge type check valve.

Operation

The POC1-12 will positively lock a load from port 1 to port 2, but will release the load by applying pressure to port 3 (pilot). The load can also be released by adjusting the optional override.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	350 bar (5000 psi)
Cartridge fatigue pressure (infinite life)	310 bar (4500 psi)
Rated flow	114 l/min (30 USgpm)
Pilot ratio	3:1
Internal leakage	Port 1 to 2 5 drops / min maximum 350 bar (5000 psi)
Free flow cracking pressure @ 1.0 l/min (0.25 USgpm)	0,3 bar (5 psi); 2,0 bar (30 psi); 5 bar (75 psi); 7 bar (100 psi)
Hysteresis	less than 3 bar (45 psi)
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Cavity	C-12-3S (see page 29)
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum or steel
Weight	
Cartridge w/out override	0,26 kg (0.58 lb.)
Cartridge w/ override	0,34 kg (0.74 lb.)
Seal kits	02-180095 Buna-N 02-165887 Viton®

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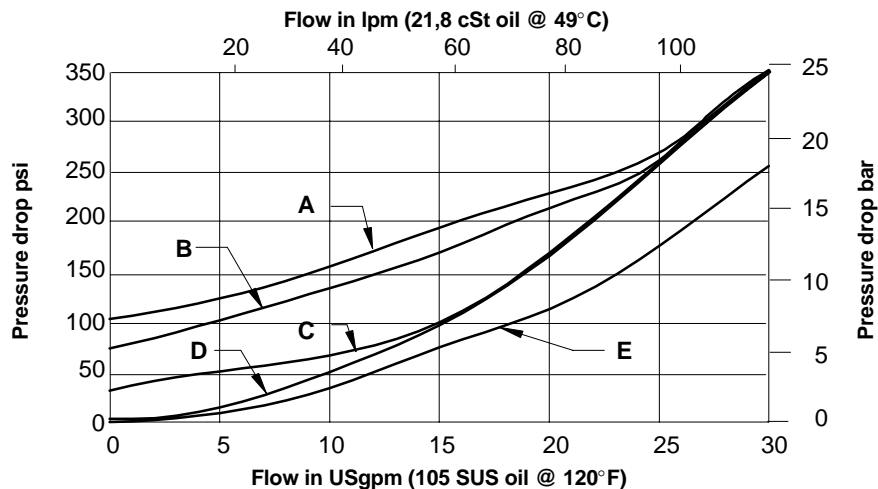
Pressure drop curve

Cartridge only



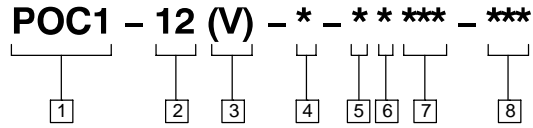
WARNING: Do not use Pilot-to-open check valves in load holding applications where either overrunning loads are possible or, load release speed is critical. Failure to observe these guidelines may result in bodily injury or damage to equipment.

- A - 7 bar (100 psi)
- B - 5 bar (75 psi)
- C - 2 bar (30 psi)
- D - 0,3 bar (5 psi)
- E - Full pilot



For 3:1 Ratio

$$\text{Pilot pressure nominal @ Port 3} = \frac{\text{Crack Pressure} + \text{Port 1 Pressure} - \text{Port 2 Pressure}}{3} + \text{Port 2 Pressure}$$



1 Valve function

POC1–Pilot operated check valve

2 Valve size

12 – size 12

3 Seals

Blank–Buna-N
V – Viton

4 Override option

F – Fixed
S – Adjustable override

5 Cartridge / valve housing

O – Cartridge only
I – Inline body
B – 4 bolt pad
N – Close coupled – nipple mounting
G – Gasket mounted – single
D – Dual counterbalance – line mounted
P – Dual counterbalance – gasket mounted

6 Valve housing material

A – Aluminum
S – Steel

Aluminum housings can be used for pressures up to 210 bar (3000 psi)
Steel housings **must** be used for operating pressures **above** 210 bar (3000 psi)

7 Housing–port sizes

I – **Inline body NFPA fatigue rated**

10T –SAE 10
12T –SAE 12
4G – 1/2" BSPP
6G – 3/4" BSPP

N – **Close coupled – nipple mounting**

8T – SAE 8
4G – 1/2" BSPP

(See pages 36–39 for housing dimensions)

7 Housing–port sizes(cont'd)

G – **Gasket mounted – single**
8T – SAE 8
4G – 1/2" BSPP

D – **Dual – line mounted**

10T –SAE 10
12T –SAE 12
4G – 1/2" BSPP

P – **Dual – gasket mounted**

8T – SAE 8
4G – 1/2" BSPP

(see pages 36–39 for housing dimensions)

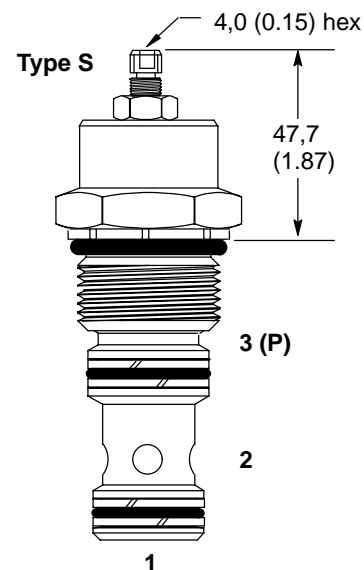
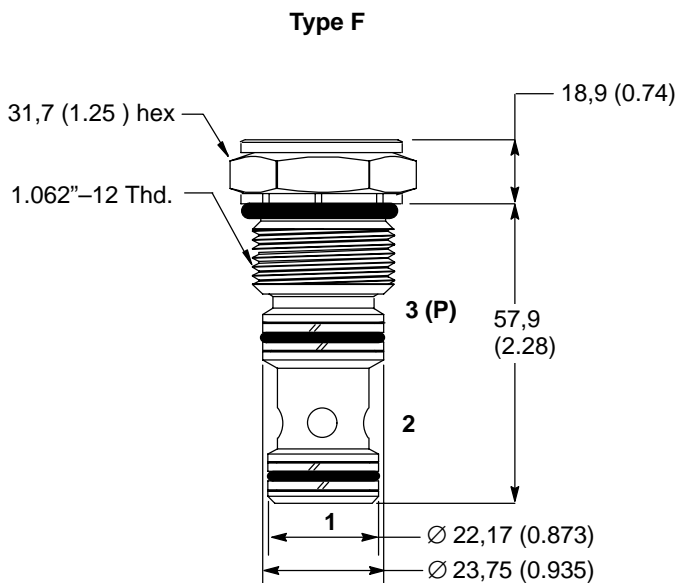
8 Free flow crack pressure

005–0,3 bar (5 psi)
(anti-cavitation)
030–2,0 bar (30 psi)
075–5 bar (75 psi)
100–7 bar (100 psi)

Installation Dimensions

mm (in.)

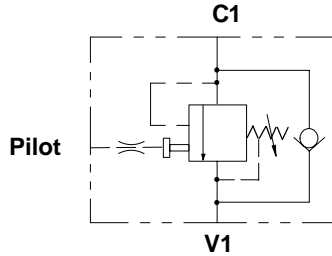
Torque cartridge in housing
A – 81-95 Nm (60-70 lbf ft.)
S – 102-115 Nm (75-85 lbf ft.)



MCV1-16

Motion control valve

Functional Symbol



Description

The MCV1-16 is an in-line housing type motion control or load holding valve. This valve controls a moving load and prevents loads from running ahead of a pump. It will also lock or hold a load in any position and provides for thermal expansion relief.

Operation

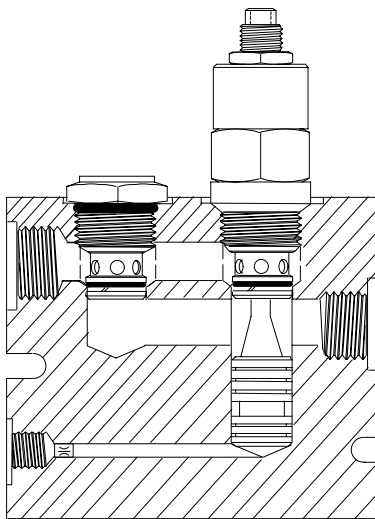
This valve allows free flow from the "V1" port to the "C1" port and blocks flow in the opposite direction until either the relief setting is reached or until sufficient pilot pressure has been applied to the "Pilot" port.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	210 bar (3000 psi)
Rated flow	151 l/min (40 USgpm)
Free flow cracking pressure @1 l/min (0.25 USgpm)	13 – 3,4 – 8,4 bar (50 – 1300 psi)
	35 – 13,6 – 240 bar (200 – 3500 psi)
Internal leakage Port "C1" to "V1" less than 5 drops/ min max. @210 bar (3000 psi)	
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Pilot ratio	11:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing materials	Aluminum
Weight	4,50 kg (10.0 lb.)
Seal kits (Check valve)	565810 (Buna-N) 889609 (Viton®)
Seal kits (Relief Valve)	565810 (Buna-N) 889609 (Viton®)

Sectional View



Pilot pressure calculation for 11:1 ratio

Nominal pressure to open valve by remote control

Pilot pressure=

$$\frac{\text{Cracking pressure} + (12 \times \text{Port V Pressure}) - \text{Port C Pressure}}{11}$$

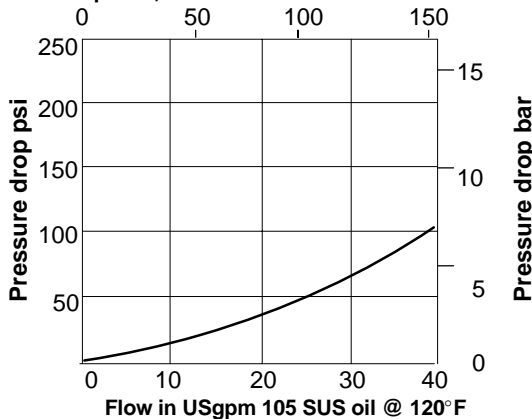
11

Viton is a registered trademark of E.I.DuPont

Pressure drop curve

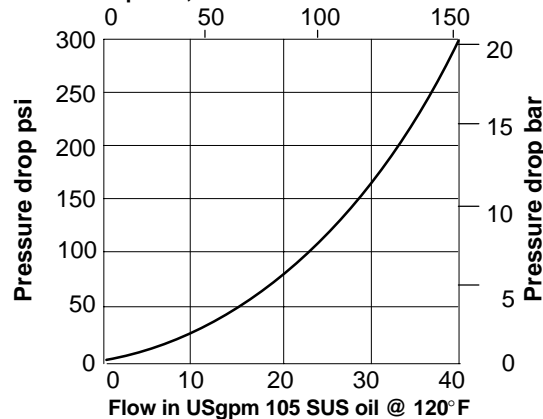
Free Flow (V1 to C1)

Flow in lpm 21,8 cSt oil @ 49° C

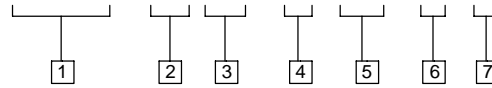


Piloted Open (C1 to V1)

Flow in lpm 21,8 cSt oil @ 49° C



MCV1 - 16 (V) - * - *** - ** / **



1 Valve function

MCV1—Motion control valve

2 Size

16— Size 16

3 Seals

Blank—Buna-N

V — Viton

4 Adjustment

K— Hand knob

S— Screw with locknut

5 Port size

12T— SAE 12 (light duty)

6B— 3/4" BSPP (light duty)

6 Cracking pressure range

13 — 3,4–8,4 bar (50–1300 psi)

35 — 13,6–240 bar (200–3500 psi)

7 Pressure setting

Optional — Specify in 100 psi ranges.

If not specified, set at:

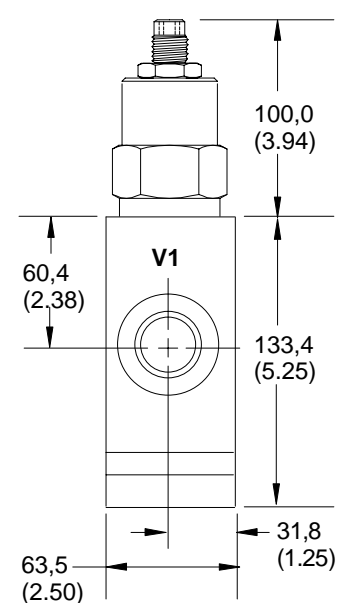
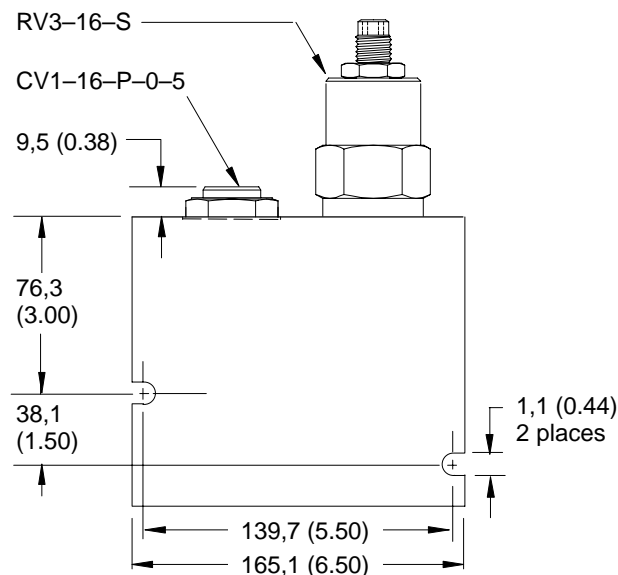
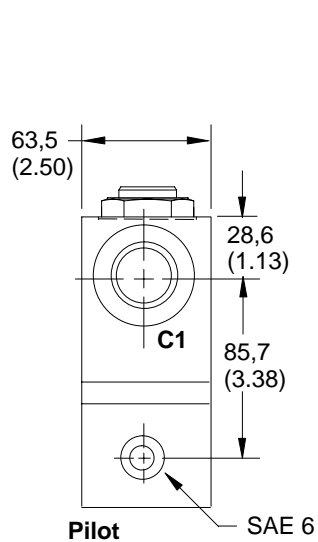
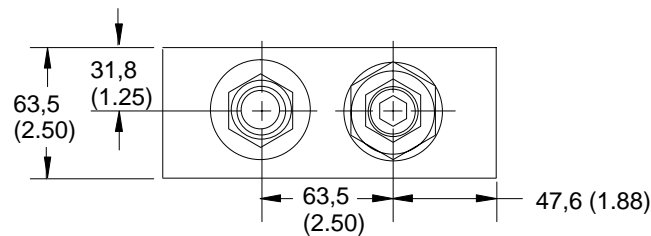
20 — 140 bar (2000 psi)

35 — 240 bar (3500 psi)

Installation Dimensions

mm (in.)

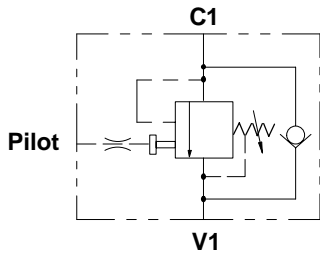
*Torque cartridge in housing 108–122 Nm
(80–90 lbf ft.)*



MCV1-20

Motion control valve

Functional Symbol



Description

The MCV1-20 is an in-line housing type motion control or load holding valve. This valve controls a moving load and prevents loads from running ahead of a pump. It will also lock or hold a load in any position and provides for thermal expansion relief.

