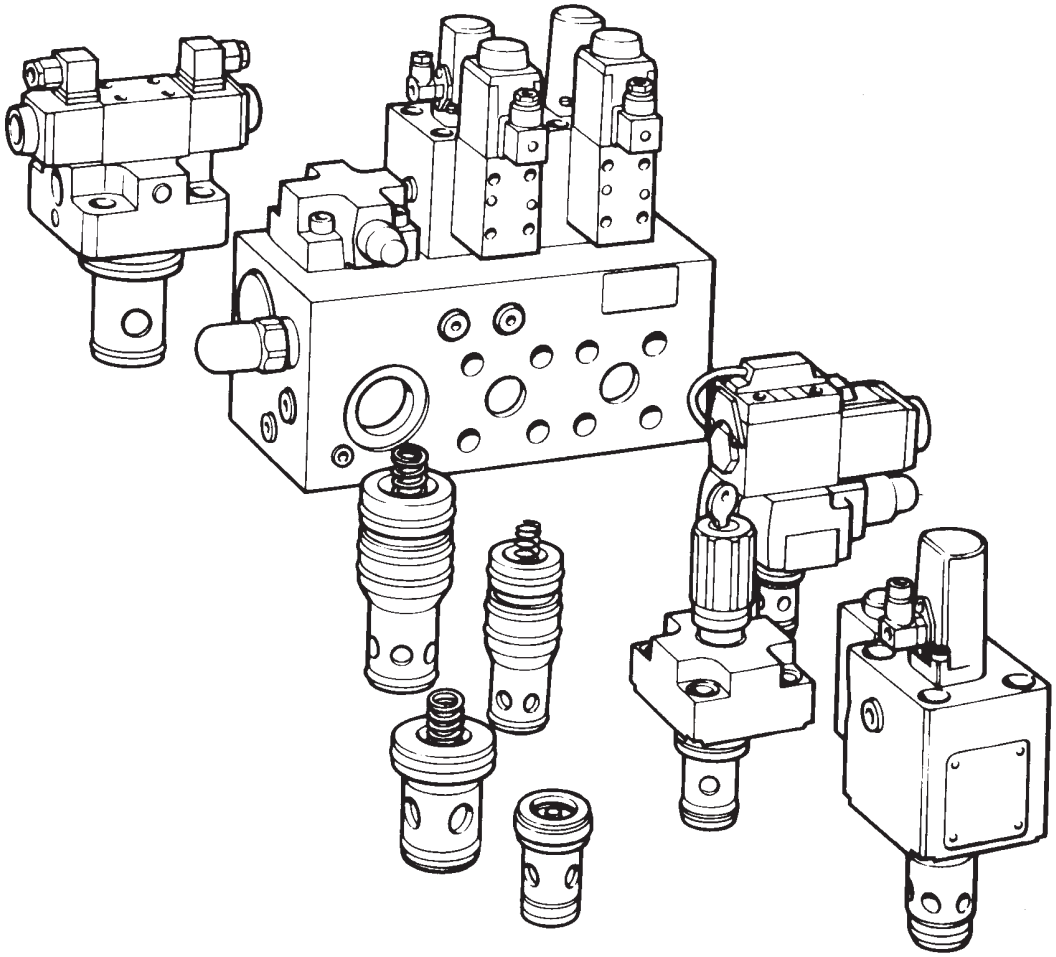
Vickers®

Cartridge Valves

Slip-in Cartridge Valves

to ISO 7368 (DIN 24342)



VICKERS

5043.00/EN/0499/A

Vickers range of cartridge valves includes five operating area ratios:

- 1:2 area ratio, where A_{AP} is 2 x the A-port area, and ports A and B areas are equal. This valve is used primarily for directional control.
- 1:1.6 area ratio, where A_{AP} is 1.6 x the A-port area. This valve is used primarily for directional control.
- 1:1.05 area ratio, where A_{AP} is 1.05 x A-port area. This valve is used for directional control or pressure control.
- 1:1.1 area ratio, where A_{AP} is 1.1 x A-port area. This valve is used for directional control or pressure control.
- 1:1 area ratio, where A_{AP} equals the A-port area and the B-port area is zero. This valve is used for pressure control.

