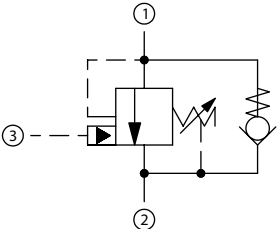
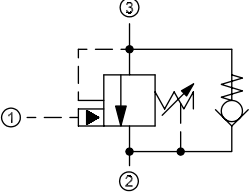


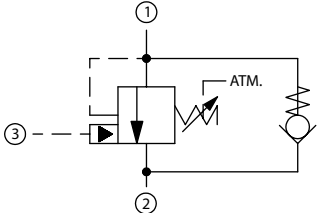
Cartridge Valves Technical Information

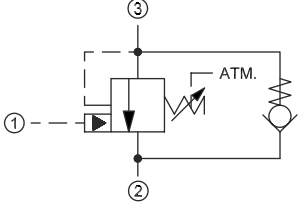
Counterbalance valves

Quick reference

Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	CP448-1	CP08-3L	Counterbalance valve	20 l/min [5 US gal/min]	350 bar [5000 psi]	09.6
	CB10 HV	SDC10-3S		60 l/min [16 US gal/min]	350 bar [5000 psi]	09.7
	CP441-1	CP12-3S		115 l/min [30 US gal/min]	350 bar [5000 psi]	09.8
	CP443-1	CP20-3S		190 l/min [50 US gal/min]	350 bar [5000 psi]	09.9

Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	VCB 12-EN	NCS12/3	Counterbalance valve	140 l/min [37 US gal/min]	350 bar [5000 psi]	09.10

Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	CB10 AV	SDC10-3S	Counterbalance valve, atmospheric vent	60 l/min [16 US gal/min]	350 bar [5000 psi]	09.11

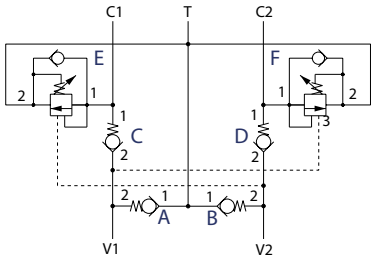
Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	VCB 12-CN	NCS12/3	Counterbalance valve	140 l/min [37 US gal/min]	350 bar [5000 psi]	09.12

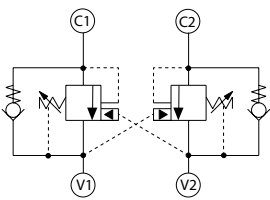
* Flow ratings are based on a pressure drop of 7 bar [100 psi] unless otherwise noted. They are for comparison purposes only.

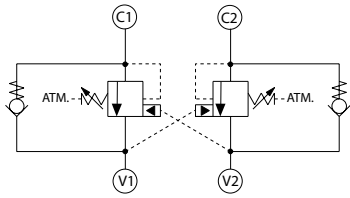
Cartridge Valves Technical Information

Counterbalance valves

Quick reference

Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	1EEC11	none	Dual counterbalance valve w/ make up checks	57 l/min [15 US gal/min]	345 bar [5000 psi]	09.13

Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	CP448-2	none	Dual counterbalance valve	20 l/min [5 US gal/min]	350 bar [5000 psi]	09.14
	DCB10-HV	None		60 l/min [16 US gal/min]	350 bar [5075 psi]	09.15
	CP441-2	none		115 l/min [30 US gal/min]	350 bar [5000 psi]	09.16

Symbol	Model No.	Cavity	Description	Flow*	Pressure	Page
	DCB10-AV	None	Dual counterbalance valve	60 l/min [16 US gal/min]	350 bar [5075 psi]	09.17

* Flow ratings are based on a pressure drop of 7 bar [100 psi] unless otherwise noted. They are for comparison purposes only.



Cartridge Valves Technical Information

Counterbalance valves

Application notes

MOTION CONTROL VALVES

Motion control valves, also referred to as load holding valves, are used to control the motion of a load in the following ways:

- Prevent a load from dropping in case of hose or tube failure.
- Prevent a load from drifting caused by directional control valve spool leakage.
- Provide smooth, modulated motion when the load is in a lowering or run-away mode.
- Provide smooth, modulated motion when the directional control valve is suddenly closed.

There are two basic types of motion control valves:

- Pilot-operated, or pilot-to-open check valves will satisfy the first two of the above requirements.
- Counterbalance valves will satisfy all four of the above requirements.

Counterbalance valves



F102 005

COUNTERBALANCE VALVES

A counterbalance valve provides several functions:

- Free flow in one direction.
- Leak-free load holding.
- Protection against hydraulic line failure.
- Protection against pressure shocks caused by external forces or overrunning loads
- Cavitation-free motion control to match speed to pump flow when a load could cause loss of control of an actuator (cylinder or motor).
- Smooth, modulated motion control when the directional valve is suddenly closed.