Operation

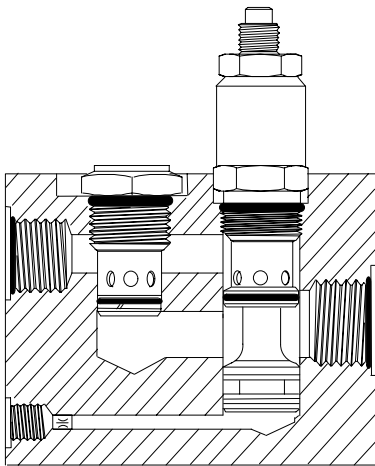
This valve allows free flow from the "V1" port to the "C1" port and blocks flow in the opposite direction until either the relief setting is reached or until sufficient pilot pressure has been applied to the "Pilot" port.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	210 bar (3000 psi)
Rated flow	190 l/min (50 USgpm)
Free flow cracking pressure @1 l/min (0.25 USgpm) 13 – 3,4 – 8,4 bar (50 – 1300 psi)	35 – 13,6 – 240 bar (200 – 3500 psi)
Internal leakage ... Port "C" to "V" less than 5 drops / min max. @210 bar (3000 psi)	
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Pilot ratio	10:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum
Weight	5,40 kg (12.0 lb.)
Seal kits (Check valve)	889615 (Buna-N) 889619 (Viton®)
Seal kits (Relief Valve)	565810 (Buna-N) 889609 (Viton®)

Sectional View



Pilot pressure calculation for 10:1 ratio

Nominal pressure to open valve by remote control

Pilot pressure=

$$\frac{\text{Cracking pressure} + (11 \times \text{Port V Pressure}) - \text{Port C Pressure}}{10}$$

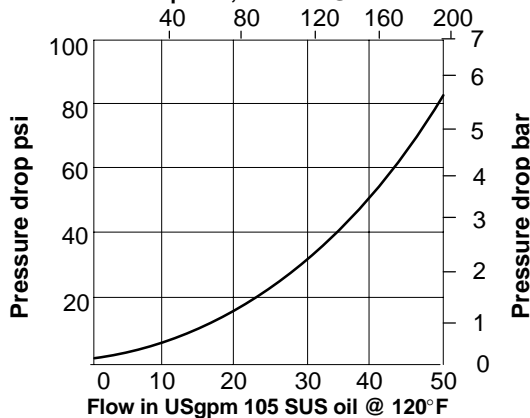
10

Viton is a registered trademark of E.I.DuPont

Pressure drop curve

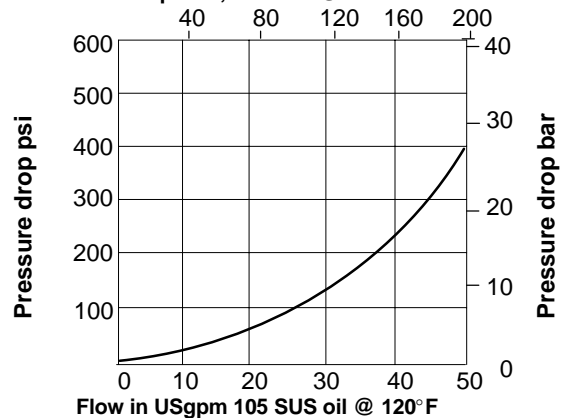
Free Flow (V1 to C1)

Flow in lpm 21,8 cSt oil @ 49° C



Piloted Open (C1 to V1)

Flow in lpm 21,8 cSt oil @ 49° C



MCV1 - 20 (V) - * - *** -** / **



1 Valve function

MCV1—Motion control valve

2 Size

20 – Size 20

3 Seals

Blank—Buna-N

V – Viton

4 Adjustment

K – Hand knob

S – Screw with locknut

5 Port size

16T—SAE 16 (light duty)

8B— 1" BSPP (light duty)

6 Cracking pressure range

13 – 3,4–8,4 bar (50–1300 psi)

35 – 13,6–240 bar (200–3500 psi)

7 Pressure setting

Optional – Specify in 100 psi ranges. If not specified, set at:

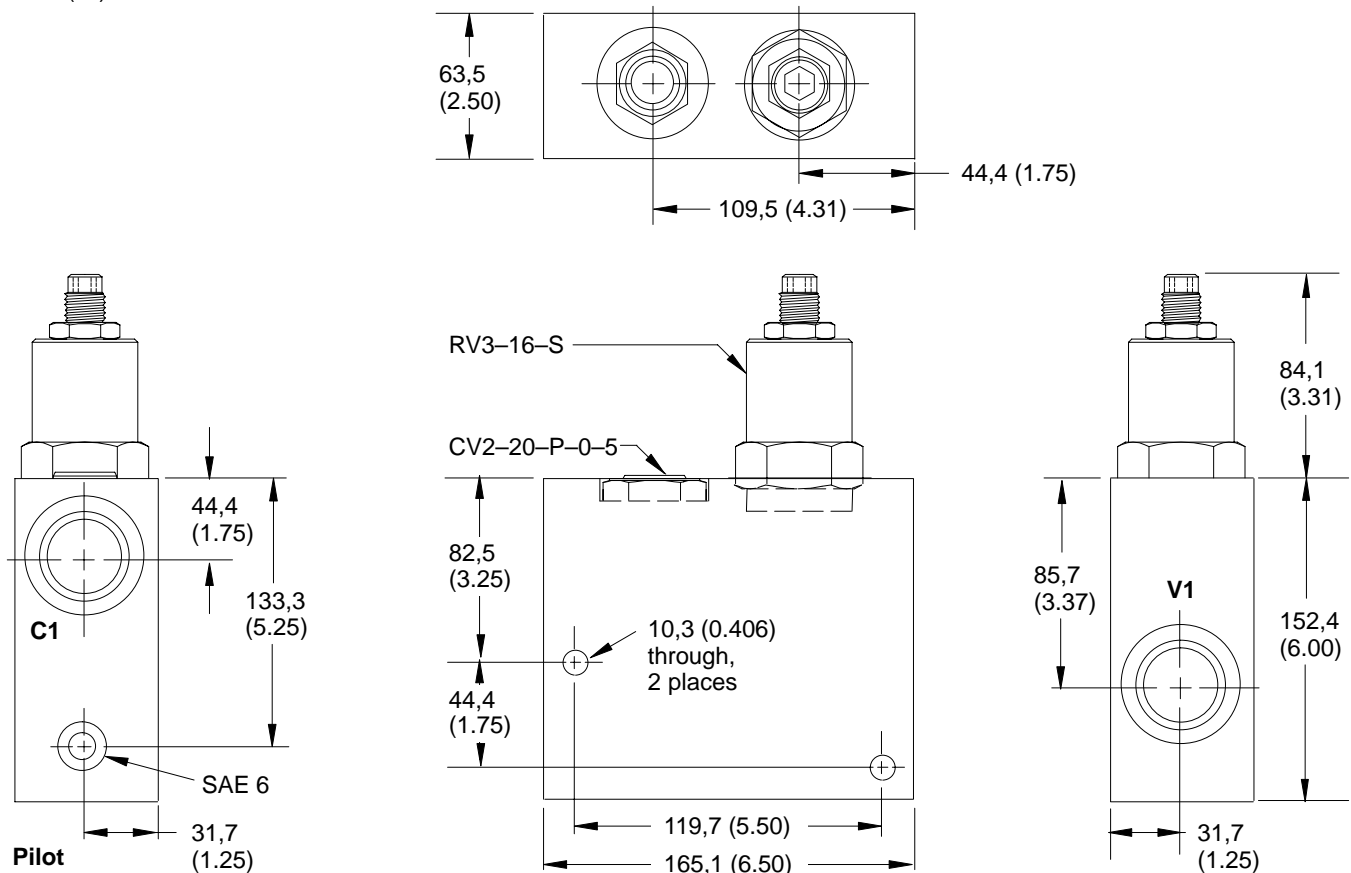
20 – 140 bar (2000 psi)

35 – 240 bar (3500 psi)

Installation Dimensions

mm (in.)

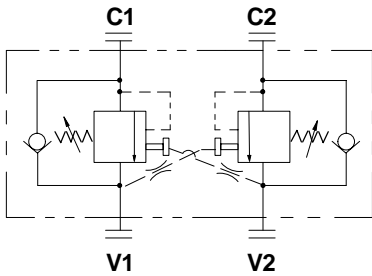
*Torque cartridge in housing 128–155 Nm
(95–115 lb-ft)*



MCV2-20

Dual-Motion control valve

Functional Symbol



Description

The MCV2-20 is a dual in-line housing type motion control or load holding. This valve controls a moving load and prevents loads from running ahead of a pump. It will also lock or hold a load in any position and provides for thermal expansion relief.

Operation

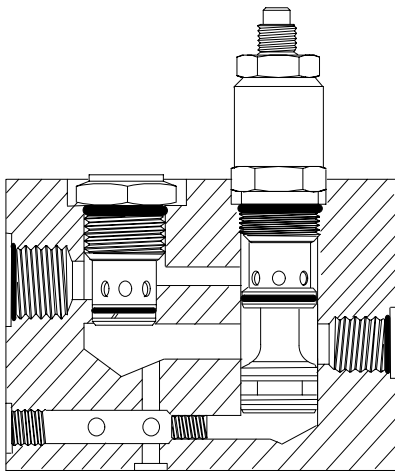
This valve allows free flow from the "V" port to the "C" ports and blocks flow in the opposite direction until either the relief setting is reached or until sufficient pilot pressure has been applied from the opposite "V" port.

Ratings and specifications

Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)

Typical application pressure (all ports)	210 bar (3000 psi)
Rated flow	190 l/min (50 USgpm)
Free flow cracking pressure @1 l/min (0.25 USgpm) 13 – 3,4 – 8,4 bar (50 – 1300 psi)	
35 – 13,6 – 240 bar (200 – 3500 psi)	
Internal leakage . . . Port "C" to "V" less than 5 drops / min. max. @210 bar (3000 psi)	
Temperature range	-40 ° to 120 °C (-40 ° to 248 °F)
Pilot ratio	10:1
Fluids	All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
Filtration	Cleanliness code 18/16/13
Standard housing material	Aluminum
Weight	10,0 kg (21.5 lb.)
Seal kits (Check valve)	889615 (Buna-N) 889619 (Viton®)
Seal kits (Relief Valve)	565810 (Buna-N) 889609 (Viton®)

Sectional View



Pilot pressure calculation For 10:1 Ratio

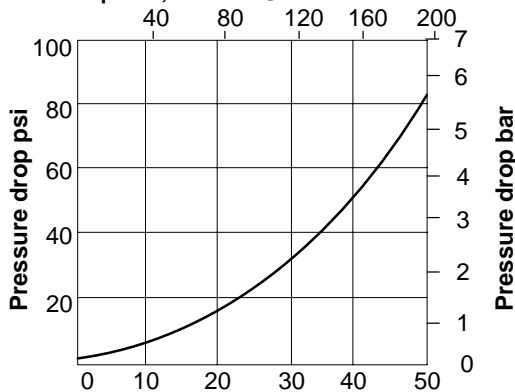
$$\text{Pilot pressure, nominal at port 3} = \frac{\text{Cracking pressure} + (11 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{10}$$

Viton is a registered trademark of E.I.DuPont

Pressure drop curve

Free Flow (V1 to C1 or V2 to C2)

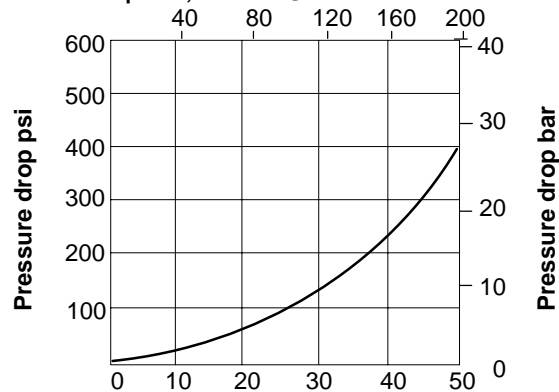
Flow in lpm 21,8 cSt oil @ 49° C



Flow in USgpm 105 SUS oil @ 120° F

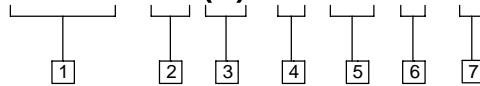
Piloted Open (C1 to V1 or C2 to V2)

Flow in lpm 21,8 cSt oil @ 49° C



Flow in USgpm 105 SUS oil @ 120° F

MCV2 - 20 (V) - * - *** -** / **



1 Valve function

MCV2–Dual-Motion control valve

2 Size

20 – Size 20

3 Seals

Blank–Buna-N
V – Viton

4 Adjustment

K – Hand knob
S – Screw with locknut

5 Port size

20T–SAE 12 (light duty)
8B– 1" BSPP (light duty)

6 Cracking pressure range

13 – 3,4–8,4 bar (50–1300 psi)
35 – 13,6–240 bar (200–3500 psi)

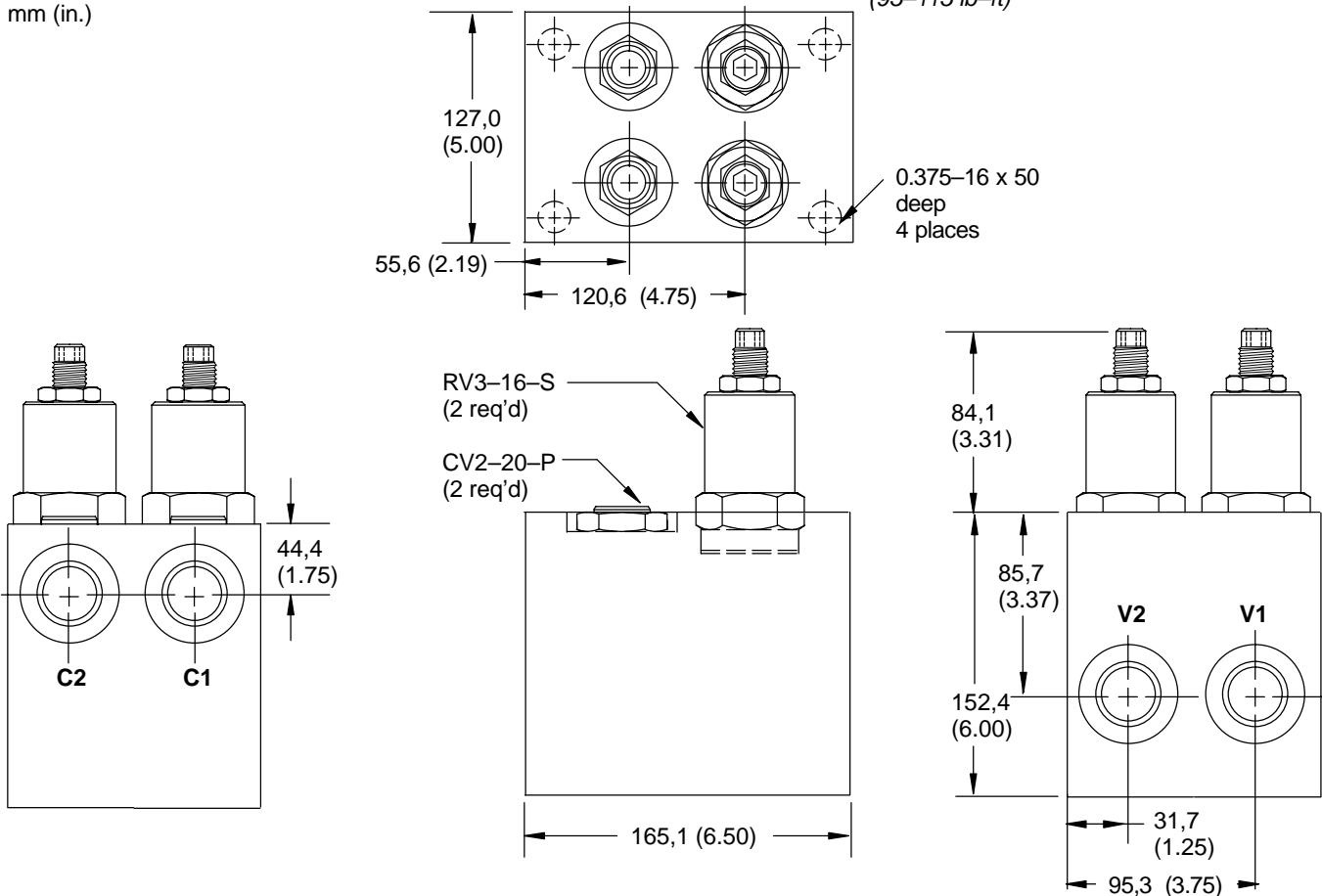
7 Pressure setting

Optional – Specify in 100 psi ranges. If not specified, set at:
120– 140 bar (2000 psi)
35 – 240 bar (3500 psi)

Installation Dimensions

mm (in.)

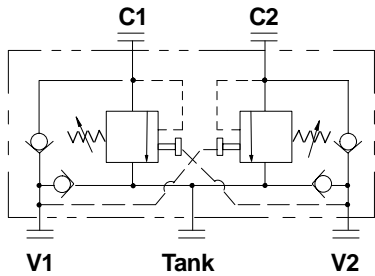
Torque cartridge in housing 128–155 Nm
(95–115 lb-ft)



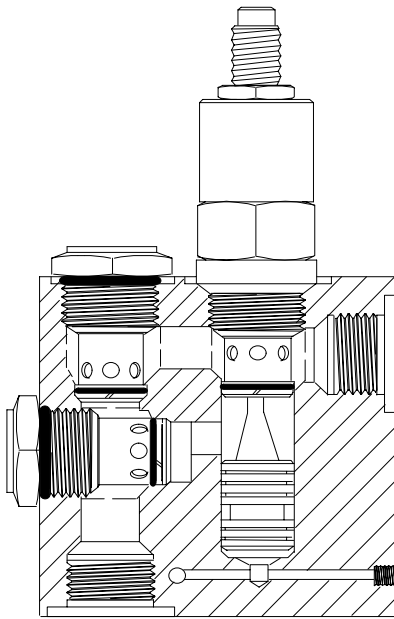
MCV4-16

Dual-Motion control valve

Functional Symbol



Sectional View



Description

The MCV4-16 is a dual in-line housing type motion control or load holding valve. This valve controls a moving load and prevents loads from running ahead of a pump. It will also lock or hold a load in any position and provides for thermal expansion relief and make-up oil.

Operation

This valve allows free flow from the "V" ports to the "C" ports and blocks flow in the opposite direction until either the relief setting is reached or until sufficient pilot pressure has been applied from the opposite "V" port.