Figure 5 shows area ratio relationships, associated hydraulic symbols, and related model codes. The 1:1.1 area ratio is not shown, but is similar to the 1:1.6

The reducer insert, Figure 6, differs from other inserts in that it has a spool type valving mechanism, rather than poppet type, and has an integral check valve to relieve surge pressures in the reduced pressure A (load) port. The reducer insert is normally closed, i.e. the spool tends to widen the hole opening in the sleeve with increased load pressure at port A. Flow is always from port B to port A.

Unlike most reducing valves, pilot pressure is obtained from high-pressure port B rather than from reduced-pressure port A, thus providing significantly more flow capacity.

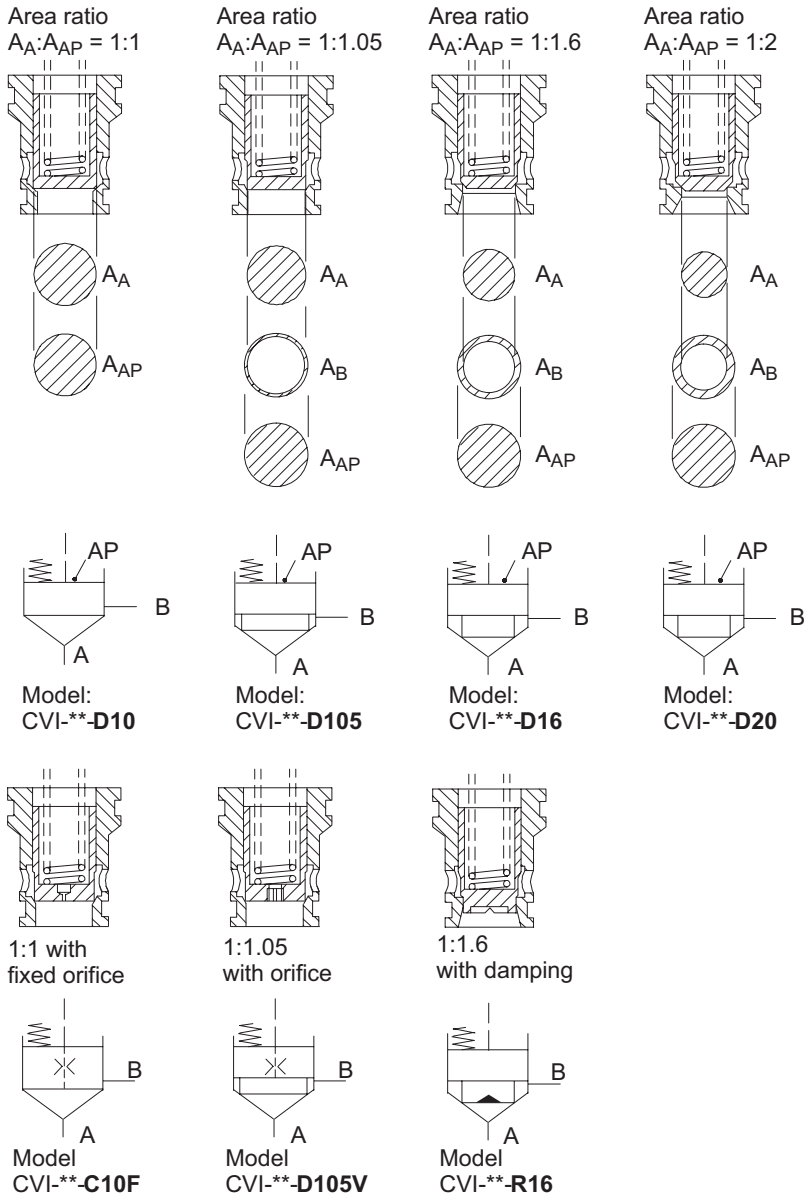


Figure 5

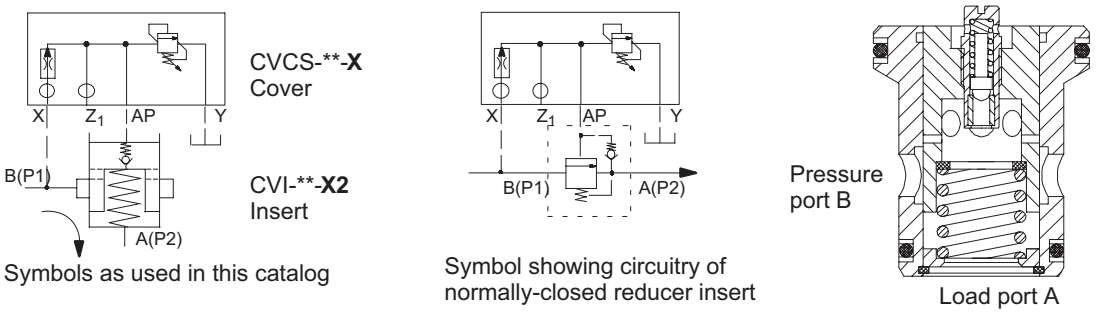
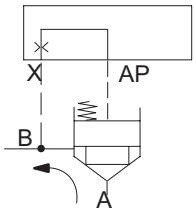


Figure 6

Check Valve Functions

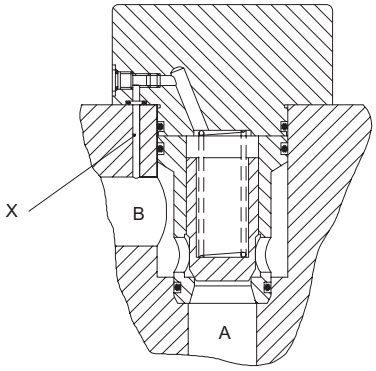
Basic Check Valve: Sizes 16 to 63
The standard directional cover (model code letter N), contains a pilot pressure passage with an orifice to control the poppet's opening and closing rate.