Cartridge Valves Technical Information

Counterbalance valves

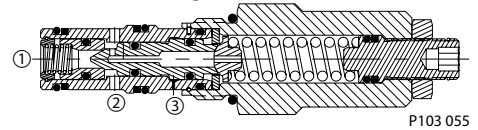
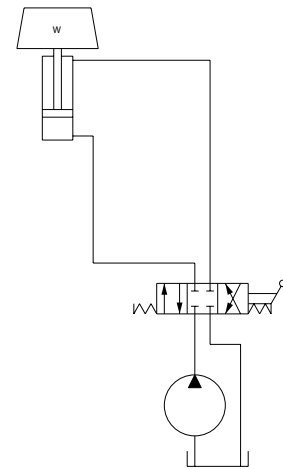
Application notes

COUNTERBALANCE VALVES
(continued)

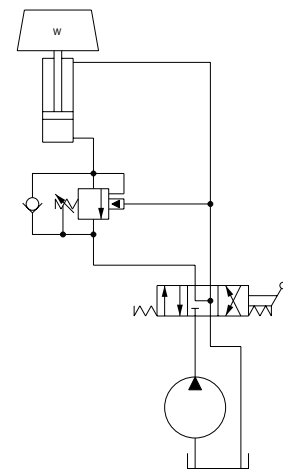
Counterbalance valves will positively hold a pressurized load and will control the motion of the load based on application of a pressure signal to the pilot port. Counterbalance valves are available as individual cartridges or standard cartridge-in-body (CIB) packages.

A typical circuit application for a counterbalance valve contains a pump, directional control valve, and an actuator. Without a counterbalance valve the load will drift down due to spool leakage if the directional control valve is centered with the load raised. Additionally there is no protection against the load dropping in the event of hydraulic line failure.

Adding a counterbalance valve controls motion and provides protection against hose or tube failure. In this circuit, moving the directional control valve to the left causes the cylinder to extend, raising the load with free flow going through the check valve portion of the counterbalance valve. When the directional control valve is centered, the counterbalance valve will prevent leakage and lock the load in position. Moving the directional control valve to the right sends flow/pressure to the rod end of the cylinder. This pressure also acts to pilot open the counterbalance valve and allows the load to be lowered. Should the load cause the cylinder to run away from the pump, pilot pressure to the counterbalance valve will decrease and the counterbalance valve will modulate to match the cylinder speed to the pump flow.

Individual cartridge counterbalance valve*Circuit without a counterbalance valve*

P103 121

Circuit with a counterbalance valve

P103 122

Cartridge Valves Technical Information

Counterbalance valves

Application notes

**COUNTERBALANCE
VALVES
(continued)**

The pressure required to pilot open the counterbalance valve can be calculated as follows:

$$P = \frac{(P_s \cdot A_b) - W}{(A_b \cdot R) + A_r} \text{ (load retracts cylinder)}$$

$$P = \frac{(P_s \cdot A_r) - W}{(A_r \cdot R) + A_b} \text{ (load extends cylinder)}$$

W = Load

P_s = Counterbalance valve relief setting; see below for more information

A_b = Cylinder bore area

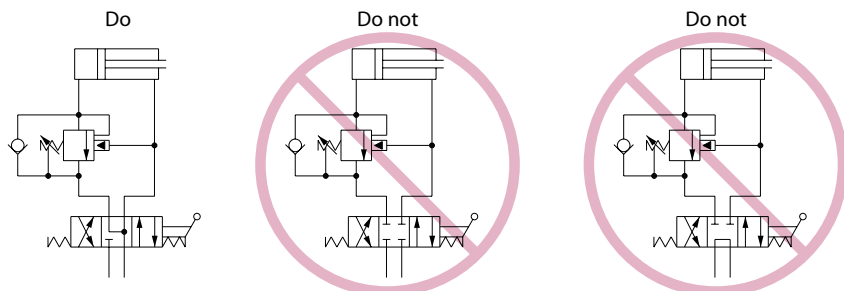
A_r = Cylinder rod area

R = Counterbalance valve pilot ratio; see below for more information

Note that these equations are idealized and do not consider any backpressure in the circuit, which is additive to the pressure required to pilot open the check valve.