Ratings and specifications

- Performance data is typical with fluid at 21,8 cSt (105 SUS) and 49° C (120° F)
- Typical application pressure (all ports) 210 bar (3000 psi)
 - Rated flow 151 l/min (40 USgpm)
 - Free flow cracking pressure @1 l/min (0.25 USgpm) 1,38 bar (20 psi)
 - 13 – 3,4 - 8,4 bar (50-1300 psi)
 - 35 – 13,6 - 240 bar (200-3500 psi)
 - Internal leakage Port "C" to "V" less than 5 drops / min. max. @210 bar (3000 psi)
 - Temperature range -40 ° to 120 °C (-40 ° to 248 °F)
 - Pilot ratio 11:1
 - Fluids All general purpose hydraulic fluids such as: MIL-H-5606, SAE 10, SAE 20, etc.
 - Filtration Cleanliness code 18/16/13
 - Standard housing material Aluminum
 - Weight 8,0 kg (18 lb.)
 - Seal kits (Check valve) 565810 (Buna-N)
889609 (Viton®)
 - Seal kits (Relief Valve) 565810 (Buna-N)
889609 (Viton®)

Pilot pressure calculation for 11:1 ratio

Nominal pressure to open valve by remote control

Pilot pressure=

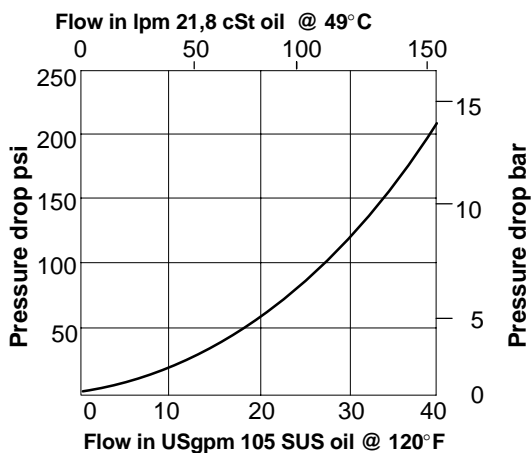
$$\text{Cracking pressure} + (12 \times \text{Port V Pressure}) - \text{Port C Pressure}$$

11

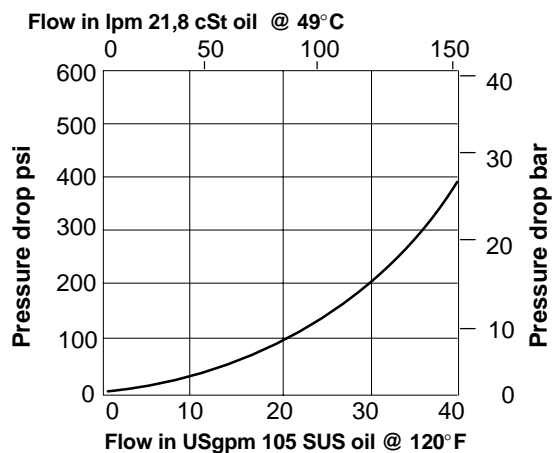
Viton is a registered trademark of E.I.DuPont

Pressure drop curve

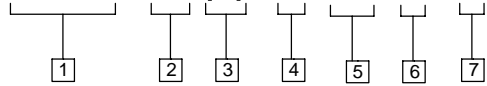
Free Flow (V1 to C1 or V2 to C2)



Piloted Open (C1 to V1 or C2 to V2)



MCV4 - 16 (V) - * - *** - ** / **



1 Valve function

MCV4—Dual-Motion control valve

2 Size

16 – Size16

3 Seals

Blank—Buna-N
V – Viton

4 Adjustment

K – Hand knob
S – Screw with locknut

5 Port size

12T—SAE 12 (light duty)
6B— 3/4" BSPP (light duty)

6 Cracking pressure range

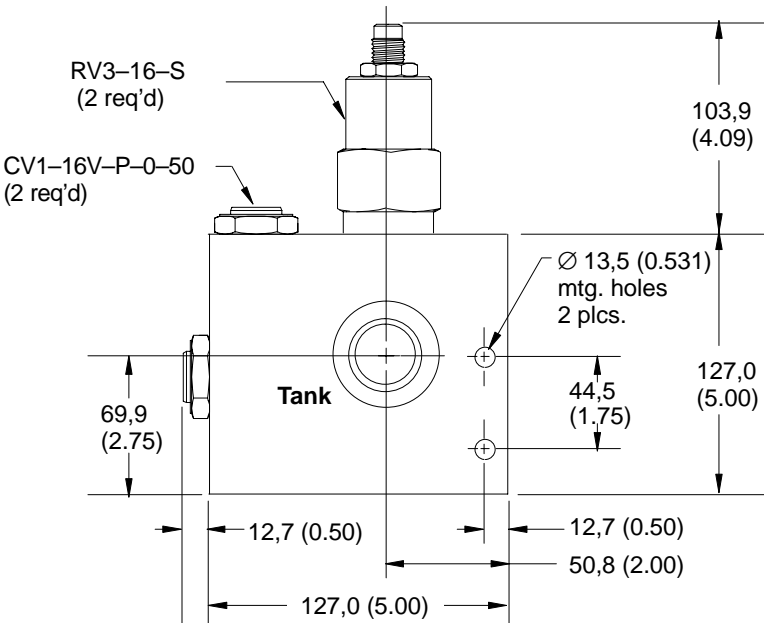
13 – 3,4–8,4 bar (50–1300 psi)
35 – 13,6–240 bar (200–3500 psi)

7 Pressure setting

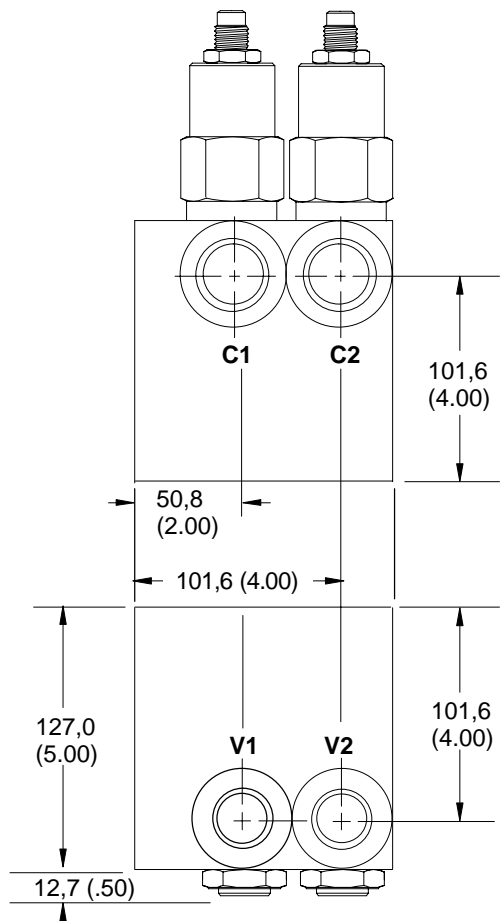
Optional – Specify in 100 psi ranges.
If not specified, set at:
20 – 140 bar (2000 psi)
35 – 240 bar (3500 psi)

Installation Dimensions

mm (in.)



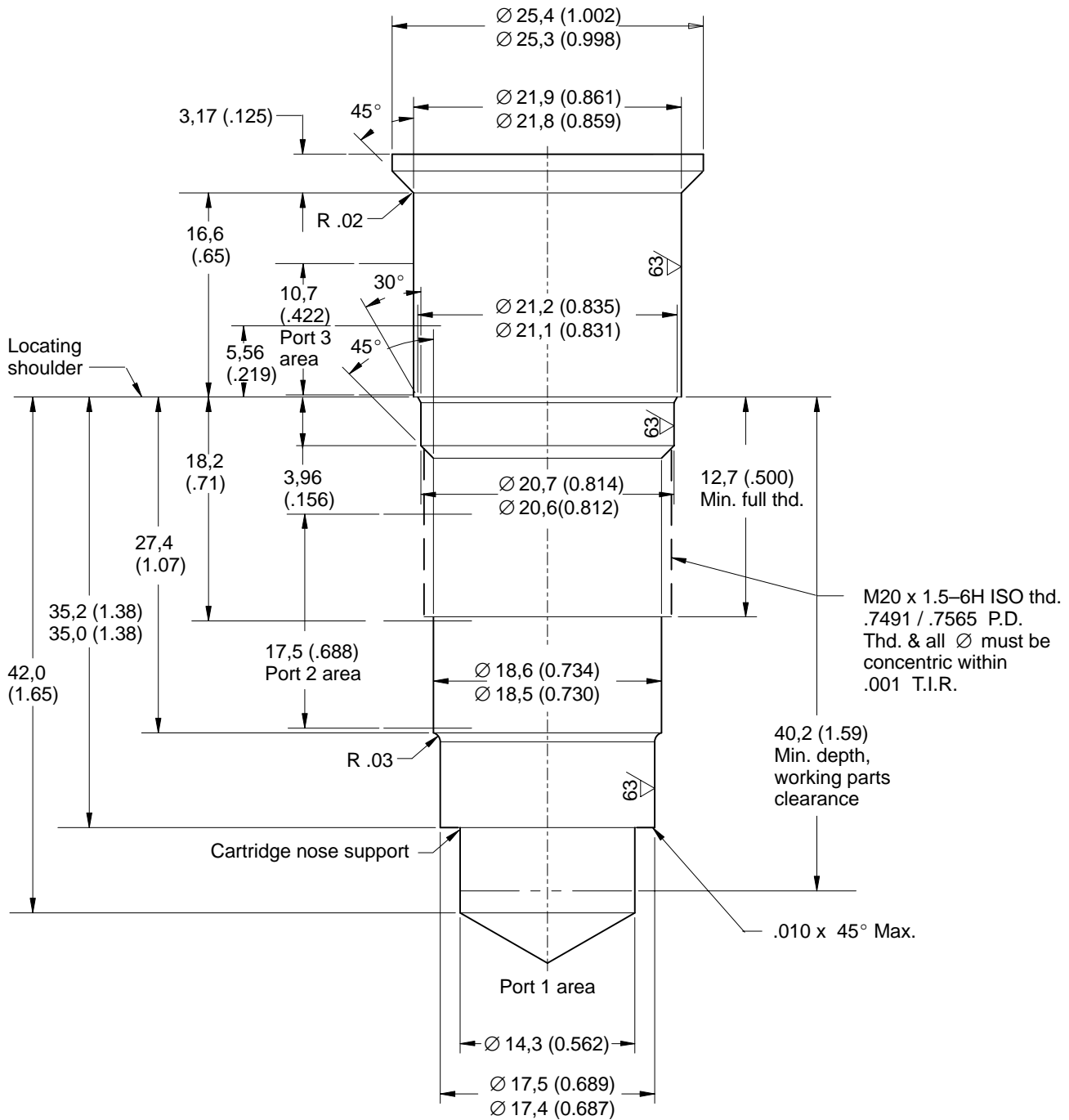
*Torque cartridge in housing 108–122 Nm
(80–90 lbf ft.)*



CMM-10-3 Cavity Dimensions

Dimensions

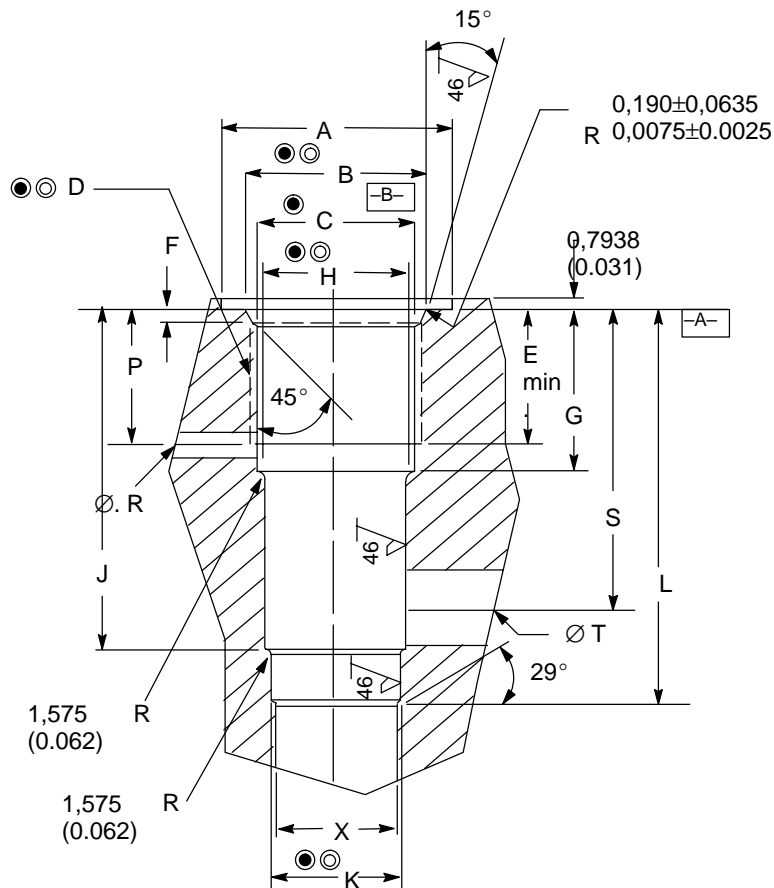
mm (in.)



C-10/12-3S Cavity Dimensions

Dimensions

mm (in.)



3-Way Cavity – short

- These diameters $\sqrt{\text{0,051 mm (.002 inch) B}}$ unless otherwise specified
- These diameters $\square \text{0,025 mm (.001 inch) A}$ unless otherwise specified

Cavity mm (in.)	A Spot face	B $+0,051$ 0 ($+0,002$ 0)	C $+0,051$ 0 ($+0,002$ 0)	D Thread	E Full Thread	F	G	H $\pm 0,0254$ ($\pm 0,0001$)	J	K $\pm 0,0254$ ($\pm 0,0001$)	L
C-10-3S	30,16 (1.188)	24,00 (0.945)	20,62 (0.812)	0.875"-14	14,29 (0.562)	2,54/2,92 (0.100/0.115)	16,51 (0.650)	19,08 (0.751)	38,48 (1.515)	17,50 (0.689)	47,62 (1.875)
C-12-3S	38,10 (1.500)	29,15 (1.148)	24,76 (0.975)	1.062"-12	22,22 (0.875)	3,30/3,68 (0.130/0.145)	25,40 (1.000)	23,82 (0.938)	48,26 (1.900)	22,25 (0.876)	59,69 (2.350)

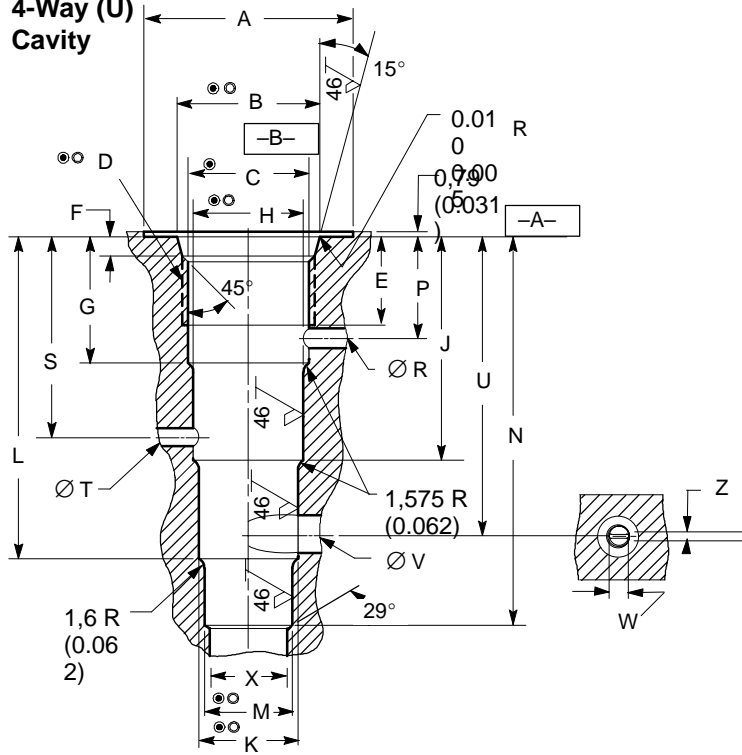
Cavity mm (in.)	P	R Max. Dia.	S	T Max. Dia.	X Max. Dia.
C-10-3S	14,29 (0.562)	3,18 (0.125)	30,96 (1.218)	13,49 (0.531)	15,88 (0.625)
C-12-3S	22,22 (0.875)	4,82 (0.190)	41,27 (1.625)	12,70 (0.500)	20,62 (0.812)

C-**-4(U) Cavity Dimensions

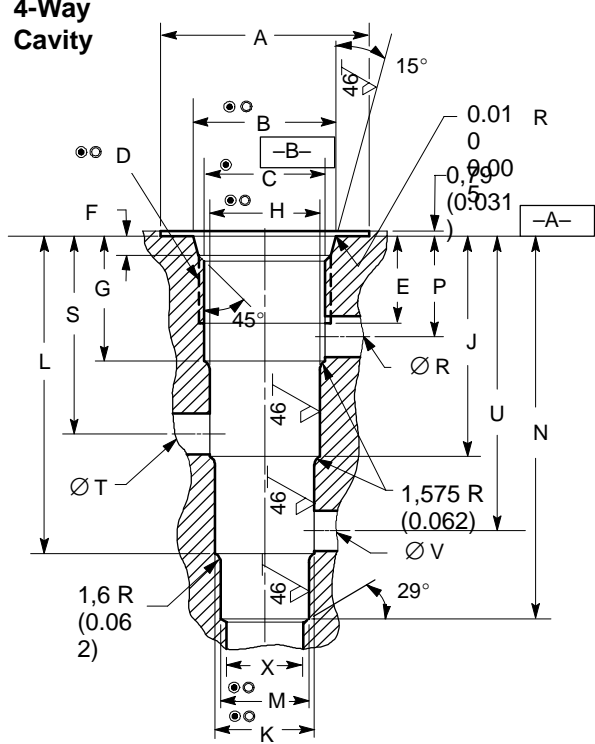
Dimensions

mm (in.)