When used with insert model D16 (1:1.6 area ratio poppet), or model D20 (1:2 area ratio poppet), the combined cover and insert, Figure 8, becomes a check valve. Port X in the cover is connected to port B in the insert. This allows free flow from insert port A to port B while blocking flow from B to A.



CVC(S)-**-**N**
Cover

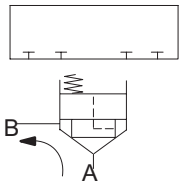
CVI-**-**D16**, or
CVI-**-**D20**
Insert



Basic poppet
A_A:A_{AP} = 1:1.6 or
A_A:A_{AP} = 1:2

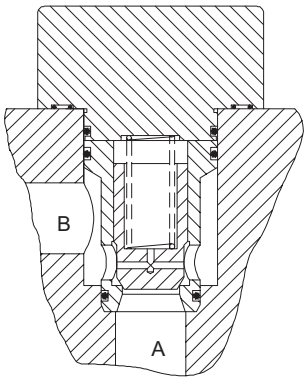
Figure 8

Direct Acting Check: Sizes 16 to 40
The type DC16 insert is used with the type B cover to provide a direct check function, Figure 9. The free flow direction is A to B. Flow in the opposite direction (B to A) is prevented by connecting port B to the full poppet area A_{AP}, via drilled holes on the poppet, whereby any pressure at port B assists the spring in holding the poppet hard on to its seat.



CVCS-**-**B**
Cover

CVI-**-**DC16**
Insert

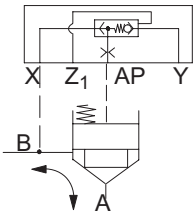


Basic poppet
A_A:A_{AP} = 1:1.6

Figure 9

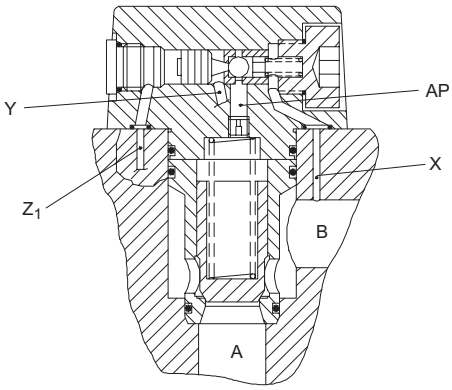
Pilot Operated Check Valve (Pilot Open): Sizes 16 to 40
A model PC cover can be combined with a model D16 insert to form a pilot operated check valve (Figure 10). Pilot pressure at Z_1 vents spring chamber AP to Y, permitting flow from B to A. Flow from A to B is independent of pilot pressure.