4-Way (U) Cavity



4-Way Cavity



● These diameters $\begin{matrix} 0,051 \text{ mm (.002 inch)} \\ 0 \\ \pm 0,002 \text{ (0)} \end{matrix}$ B unless otherwise specified

○ These diameters $\begin{matrix} 0,025 \text{ mm (.001 inch)} \\ 0 \\ \pm 0,001 \text{ (0)} \end{matrix}$ A unless otherwise specified

Cavity mm (in.)	A Spot face	B $\begin{matrix} +0,051 \\ 0 \\ (+0,002 \\ 0) \end{matrix}$	C $\begin{matrix} +0,051 \\ 0 \\ (+0,002 \\ 0) \end{matrix}$	D Thread	E Full Thread	F	G	H $\begin{matrix} \pm 0,0254 \\ (\pm 0,0001) \end{matrix}$	J	K $\begin{matrix} \pm 0,0254 \\ (\pm 0,0001) \end{matrix}$
C-10-4(U)	30,16 (1.188)	24,00 (0.945)	20,62 (0.812)	0.875"-14	15,88 (0.625)	2,54/2,92 (0.100/0.115)	22,22 (0.875)	19,08 (0.751)	38,10 (1.500)	17,50 (0.689)
C-12-4(U)	38,09 (1.500)	29,15 (1.148)	24,76 (0.975)	1.062"-12	22,22 (0.875)	3,30/3,68 (1.30/1.45)	34,91 (1.375)	23,81 (0.938)	57,77 (2.275)	22,24 (0.876)

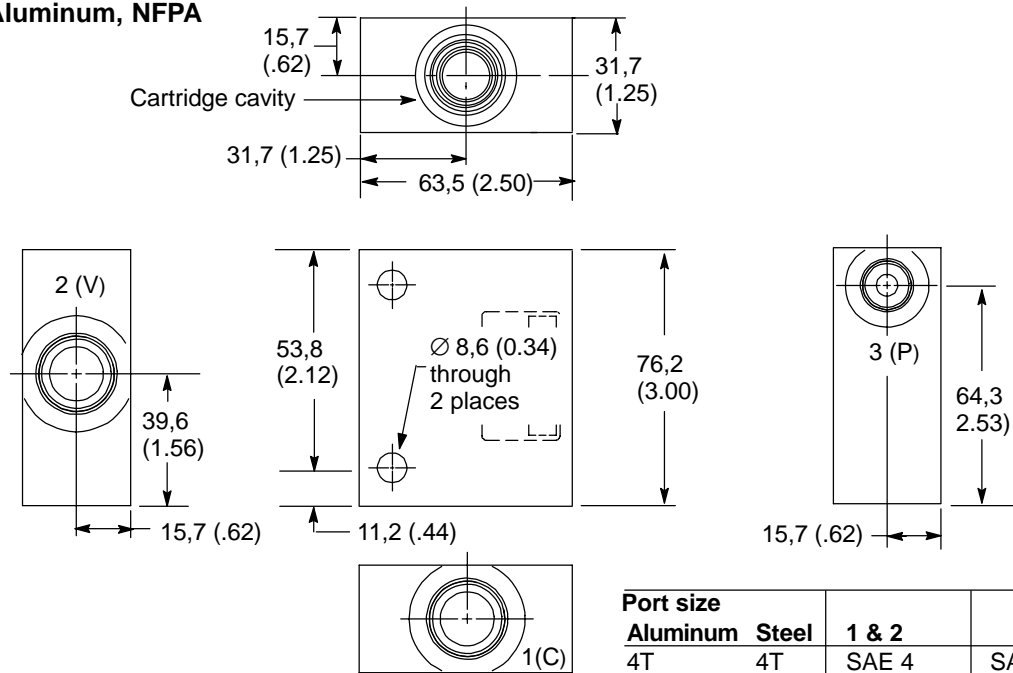
Cavity mm (in.)	L	M $\begin{matrix} \pm 0,0254 \\ (\pm 0,0001) \end{matrix}$	N	P	R Max. Dia.	S	T Max. Dia.	U	V	X Max. Dia.
C-10-4	53,98 (2.125)	15,90 (0.626)	63,50 (2.500)	18,26 (0.718)	6,35 (0.250)	34,13 (1.343)	6,35 (0.250)	50,00 (1.968)	6,35 (0.250)	14,29 (0.562)
C-10-4(U)	53,98 (2.125)	15,90 (0.626)	63,50 (2.500)	18,26 (0.719)	3,17 (0.125)	34,13 (1.344)	3,17 (0.125)	51,58 (2.031)	6,35 (0.250)	14,29 (0.562)
C-12-4(U)	80,61 (3.175)	20,64 (0.813)	92,04 (3.625)	27,93 (1.100)	12,70 (0.500)	50,78 (2.000)	12,70 (0.500)	73,63 (2.900)	12,70 (0.500)	19,04 (0.750)

Cavity	Thd.	W	Z
C-10-4U	all	19,0 (0.75)	Ø 6,3 (0.25)
C-12-4U	SAE12	22,4 (0.88)	Ø12,6 (0.50)
	1/2" BSPP	17,5 (0.68)	

Size10 Housings- CBV7/8/9

I - Inline body – Aluminum, NFPA fatigue rated

Dimensions
mm (in.)

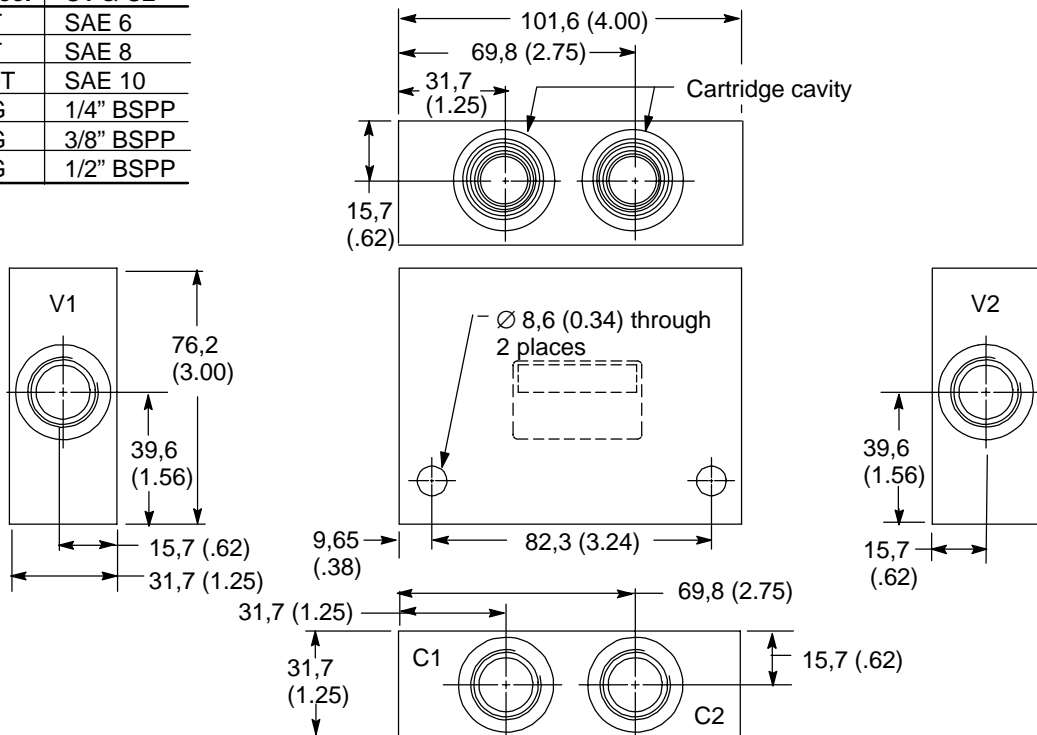


Port size		1 & 2	3
Aluminum	Steel		
4T	4T	SAE 4	SAE 4
6T	6T	SAE 6	SAE 6
8T	8T	SAE 8	
10T	10T	SAE 10	
2B	2G	1/4" BSPP	1/4" BSPP
3B	3G	3/8" BSPP	
4B	4G	1/2" BSPP	

See page 44 for housing part numbers

D - Dual line mounted – Aluminum and Steel

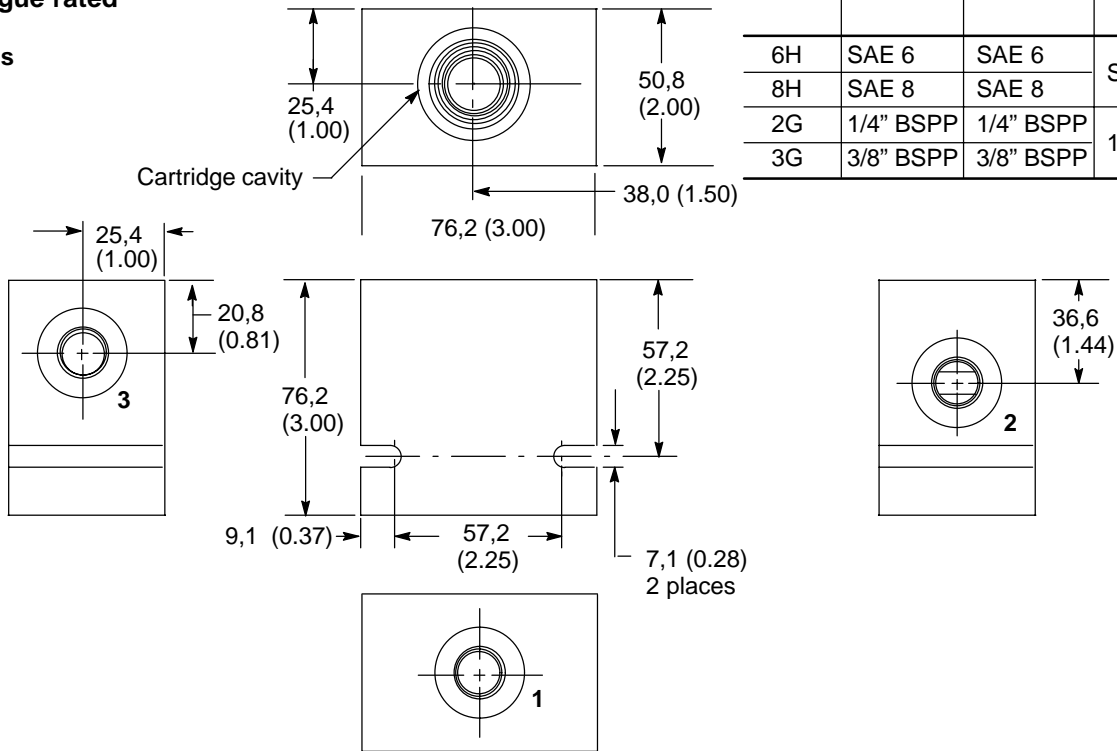
Port size	Aluminum	Steel	V1, V2, C1 & C2
6T	6T	6T	SAE 6
8T	8T	8T	SAE 8
10T	10T	10T	SAE 10
2B	2G	2G	1/4" BSPP
3B	3G	3G	3/8" BSPP
4B	4G	4G	1/2" BSPP



Size 10 Housings - CBV1/2 and POC1

I - Inline body – Aluminum, NFPA fatigue rated

Dimensions
mm (in.)

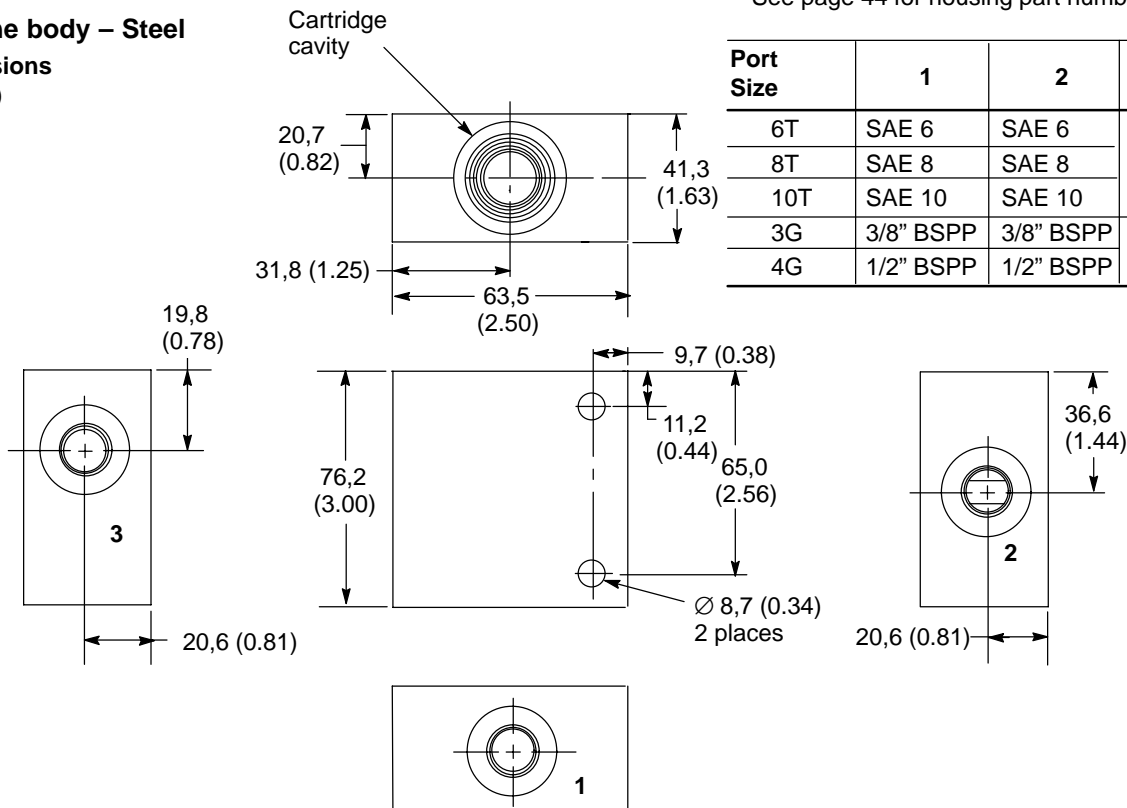


Port Size	1	2	3
6H	SAE 6	SAE 6	SAE 6
8H	SAE 8	SAE 8	
2G	1/4" BSPP	1/4" BSPP	1/4" BSPP
3G	3/8" BSPP	3/8" BSPP	

See page 44 for housing part numbers

I - Inline body – Steel

Dimensions
mm (in.)

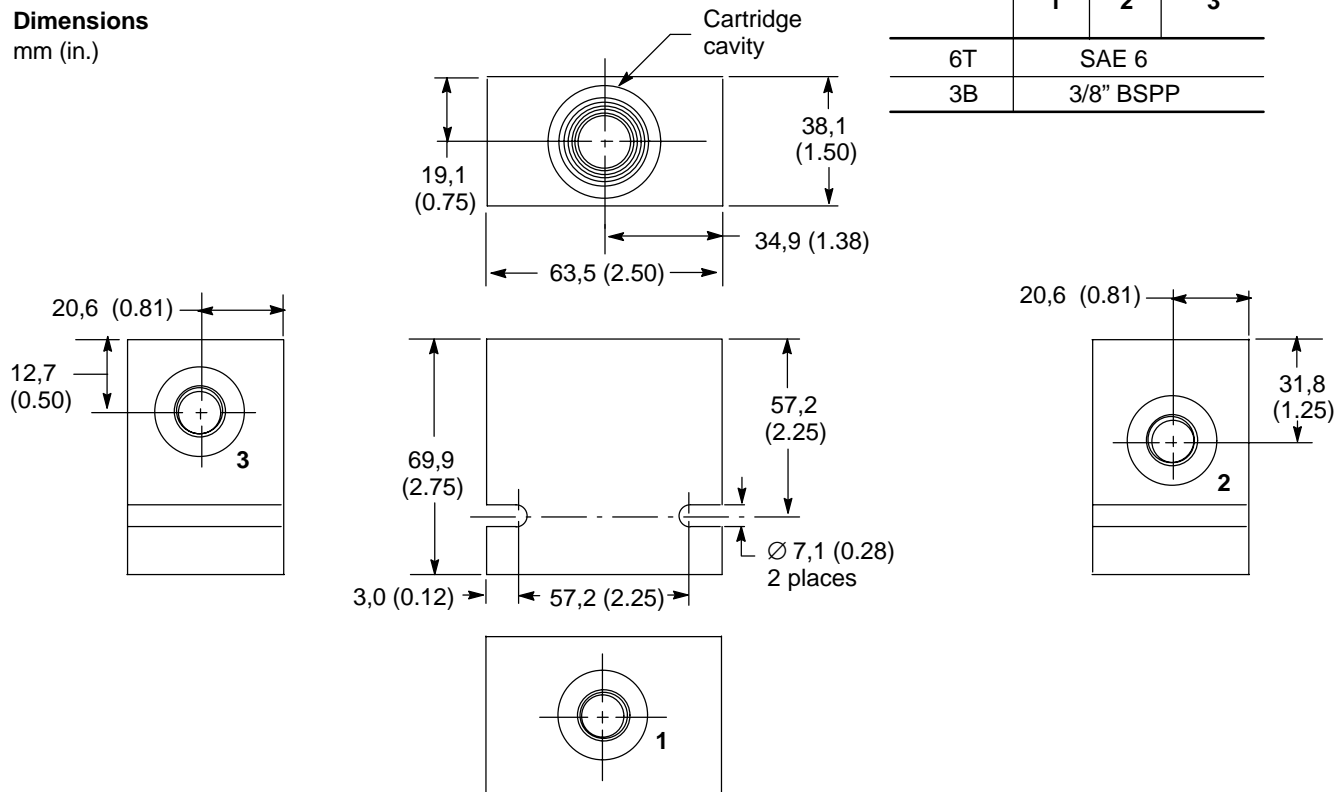


Port Size	1	2	3
6T	SAE 6	SAE 6	SAE 6
8T	SAE 8	SAE 8	
10T	SAE 10	SAE 10	1/4" BSPP
3G	3/8" BSPP	3/8" BSPP	
4G	1/2" BSPP	1/2" BSPP	

Size 10 Housings - CBV1/2 and POC1

I - Aluminum – Inline, light duty

Dimensions
mm (in.)

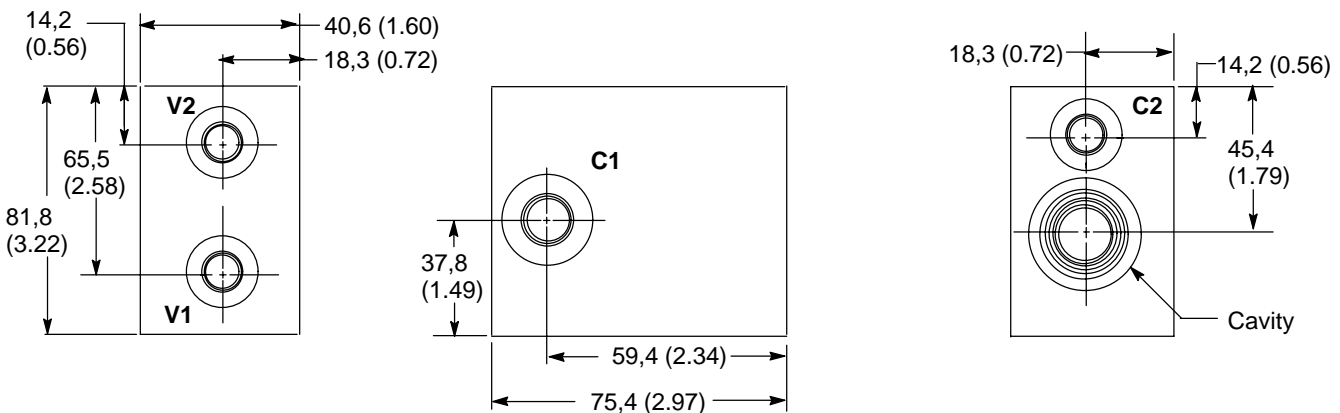


Port Size	1	2	3
6T	SAE 6		
3B	3/8" BSPP		

see page 44 for housing part numbers

N - Close coupled nipple mounted – Aluminum and Steel

Dimensions
mm (in.)



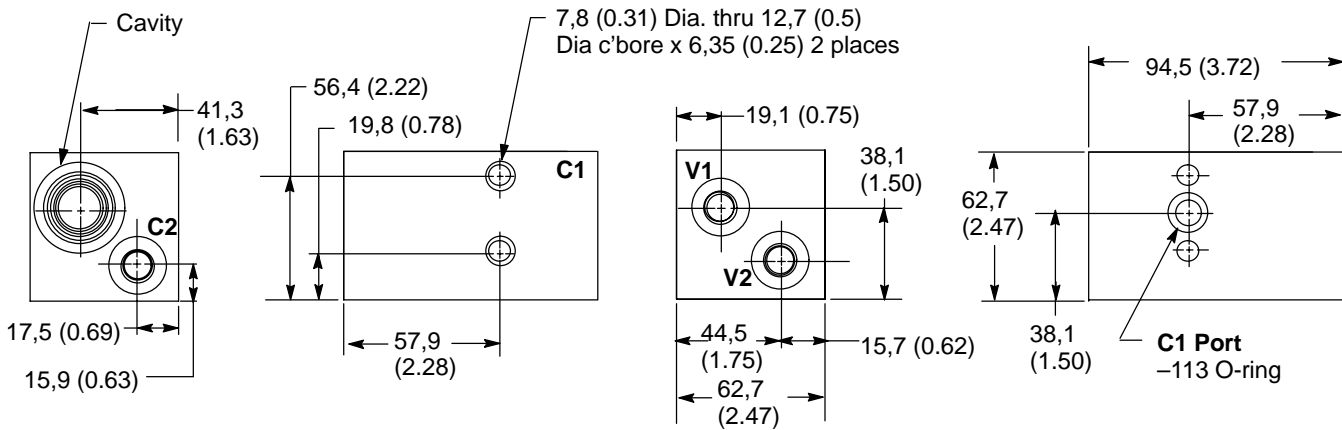
Port size	Aluminum	Steel	C1	C2, V1, V2
6H	6T		SAE 8	SAE 6
3G	3G		3/8" BSPP	

Size 10 Housings - CBV1/2 and POC1

G - Gasket mounted, single – Aluminum and Steel

Dimensions
mm (in.)

Port size		C1	C2, V1, V2
Aluminum	Steel		
6H	6T	∅ 12,7	SAE 6
3G	3G	(0.500)	3/8" BSPP

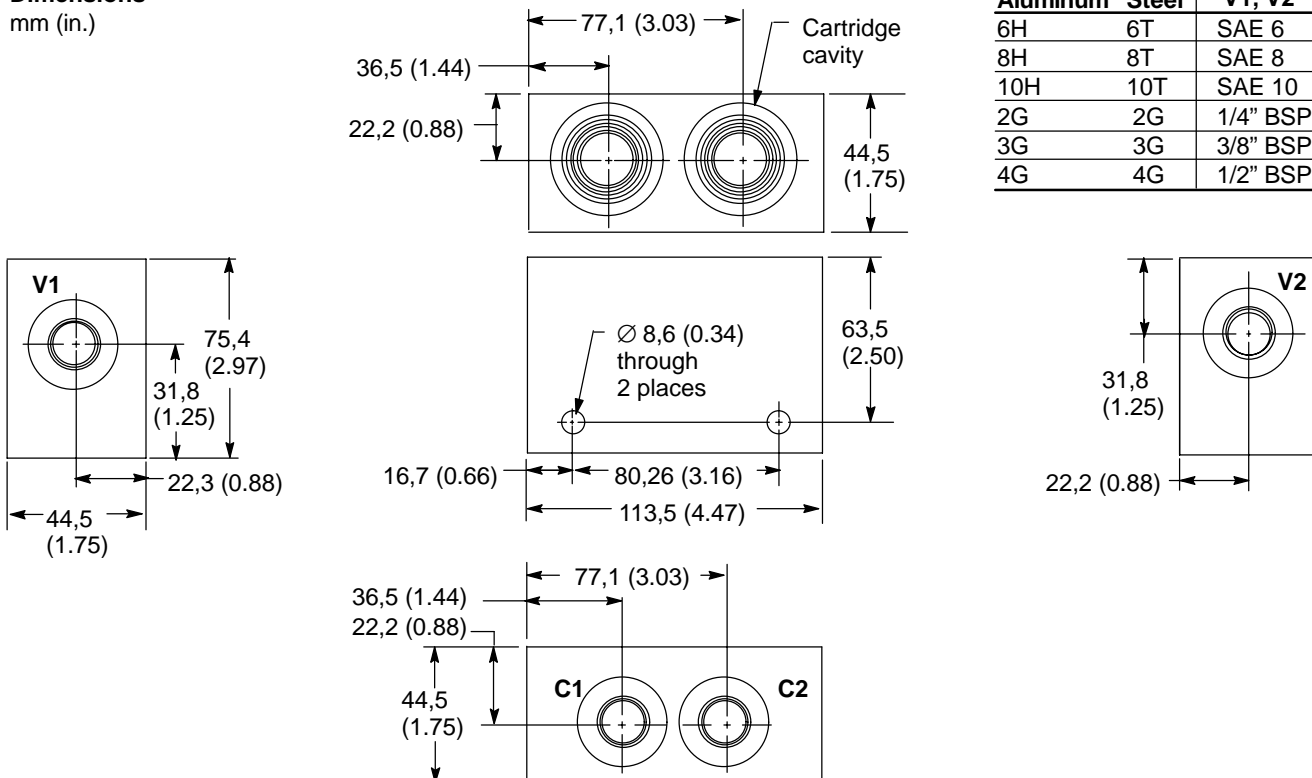


see page 44 for housing part numbers

D - Dual line mounted – Aluminum and Steel

Dimensions
mm (in.)

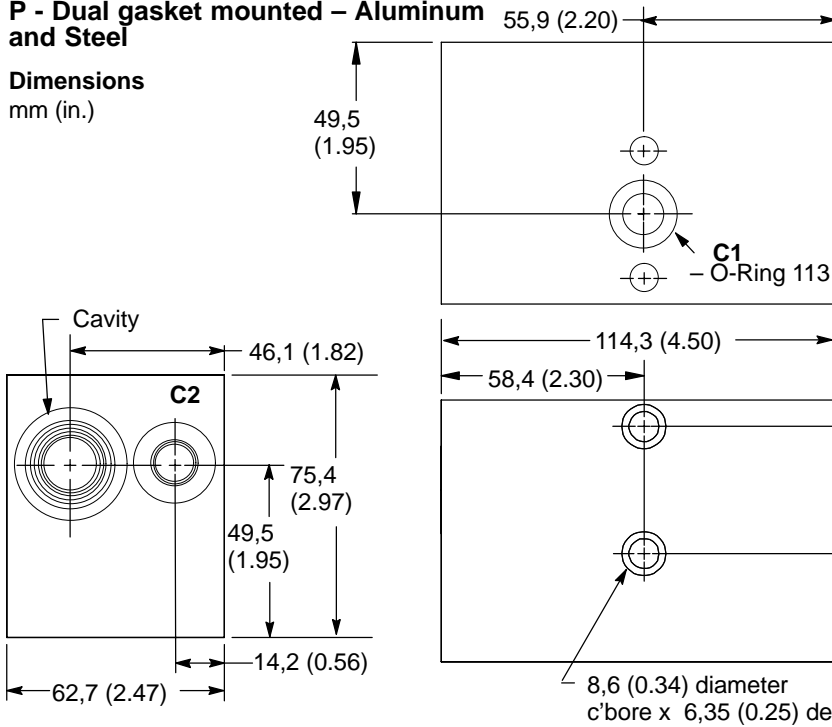
Port size		C1, C2, V1, V2
Aluminum	Steel	
6H	6T	SAE 6
8H	8T	SAE 8
10H	10T	SAE 10
2G	2G	1/4" BSPP
3G	3G	3/8" BSPP
4G	4G	1/2" BSPP



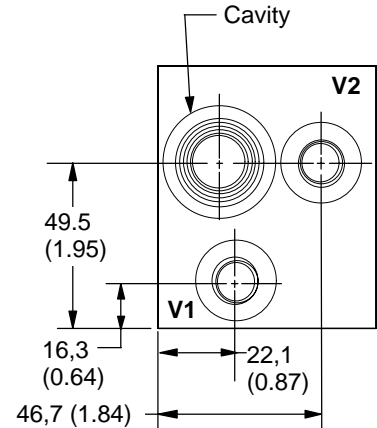
Size 10 Housings - CBV1/2 and POC1

P - Dual gasket mounted – Aluminum and Steel

Dimensions
mm (in.)



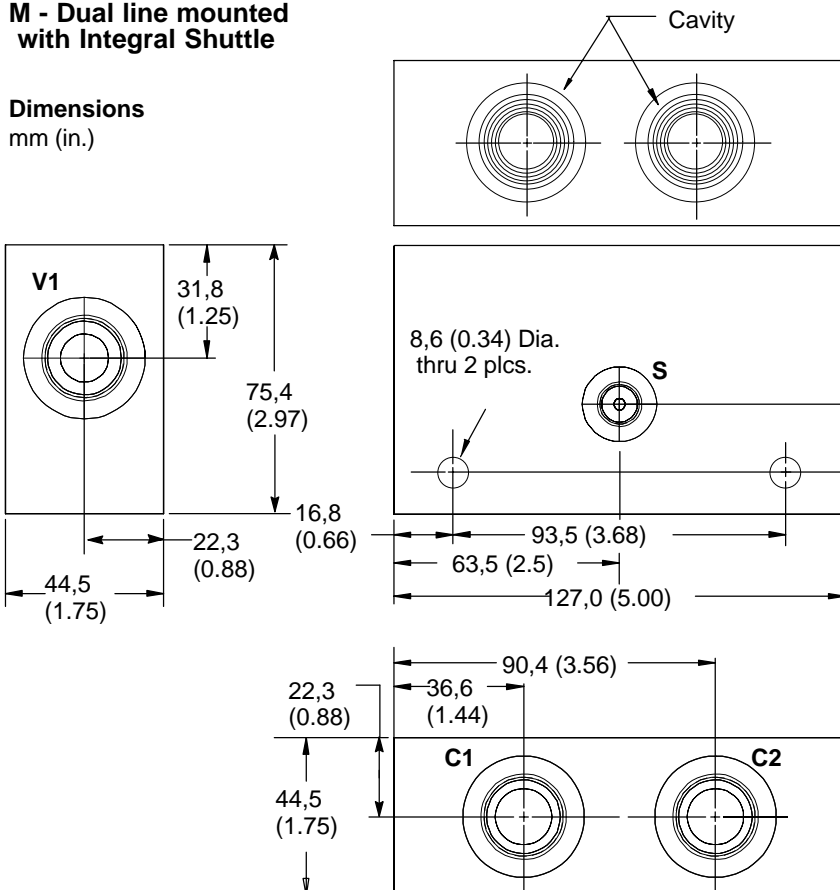
Port size		C1	C2,V1,V2
Aluminum	Steel	Ø 12,7 (0.500)	SAE 6 3/8" BSPP
6H	6T		
3G	3G		



See page 44 for housing part numbers

M - Dual line mounted with Integral Shuttle

Dimensions
mm (in.)

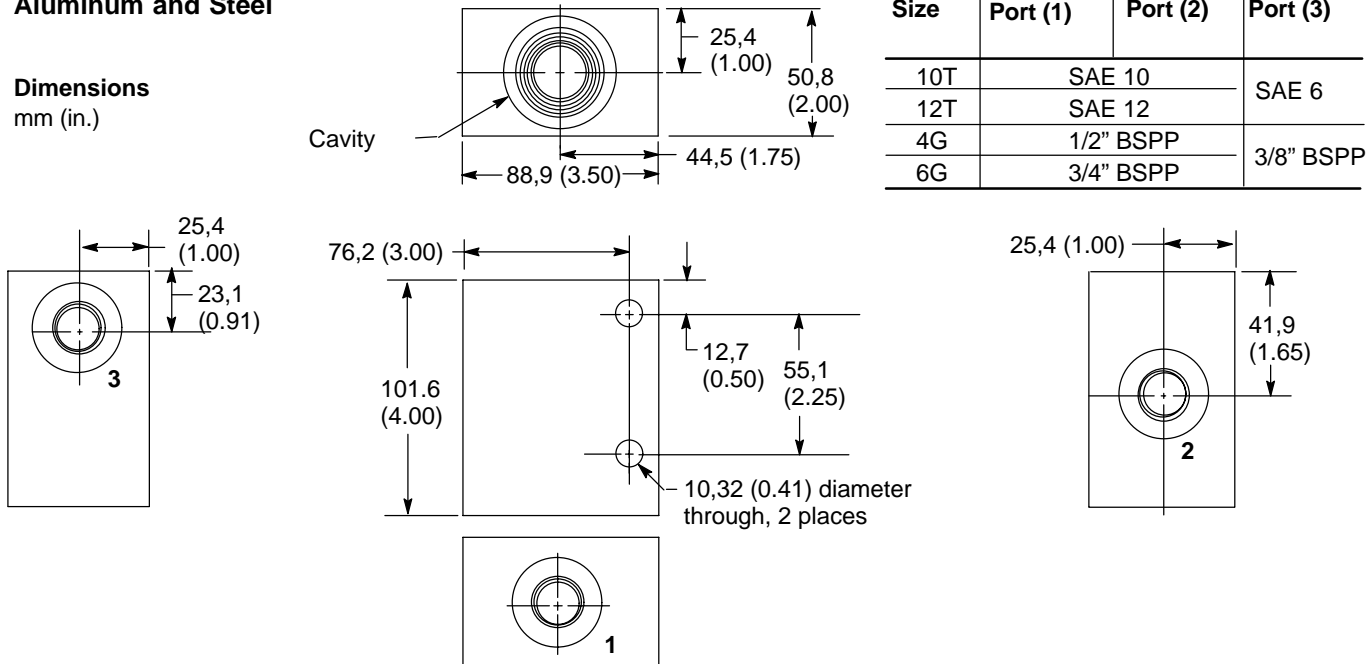


Port size		C1, C2, V1, V2	S
Aluminum	Steel	SAE 6	SAE 4
6H	6T		
8H	8T	SAE 8	
10H	10T	SAE 10	
2G	2G	1/4" BSPP	1/4" BSPP
3G	3G	3/8" BSPP	
4G	4G	1/2" BSPP	

Size 12 Housings - CBV1/2 and POC1

I - Inline body – Aluminum and Steel

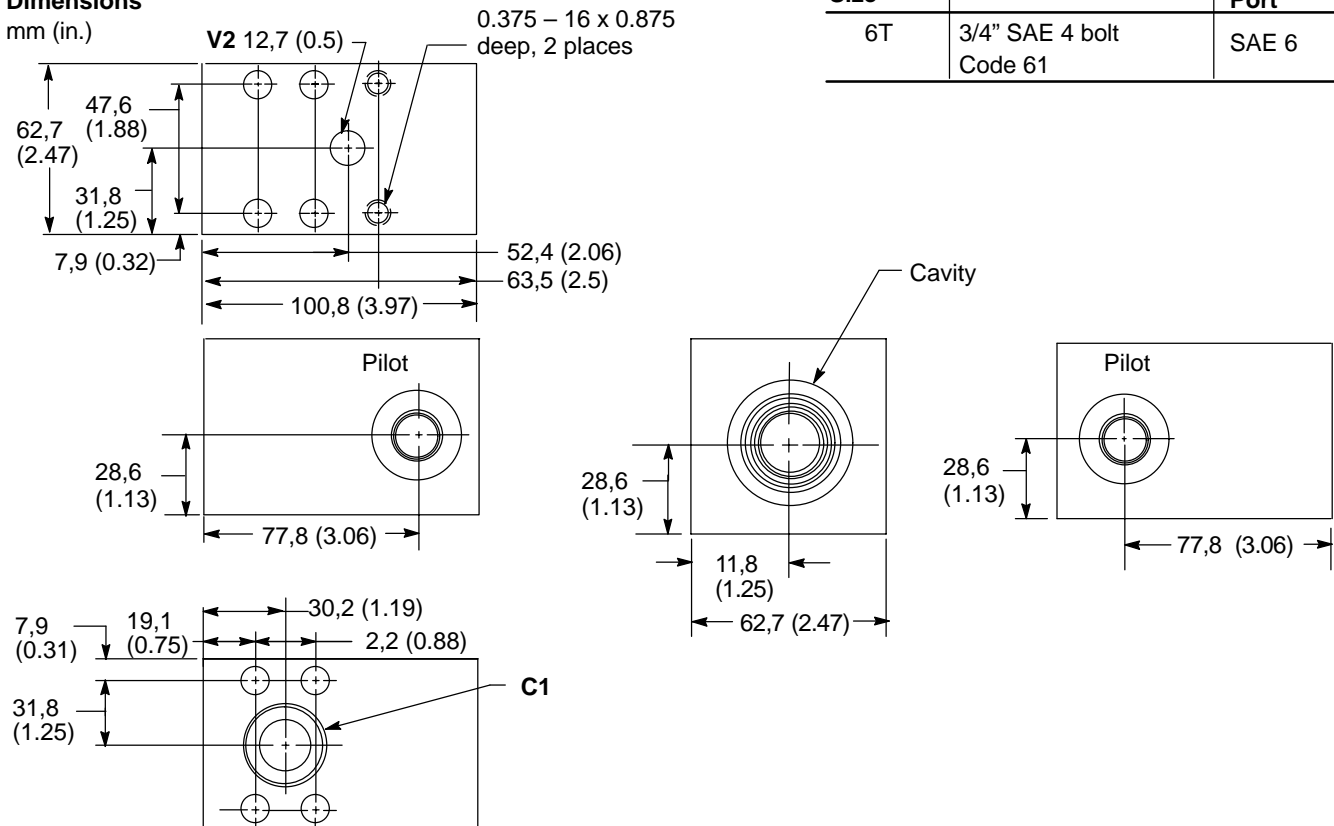
Dimensions
mm (in.)



see page 44 for housing part numbers

B - 3/4" 4-Bolt Pad – Aluminum and Steel

Dimensions
mm (in.)