With port B connected to the system load, pilot pressure at Z_1 must be at least 30% of load pressure, the latter including any intensification that may occur such as when controlling double-acting cylinders. Port Y is normally connected to a drain line.



CVCS-**-**PC**
Cover

CVI-**-**D16**
Insert



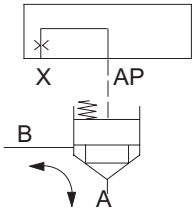
Basic poppet
A_A:A_{AP} = 1:1.6

Figure 10

Directional Valve Functions

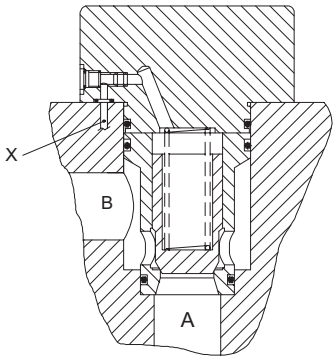
2-Way, 2-Position Function: Sizes 16 to 40

Using a model N cover with a D16 insert, Figure 11, can provide directional control of flow from insert port A to B or from B to A. Pressurizing port X from a remote source will block flow from insert port A and B. With X connected to B, system flow is from A to B. Flow will be from B to A if X is connected to tank or A.



CVCS-**-**N**
Cover

CVI-**-**D16**
Insert



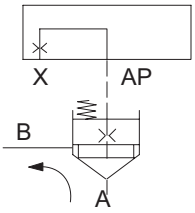
Area ratio
$A_A:A_{AP}$ = 1:1.6

Figure 11

2-Way, 2-Position Function (With Internal Pilot): Sizes 16 to 40

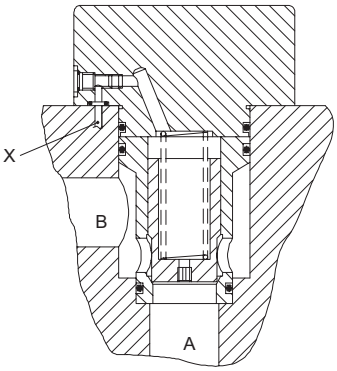
A model N cover is used with a D105 insert (1:1.05 area ratio) which can be supplied with an orifice in the poppet. See Figure 12. This configuration is used to open A to B or block A to B. *D105 poppets cannot be used for flow from B to A.*

The orifice avoids the need to machine a connecting hole in the manifold to port A. To obtain a D105 insert with an orifice in the poppet (i.e. D105V), the orifice size must be specified at the end of the insert model number.



CVCS-**-**N**
Cover

CVI-**-**D105V**
Insert



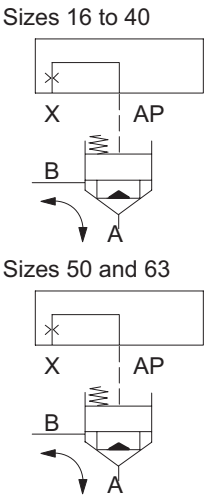
Area ratio
$A_A:A_{AP}$ = 1:1.05

Figure 12

Damping Function: Sizes 16 to 63
Sizes 16 to 40:
Damping can be achieved with a model R16 insert (area ratio 1:1.6), see Figure 13. The poppet has a skirt with a damping notch which helps smooth shifting (reduces gain) of the poppet.

R16 inserts may be used with any check or directional function where a D16 insert is ordinarily used.

Sizes 50 and 63:
As above but using a model R insert (area ratio 1:2). Use the R also for any check or directional function where a D20 insert is ordinarily used.