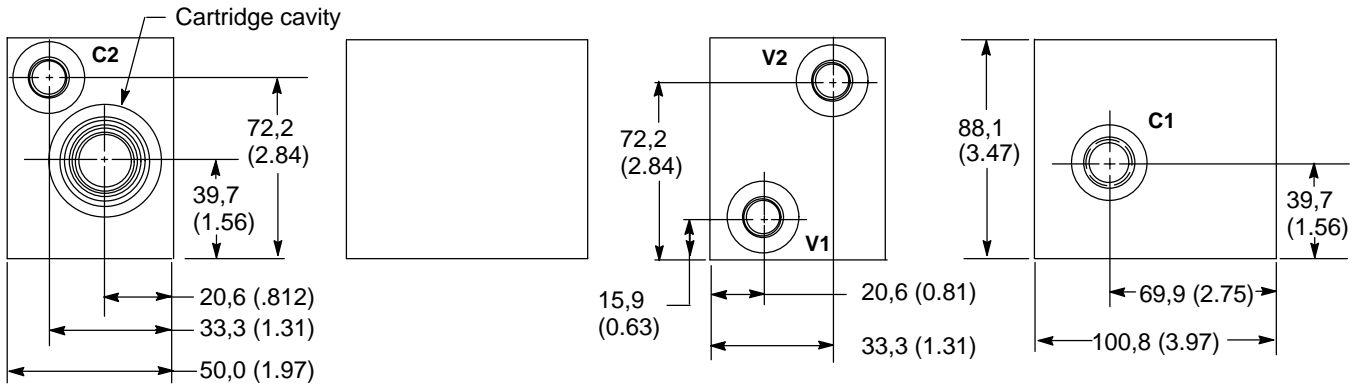


Size 12 Housings - CBV1/2 and POC1

N - Close coupled nipple mounted – Aluminum and Steel

Dimensions
mm (in.)

Port Size	C1	C2	V1	V2
8T	1/2" NPTF	SAE 8		
4G	1/2" BSPP	1/2" BSPP		

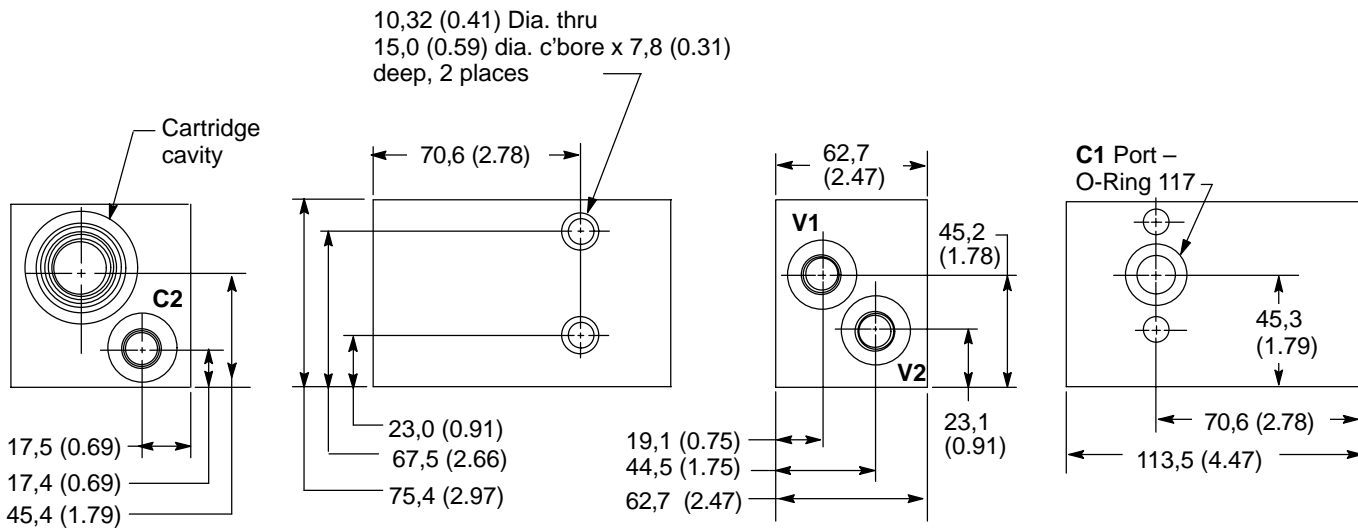


see page 44 for housing part numbers

G - Gasket mounted, single – Aluminum and Steel

Dimensions
mm (in.)

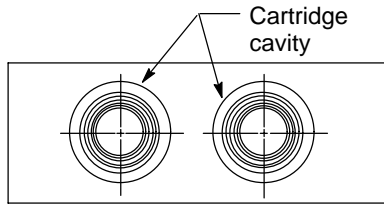
Port Size	C1	C2	V1	V2
8T	∅ 15,8 (0.625)	SAE 8		
4G	(0.625)	1/2" BSPP		



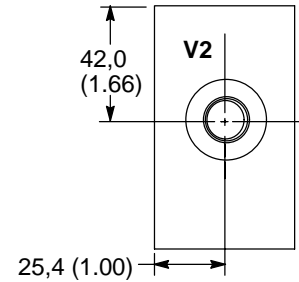
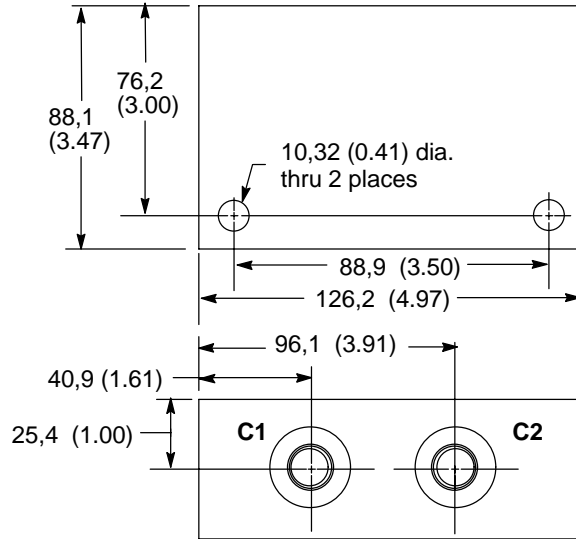
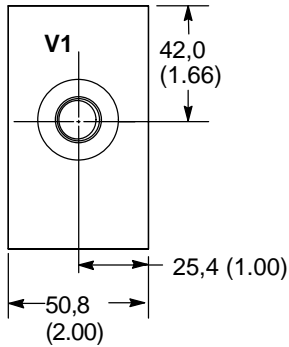
Size 12 Housings - CBV1/2 and POC1

D - Dual line mounted – Aluminum and Steel

Dimensions
mm (in.)



Port Size	C1, C2, V1, V2
10T	SAE 10
12T	SAE 12
4G	1/2" BSPP

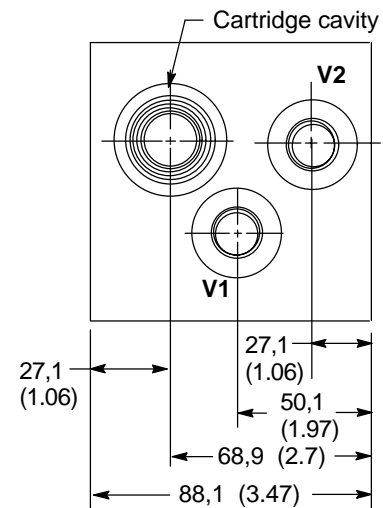
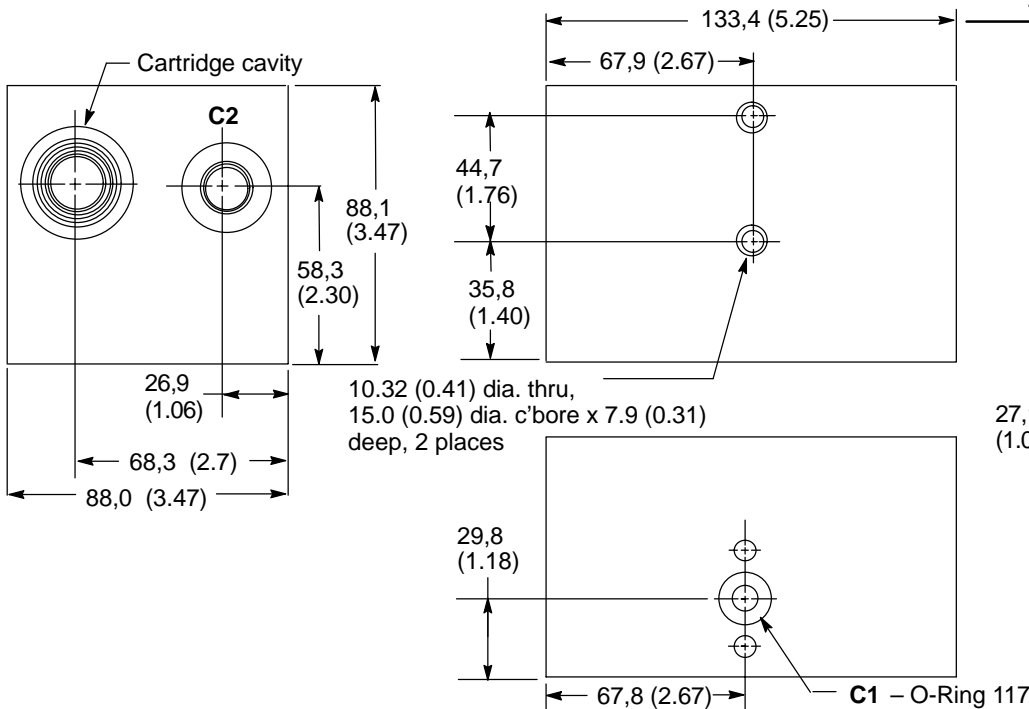


P - Dual gasket mounted

See page 44 for housing part numbers

Dimensions
mm (in.)

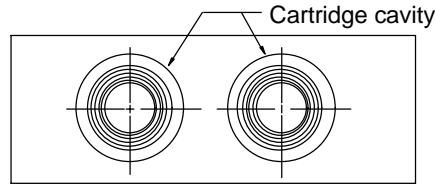
Port Size	C1	C2, V1, V2
8T	∅ 15,8	SAE 8
4G	(0.625)	1/2" BSPP



Size 12 Housings - CBV1/2 and POC1

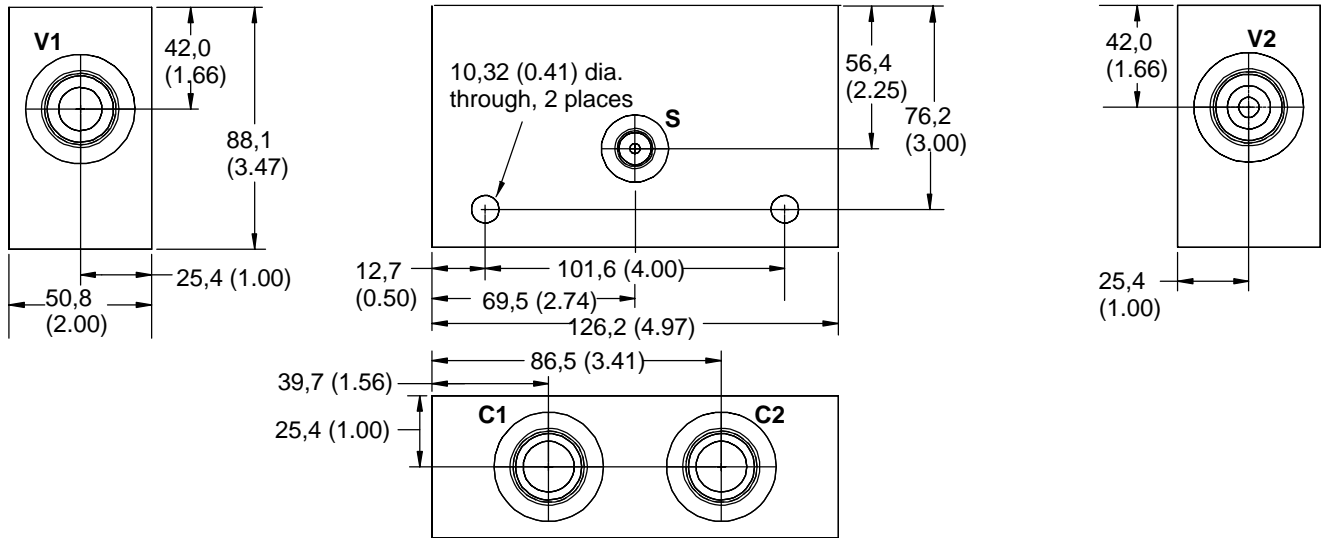
M - Dual line mounted – with integral shuttle, counterbalance only

Dimensions
mm (in.)



Port Size	C1, C2, V1, V2	S
10T	SAE10	SAE 4
12T	SAE12	
4G	1/2" BSPP	1/4" BSPP

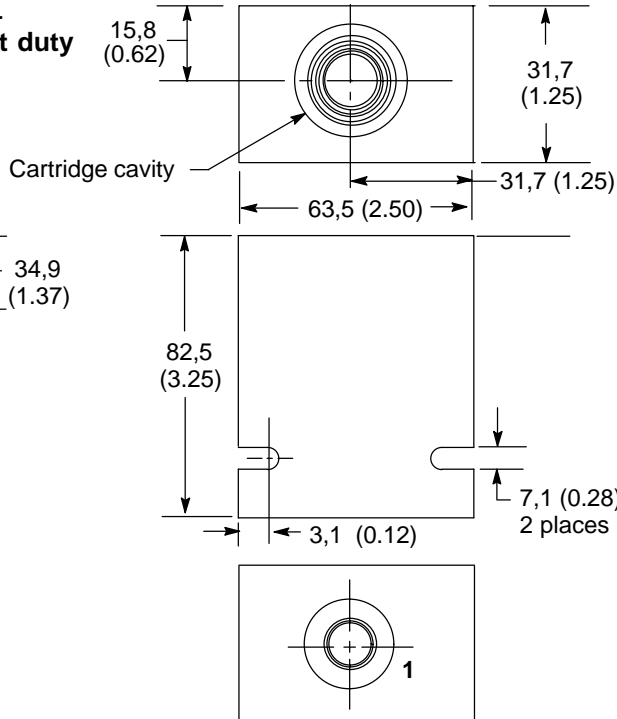
See page 44 for housing part numbers



Size 10 Housings - VCB1-10

I - Inline body – Aluminum, light duty

Dimensions
mm (in.)



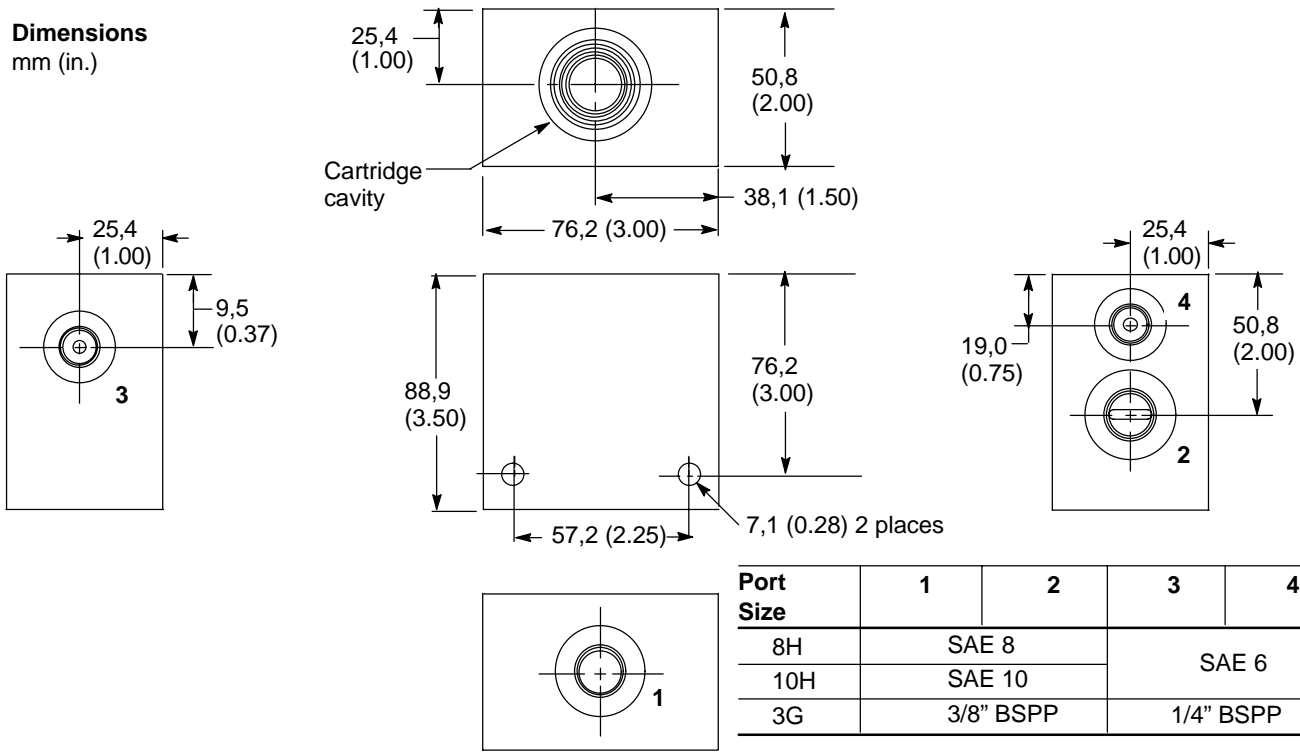
Port Size	1	2	3	4
6T	SAE 6			

See page 45 for housing part numbers

Size 10 Housings - VCB1

I - Inline body – Aluminum, NFPA fatigue rated

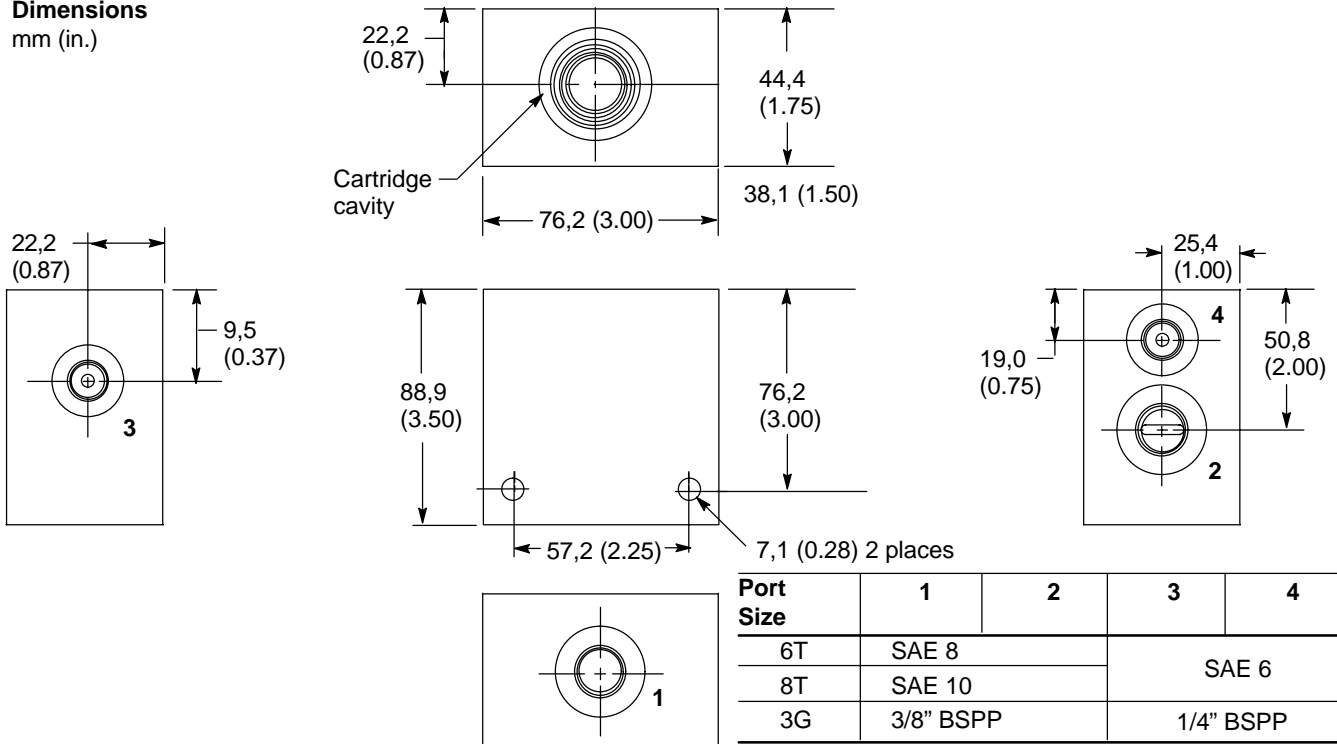
Dimensions
mm (in.)



See page 45 for housing part numbers

I - Inline body – Steel, NFPA fatigue rated

Dimensions
mm (in.)

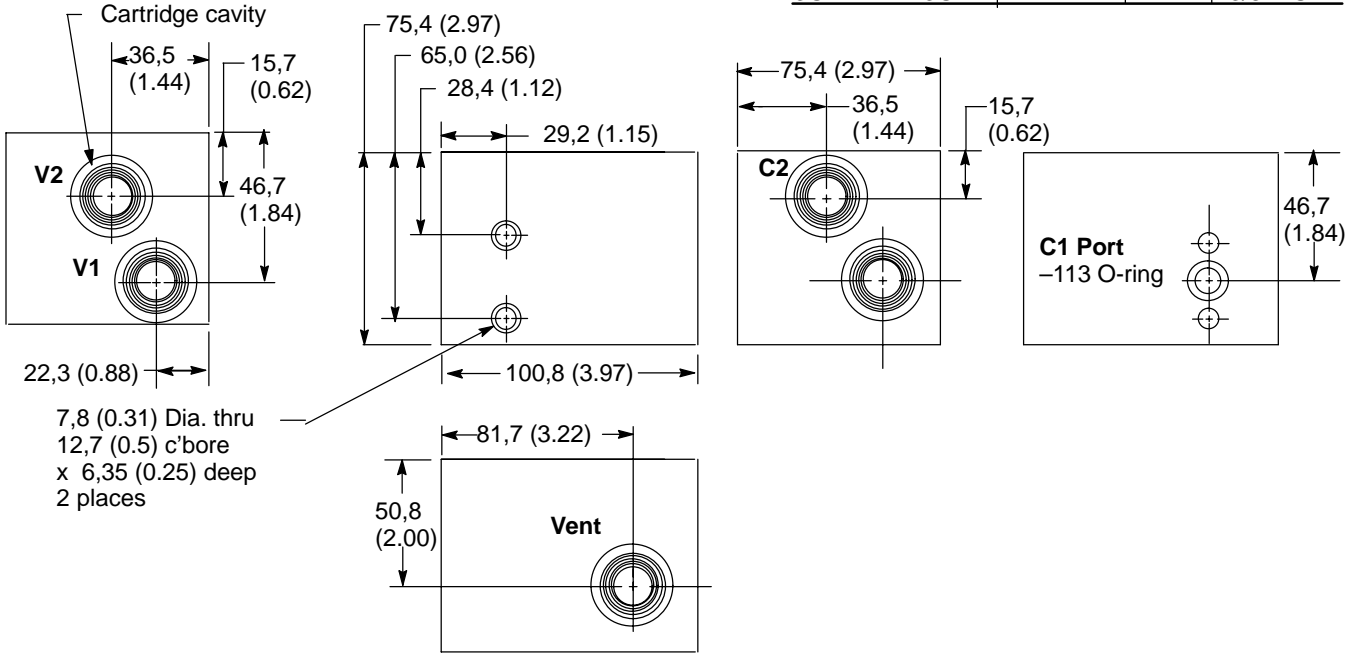


Size 10 Housings - VCB1

G - Gasket mounted, single – Aluminum and Steel

Dimensions
mm (in.)

Port size		Vent	C1	C2, V1, V2
Aluminum	Steel			
6H	6T	SAE 6	Ø 12,7 (0.500)	SAE 6
N/A	8T			SAE 8
3G	3G	1/4" BSPP		3/8" BSPP

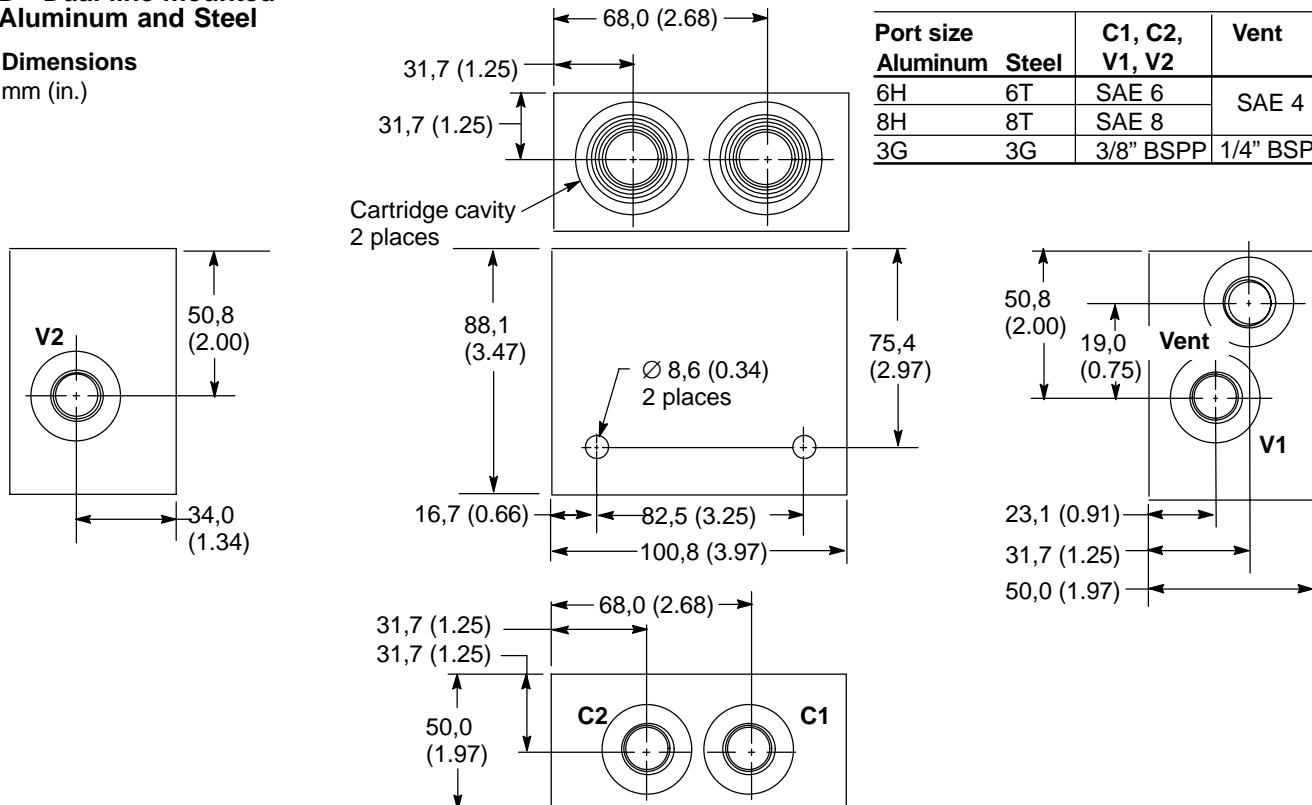


See page 45 for housing part numbers

D - Dual line mounted – Aluminum and Steel

Dimensions
mm (in.)

Port size		C1, C2, V1, V2	Vent
Aluminum	Steel		
6H	6T	SAE 6	SAE 4
8H	8T		
3G	3G	3/8" BSPP	1/4" BSPP



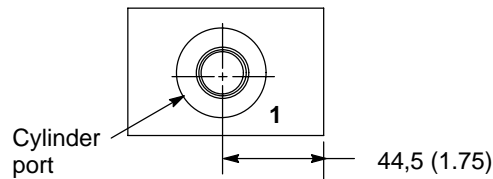
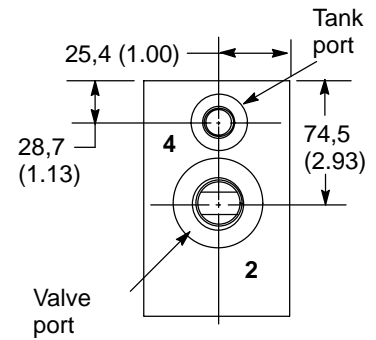
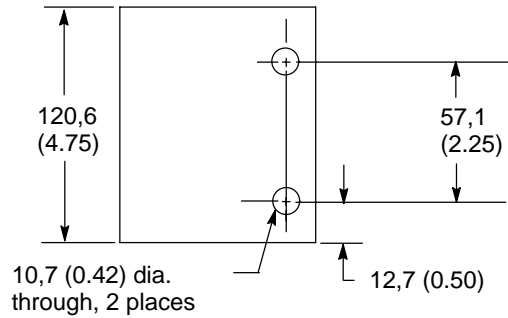
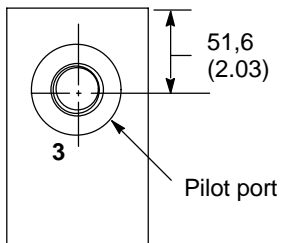
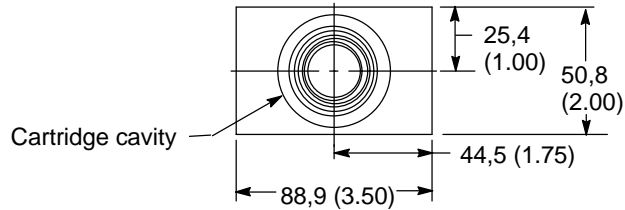
Size 12 Housings - VCB1

I - Inline body – Aluminum and Steel

Dimensions
mm (in.)

Port Size	1, 2	3, 4
10T	SAE 10	SAE 6
12T	SAE 12	SAE 6
4G	1/2" BSPP	1/4" BSPP

See page 45 for housing part numbers



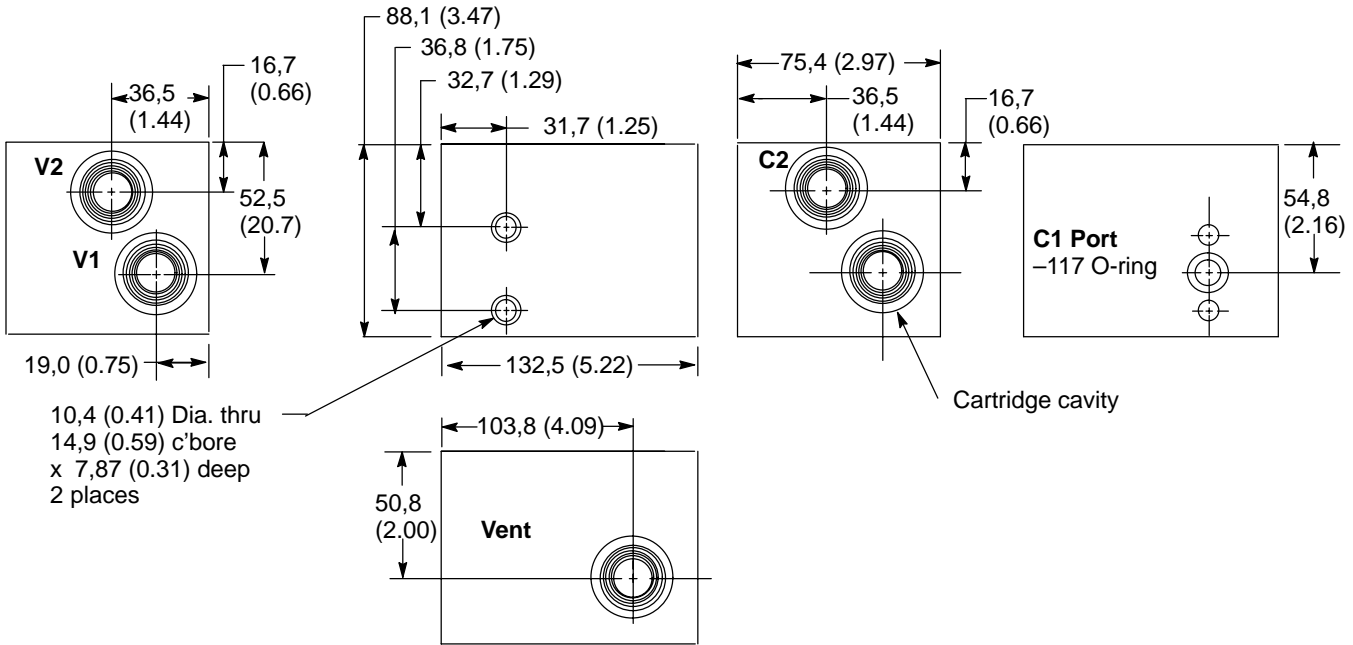
Size 12 Housings - VCB1

G - Gasket mounted, single – Aluminum and Steel

Dimensions

mm (in.)