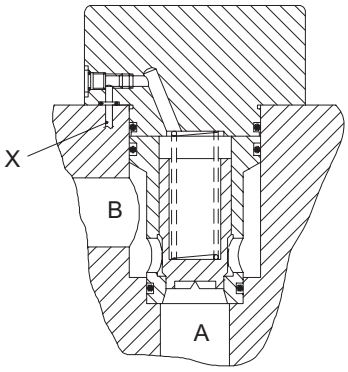


CVCS-**-**N**
Cover

CVI-**-**R16**
Insert

CVC(S)-**-**N**
Cover

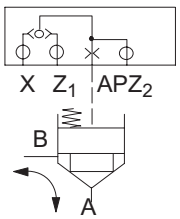
CVI-**-**R**
Insert



Area ratio
Sizes 16 to 40: A_A:A_{AP} = 1:1.6
Sizes 50 and 63: A_A:A_{AP} = 1:2

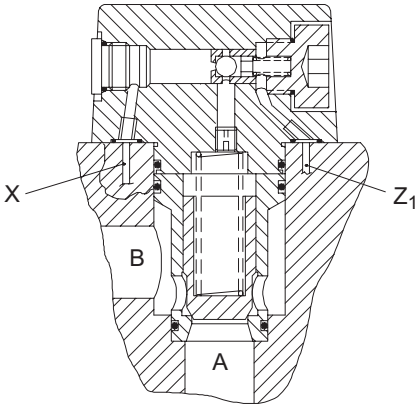
Figure 13

Pilot Shuttle Control: Sizes 16 to 40
The shuttle function is obtained with a model W cover and D16 insert (Figure 14). The shuttle directs the higher of the pressures at the X and Z_1 ports to the spring area (AP) of the insert poppet to close it. The Z_2 port can be used as a convenience to operate another cartridge simultaneously.



CVCS-**-**W**
Cover

CVI-**-**D16**
Insert



Area ratio
A_A:A_{AP} = 1:1.6

Figure 14

Pilot Operated Directional Valves

Sizes 16 to 40

Covers are available with mounting interfaces for pilot valves. These pilots are typically the DG4V-3(S) solenoid operated directional valve that mounts to the ISO 4401, size 03 (ANSI/B93.7M-D03) interface. Manually operated DG17V-3, pilot operated DG3V-3, or air operated DG18V-3 pilots are also applicable. The Vickers soft shift pilot valves DG4V-3S-****2** (catalog 614 can also be used to achieve smooth opening and closing.

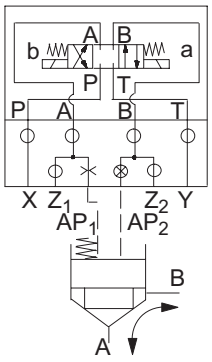
The model identification for size 03 pilot valve interface options is:
D1 for North American formats, i.e. UNC/UNF threads
D3 for European formats, i.e. metric threads

Single or dual solenoid pilots are applicable (Figure 15), depending on circuit requirements. The spool center condition of the solenoid pilots also depends on the circuit function desired.

Ports Z_1 and Z_2 are for remote control of additional cartridges.That is, for D1/D3 covers, Z_1 is connected to pilot port A. The X port is the pilot pressure port. The Y port should always go directly to the reservoir.

The insert used can be either the model D16 (1:1.6 area ratio poppet), or model D20 (1:2 area ratio poppet).

Dual Solenoid Control: Sizes 16 to 40
3-position, spring centered pilot valve



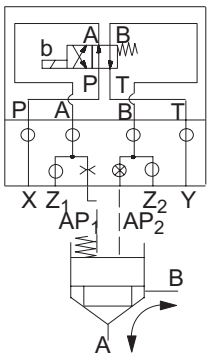
DG4V-3(S)-***C**
Pilot valve

CVCS-****-D1/D3**
Cover

CVI-****-D16** or
CVI-****-D20**
Insert

Note that the circuitry (i.e. flow path and orifice locations) of these 16 to 40 sizes is different from that of sizes 50 and 63 shown on the next page.