Port	Vent	C1	C2	V1	V2
8T	SAE 6	Ø 15,8 (0.625)	SAE 8		
4G	1/4" BSPP		1/2" BSPP		



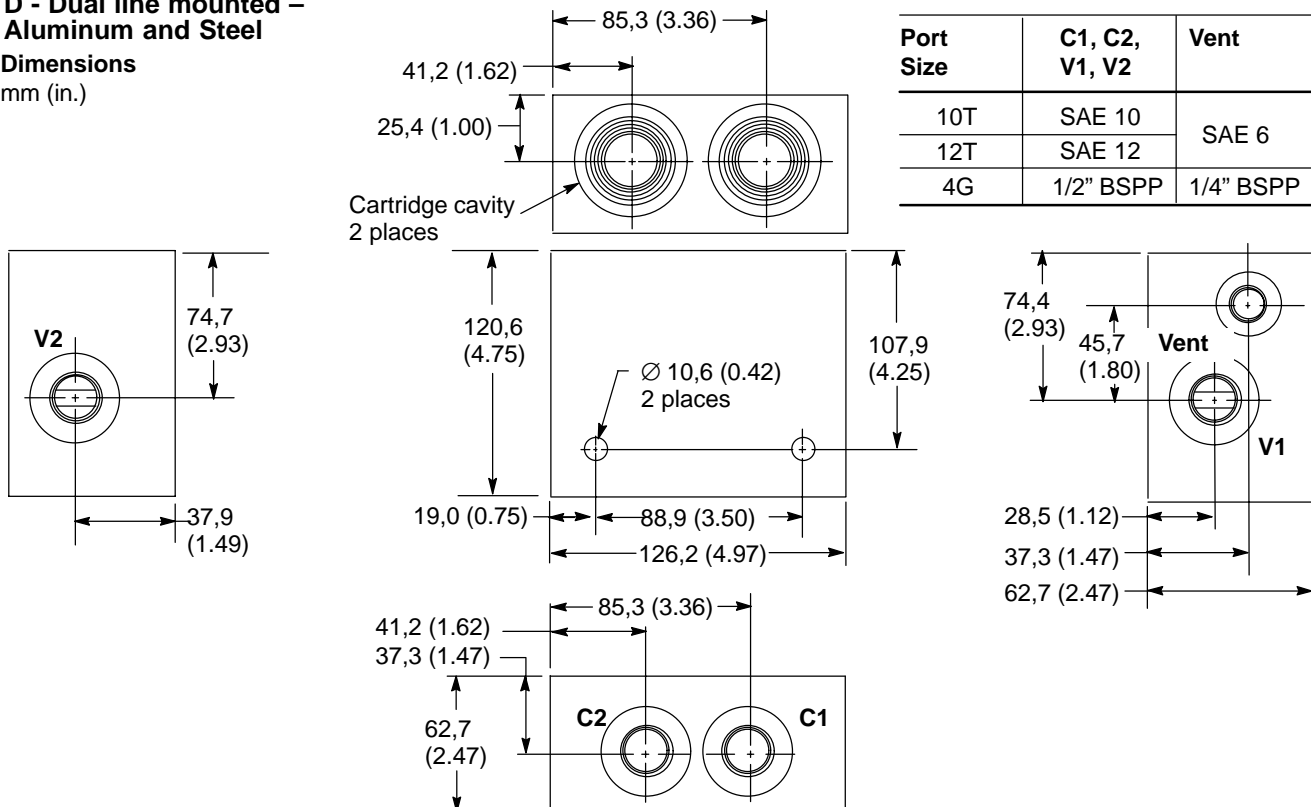
See page 45 for housing part numbers

D - Dual line mounted – Aluminum and Steel

Dimensions

mm (in.)

Port Size	C1, C2, V1, V2	Vent
10T	SAE 10	SAE 6
12T	SAE 12	
4G	1/2" BSPP	1/4" BSPP



Valve housings

CBV1/2, POC1

Housing type	Port size	Size 10 Aluminum light duty	Size 10 Aluminum	Size 10 Steel	Size 12 Aluminum	Size 12 Steel
I Inline Mounted	3B (3/8" BSPP)	02-175470	_____	_____	_____	_____
	6H (SAE 6)	_____	876706	_____	_____	_____
	8H (SAE 8)	_____	876712	_____	_____	_____
	6T (SAE 6)	566413	_____	02-171961	_____	_____
	8T (SAE 8)	_____	_____	02-163322	_____	_____
	10T (SAE 10)	_____	_____	02-163323	02-178268	02-160996
	12T (SAE 12)	_____	_____	_____	02-178269	02-160997
	2G (1/4" BSPP)	_____	876707	_____	_____	_____
	3G (3/8" BSPP)	_____	876710	02-163313	_____	_____
	4G (1/2" BSPP)	_____	_____	02-163324	02-178270	02-160994
	6G (3/4" BSPP)	_____	_____	_____	02-178271	02-160995
B 4-Bolt Pad	4T (SAE 4)	_____	_____	_____	02-160801	02-160800
N Close Coupled, Nipple Mounted	6H (SAE 6)	_____	02-160853	_____	_____	_____
	6T (SAE 6)	_____	_____	02-160851	_____	_____
	8T (SAE 8)	_____	_____	_____	02-160820	02-160818
	3G (3/8" BSPP)	_____	02-172324	02-172323	_____	_____
	4G (1/2" BSPP)	_____	_____	_____	02-160821	02-160819
G Gasket Mounted, Single	6H (SAE 6)	_____	02-160845	_____	_____	_____
	6T (SAE 6)	_____	_____	02-160847	_____	_____
	8T (SAE 8)	_____	_____	_____	02-160824	02-160822
	3G (3/8" BSPP)	_____	02-160844	02-160848	_____	_____
	4G (1/2" BSPP)	_____	_____	_____	02-160825	02-160823
D Dual Line Mounted	6H (SAE 6)	_____	02-160829	_____	_____	_____
	8H (SAE 8)	_____	02-160830	_____	_____	_____
	10H (SAE 10)	_____	02-160831	_____	_____	_____
	6T (SAE 6)	_____	_____	02-160838	_____	_____
	8T (SAE 8)	_____	_____	02-160839	_____	_____
	10T (SAE 10)	_____	_____	02-160840	02-160811	02-160808
	12T (SAE 10)	_____	_____	_____	02-160812	02-160809
	2G (1/4" BSPP)	_____	02-171912	02-160841	_____	_____
	3G (3/8" BSPP)	_____	02-160833	02-160842	_____	_____
	4G (1/2" BSPP)	_____	02-160834	02-160843	02-160813	02-160810
P Dual Gasket Mounted	6H (SAE 6)	_____	02-160876	_____	_____	_____
	6T (SAE 6)	_____	_____	02-160873	_____	_____
	8T (SAE 8)	_____	_____	_____	02-160816	02-160814
	3G (3/8" BSPP)	_____	02-160877	02-160874	_____	_____
	4G (1/2" BSPP)	_____	_____	_____	02-160817	02-160815
M Dual Counterbalance Line Mounted w/Integral Shuttle Valve	6H (SAE 6)	_____	02-160857	_____	_____	_____
	8H (SAE 8)	_____	02-160858	_____	_____	_____
	10H (SAE 10)	_____	02-160859	_____	_____	_____
	6T (SAE 6)	_____	_____	02-160866	_____	_____
	8T (SAE 8)	_____	_____	02-160867	_____	_____
	10T (SAE 10)	_____	_____	02-160868	02-160805	02-160802
	12T (SAE 10)	_____	_____	_____	02-160806	02-160803
	2G (1/4" BSPP)	_____	02-160860	02-160869	_____	_____
	3G (3/8" BSPP)	_____	02-160861	02-160870	_____	_____
	4G (1/2" BSPP)	_____	02-160862	02-160871	02-160807	02-160804

Valve housings

CBV7/8/9

Housing type	Port size	Size 10 Aluminum	Size 10 Steel	Housing type	Port size	Size 10 Aluminum	Size 12 Steel
I Inline Mounted	4T (SAE 4)	02-184740	02-184747	D Dual Line Mounted	6T (SAE 6)	02-184754	02-184760
	6T (SAE 6)	02-184741	02-184748		8T (SAE 8)	02-184755	02-184761
	8T (SAE 8)	02-184742	02-184749		10T (SAE 10)	02-184756	02-184762
	10T (SAE 10)	02-184743	02-184750		12T (SAE 12)	_____	_____
	12T (SAE 12)	_____	_____		16T (SAE 16)	_____	_____
	16T (SAE 16)	_____	_____		20T (SAE 20)	_____	_____
	20T (SAE 20)	_____	_____		2B (1/4" BSPP)	02-184757	_____
	2B (1/4" BSPP)	02-184744	_____		3B (3/8" BSPP)	02-184758	_____
	3B (3/8" BSPP)	02-184745	_____		4B (1/2" BSPP)	02-184759	_____
	4B (1/2" BSPP)	02-184746	_____		6B (3/4" BSPP)	_____	_____
	6B (3/4" BSPP)	_____	_____		8B (1" BSPP)	_____	_____
	8B (1" BSPP)	_____	_____		12B (1 1/4" BSPP)	_____	_____
	12B (1 1/4" BSPP)	_____	02-184751		2G (1/4" BSPP)	_____	02-184763
	2G (1/4" BSPP)	_____	02-184752		3G (3/8" BSPP)	_____	02-184764
	3G (3/8" BSPP)	_____	02-184753		4G (1/2" BSPP)	_____	02-184765
	4G (1/2" BSPP)	_____	_____		6G (3/4" BSPP)	_____	_____
6G (3/4" BSPP)	_____	_____	8G (1" BSPP)	_____	_____		
8G (1" BSPP)	_____	_____	12G (1 1/4" BSPP)	_____	_____		
12G (1 1/4" BSPP)	_____	_____	_____	_____	_____		

VCB1

Housing type	Port size	Size 10 Aluminum light duty	Size 10 Aluminum	Size 10 Steel	Size 12 Aluminum	Size 12 Steel		
I Inline Mounted	6H (SAE 6)	_____	876708	_____	_____	_____		
	8H (SAE 8)		⌘02-178190					
	10H (SAE 10)		⌘01-178192					
	6T (SAE 6)	566160	_____	⌘02-178191	_____	_____		
	8T (SAE 8)	_____		⌘02-178193			02-178739	02-178732
	10T (SAE 10)	_____		_____			⌘02-178740	⌘02-178733
	12T (SAE 12)	_____		_____			_____	_____
	2G (1/4" BSPP)	_____	876709	_____	_____	_____		
	3G (3/8" BSPP)	_____	⌘02-178194	⌘02-178195	_____	_____		
	4G (1/2" BSPP)	_____	_____	_____	⌘02-178741	⌘02-178734		
G Gasket Mounted, Single	6H (SAE 6)	_____	02-160986	_____	_____	_____		
	8H (SAE 8)		02-160987	_____	_____	_____		
	6T (SAE 6)		_____	02-178166	_____	_____		
	8T (SAE 8)		_____	02-178167	02-178905	02-178904		
	3G (3/8" BSPP)		_____	02-160989	02-178169	_____	_____	
	4G (1/2" BSPP)		_____	_____	_____	02-178903	02-178906	
D Dual Line Mounted	6H (SAE 6)	_____	02-160990	_____	_____	_____		
	8H (SAE 8)	_____	02-160991	_____	_____	_____		
	6T (SAE 6)	_____	_____	02-178170	_____	_____		
	8T (SAE 8)	_____	_____	02-178171	_____	_____		
	10T (SAE 10)	_____	_____	⌘02-178193	02-178915	02-178916		
	12T (SAE 12)	_____	_____	_____	⌘02-178917	⌘02-178918		
	3G (3/8" BSPP)	_____	02-160993	02-178173	_____	_____		
	4G (1/2" BSPP)	_____	_____	_____	⌘02-178919	⌘02-178920		

⌘ Housings with slot

Valve Housings - Weights / Kits

Weight (ca.) for CBV, POC and VCB Valve housings

Housing	Aluminum, Standard CVB/POC		Aluminum, Standard VCB		Aluminum, Light duty Size 10	Steel CVB/POC		Steel VCB	
	Size 10	Size 12	Size 10	Size 12		Size 10	Size 12	Size 10	Size 12
I	0,75 (1.65)	0,82 (1.80)	0,85 (1.87)	0,95 (2.09)	0,23 (0.51)	1,08 (2.40)	2,63 (5.40)	1,23 (2.71)	3,05 (6.72)
B	–	0,86 (1.90)	–	–	–	–	2,61 (5.75)	–	–
N	0,49 (1.10)	0,91 (2.00)	–	–	–	1,49 (3.30)	2,72 (6.00)	–	–
G	0,67 (1.85)	0,73 (1.60)	0,85 (1.87)	0,95 (2.09)	–	2,49 (5.50)	2,15 (4.75)	1,23 (2.71)	3,05 (6.72)
D	0,79 (1.75)	1,11 (2.45)	1,60 (3.52)	1,10 (2.42)	–	2,38 (5.25)	3,33 (7.35)	2,55 (5.62)	3,70 (8.15)
P	0,72 (1.60)	2,0 (4.40)	–	–	–	2,17 (4.80)	5,90 (10.00)	–	–

Seal kits

Cartridge seal kits, comprising external seals and back-up rings are available for servicing these units. Please refer to the individual model sheets for the appropriate seal kits.

CBV & VCB Adjustment Kits

Type	Part number	
	Size10	Size12
S– (Nut)	02–163513	02–170161
C–(Cap over screw)	02–163514	02–170163
K–(Hand knob)	02–170164	02–170164

MCV Adjustment Kits

Description	Part number
S (Nut)	565558
K (Hand knob)	
Knob	565586
Jam nut	02-162137
Set screw	02-170637
	000805

MCV Parts

Model Code	Check valve	Qty.	Relief Valve	Qty.	Spool	Qty.
MCV1-16	CVI-16-P-0-5	1	RV3-16-S-0-35/	1	889052	1
MCV4-16	CVI-16-P-O-5	4	RV3-16-S-0-35/	2		2
MCV1-20	CV2-20-P-O-5	1	RV3-16-S-0-35/	1		1
MCV2-20	CV2-20-P-0-5	2	RV3-16-S-0-35/	2		2

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Model Code	Description	Page
C-10/12-3S	Standard cavity dimensions	29
C10/12*-4(U)	Standard cavity dimensions	30
CBV1/2-10	Counterbalance valve	6
CBV1/2-12	Counterbalance valve	10
CBV7/8/9-10	Counterbalance valve	8
CBV7/8/9-10 Housing dimensions	I - Inline body - Aluminum & Steel / D - Dual line mounted - Aluminum & Steel	31
CBV1/2-10 & POC1-10 Housing dimensions	I - Inline body - Aluminum NFPA fatigue rated / I - Inline body - Steel	32
CBV1/2-10 and POC1-10 Housing dimensions	I - Inline body-Aluminum-light duty / N - Close coupled nipple mounted-Aluminum & Steel	33
	G - Gasket mounted, single-Aluminum & Steel / D - Dual line mounted-Aluminum & Steel	34
	P - Dual gasket mounted - Aluminum and Steel Dual Counterbalance Line Mounted with Integral Shuttle-Counterbalance Only	35
CBV1/2-12 & POC1-12 Housing dimensions	I - Inline body - Aluminum & Steel / B - 3/4" SAE 4-Bolt mounted - Aluminum & Steel	36
	N - Close coupled nipple mounted-Aluminum & Steel / G - Gasket mounted, single-Aluminum & Steel	37
	D - Dual line mounted - Aluminum & Steel / P - Dual gasket mounted	38
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POC1-12	Pilot-to-Open Check Valve	18
VCB1-10	Vented counterbalance valve	12
VCB1-12	Vented counterbalance valve	14

Supporting Products

Roughing Tools

Roughers are basically step drills which leave .030" per cutting diameter and .015" above all radii for the finishing reamer, with an additional .015" depth in the cavity bottom as clearance. The roughing tool is necessary to prepare the cavity for the finishing reamer, which has not been designed for the primary forming or bottom cutting.

We offer two types of roughers, one for aluminum and one for steel. The aluminum rougher is manufactured with a 4 facet point and polished flutes. The steel rougher is supplied with a standard drill point. Both types will work in either material, however, longevity of an aluminum tool will be sacrificed when used continually in steel.

Cavity	Material	Model Code	Assembly Number	Cavity	Material	Model Code	Assembly Number
3-Way- short				4-Way			
C-10-3S	Aluminum	RT-10-3S-A-8099	565824	C-10-4	Aluminum	RT-10-4-A-8072	889513
C-10-3S	Steel	RT-10-3S-S-8209	566703	C-10-4	Steel	RT-10-4-S-8073	889514
CMM-10-3	Aluminum/Steel	S-103D50-8331	02-181389	C-12-4	Aluminum/Steel	RT-12-4-AS-8313	02-176377
C-12-3S	Aluminum/Steel	RT-12-3S-AS-8220	02-113178	An additional operation is required to form the undercut cavity or make a slot for C-10-4 and C-12-4. Please consult the factory.			

Finishing Tools

These finishing tools have been designed as precision reamers for finishing operations only. They are not intended for primary forming or bottom cutting operations. Vickers recommends that a finishing tool only be used in a properly roughed hole. Failure to conform to this practice will produce unsatisfactory size and finishes and possibly break the tool.

Cavity	Material	Model Code	Assembly Number	Cavity	Material	Model Code	Assembly Number
3-Way - short				4-Way			
C-10-3S	Aluminum/Steel	FT-10-3S-AS-8210	566708	C-10-4	Aluminum/Steel	FT-10-4-AS-8052	565838
CMM-10-3	Aluminum/Steel	S-103D50-8329	02-181388	C-12-4	Aluminum/Steel	FT-12-4-AS-8312	02-175596
C-12-3S	Aluminum/Steel	FT-12-3S-AS-8242	02-162998	An additional operation is required to form the undercut cavity or make a slot for C-10-4 and C-12-4. Please consult the factory.			

Application Data

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561 "Vickers Guide to Systemic Contamination Control" available from your local Vickers distributor or by contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.