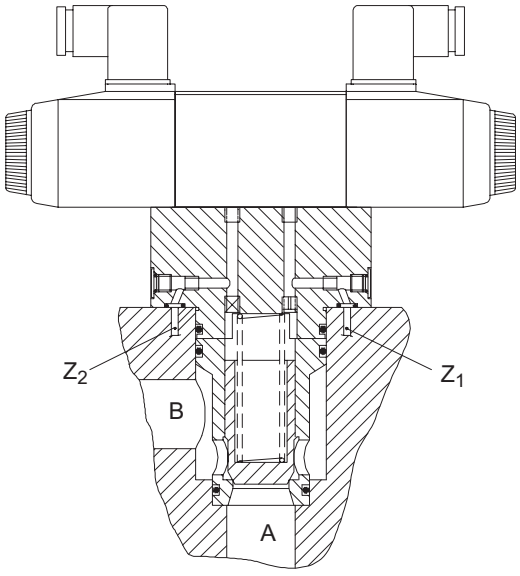
Single Solenoid Control: Sizes 16 to 40
2-position, spring offset pilot valve



DG4V-3(S)-***A**
Pilot valve

CVCS-****-D1/D3**
Cover

CVI-****-D16** or
CVI-****-D20**
Insert



DG4V-3(S)-**C**
Pilot valve
(Dual solenoid)

CVCS-****-D1/D3**
Cover

CVI-****-D16** or
CVI-****-D20**
Insert

Area ratio
$A_A:A_{AP}$ = 1:1.6 or
$A_A:A_{AP}$ = 1:2

Figure 15

Model Codes - Check, Directional and Flow Restrictor Functions - Sizes 16 to 63

CVI Inserts

For availability of inserts by size and function see page 5. All features must be specified when ordering; those in brackets ( ) are optional.

(F3-) CVI - ** - ** - * - ** (-**)**

1 2 3 4 5 6 7

1 Seal Material

F3 - Special seals. See "Fluids and Seals" on page 16.
Omit for standard seals.

2 Model

CVI - Cartridge valve insert

3 Nominal size to ISO 7368 (DIN 24342)

16 - 06 (NG16)
25 - 08 (NG25)
32 - 09 (NG32)
40 - 10 (NG40)
50 - 11 (NG50)
63 - 12 (NG63)

4 Function

Sizes 16 to 40

D10 - 1:1 ratio
D105 - 1:1.05 ratio
D105V- 1:1.05 ratio with variable orifice plug
D16 - 1:1.6 ratio
D20 - 1:2 ratio
DC16 - 1:1.6 ratio direct check
R16 - 1:1.6 ratio with damping

Sizes 50 and 63

D11 -1:1.1 ratio
D20- 1:2 ratio
F - 1:2 ratio, flow restrictor
R - 1:2 ratio with damping

5 Cracking pressure, bar (psi)

For flow direction A to B
Sizes 16 to 40

Spring code	Insert code D10	D105(V)
L	0,31 (4.5)	0,33 (4.8)
M	1,55 (22.5)	1,65 (24)
H	3,1 (45)	3,3 (48)

Spring code	Insert code D16, D20 DC16	R16
L	0,5 (7.3)	0,6 (8.7)
M	2,5 (36.3)	3,0 (43.5)
H	5,0 (73)	6,0 (87)

Sizes 50 and 63

Spring code	Insert code D11	D20, F, R
L	0,31 (4)	0,5 (7.3)
M	1,4 (20)	2,5 (36.3)
H	2,7 (39)	5,0 (73)

6 Design number, 1* & 4* series

Subject to change. Installation dimensions unchanged for design numbers 10 to 19 and 40 to 49 inclusive. Tables show availability by current design number according to function and size.

Sizes 16 to 40

D10	40 design
D105	40 design
D105V	40 design
D16	40 design
D20	10 design
DC16	40 design
R16	40 design

Sizes 50 and 63

D11	10 design
D20	10 design
F	10 design
R	10 design

7 Orifice size

Specify non-standard orifice size code, see tables on page 125.

See page 124 for sizes of standard orifices factory-fitted to function type D105V. Other orifice sizes can be fitted by special arrangement with your Vickers representative.

Note: A nameplate is supplied with each insert for fixing to the cover to identify the insert in use.