Some additional guidelines for counterbalance valve applications:

- Specify the counterbalance valve relief setting high enough to stop any motion (flow) at the maximum expected actuator pressure. Generally it is recommended to use a setting of 1.3 multiplied by the maximum load pressure.
- Use low pilot ratios (3:1 and 4.5:1) for applications where loads may vary widely. Low pilot ratios require higher pilot pressure and are less efficient but provide stable, precise control for varying loads.
- Use high pilot ratios (8:1 and 10:1) for applications where loads are relatively constant. High pilot ratio valves require lower pilot pressure, have faster response, and are more efficient, but lack stability and precision in response to varying loads.
- Do not oversize counterbalance valves. There is no pressure drop operating limit for counterbalance valves and in fact some pressure drop is required to maintain valve operation.
- Locate counterbalance valves at or near the actuator to provide maximum load holding protection in the event of hydraulic line failure.
- Do not use counterbalance valves with closed-center directional control valves. Pressure trapped between the directional control valve and the actuator can pilot the counterbalance valve open and result in undesired load motion.
- Do not use counterbalance valves with tandem-center directional control valves. Backpressure in the system can prevent the counterbalance valve from opening.





Cartridge Valves Technical Information

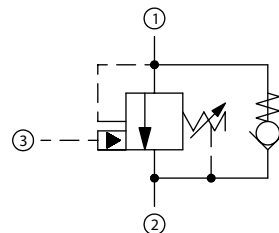
Counterbalance valves

CP448-1

OPERATION

This is a pilot-operated counterbalance valve.

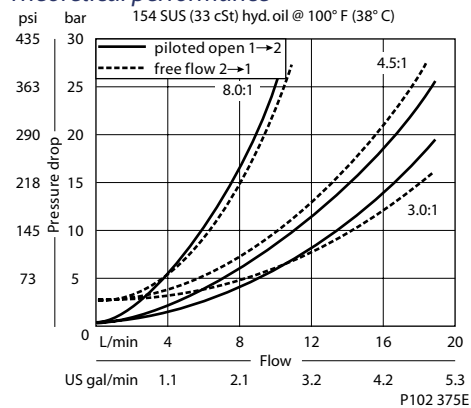
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



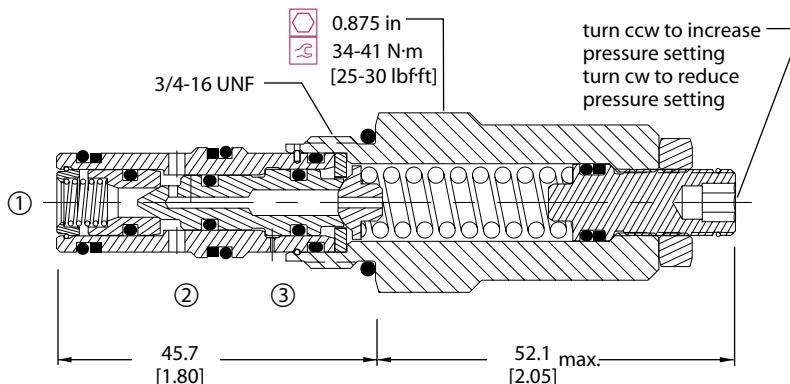
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	20 l/min [5 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.16 kg [0.36 lb]
Pilot ratio	3:1, 4.5:1, or 8:1
Cavity	CP08-3L

DIMENSIONS

mm [in]

Cross-sectional view



P102 360E

ORDERING INFORMATION

CP448 - 1 - B - 6S - E - B - 150 - 4.5 - 040

Seals

B = Buna-N
V = Viton

Housing and ports

0 = No Housing
2B = AL, 1/4 BSP
3B = AL, 3/8 BSP
4S = AL, #4 SAE
6S = AL, #6 SAE
Other housings available

Adjustment option

E = External

Seal kit

120238
120239

Housing P/N

No Housing
CP08-3L-2B
CP08-3L-3B
CP08-3L-4S
CP08-3L-6S

Pilot ratio

3.0:1
4.5:1
8.0:1

Free flow check crack pressure

040 = 2.76 bar [40] [psi]

Crack pressure

Code x 10 = psi
Example: 150 = 1500 psi
XXX = Std. setting w/no stamping

Pressure range

Pilot ratio 3.0
bar [psi]

A = 41-103 [600-1500]
Std. setting 69 [1000]
B = 69-207 [1000-3000]
Std. setting 103 [1500]
C = 124-345 [1800-5000]
Std. setting 172 [2500]

Pilot ratio 4.5
bar [psi]

A = 55-172 [800-2500]
Std. setting 103 [1500]
B = 103-345 [1500-5000]
Std. setting 172 [2500]

Pilot ratio 8.0
bar [psi]

A = 103-345 [1500-5000]
Std. setting 172 [2500]

P102 102E



Cartridge Valves Technical Information

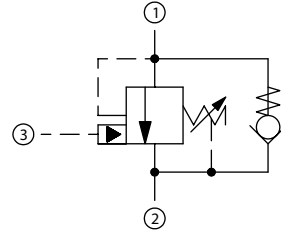
Counterbalance valves

CB10 HV

OPERATION

This is a pilot-operated counterbalance valve.

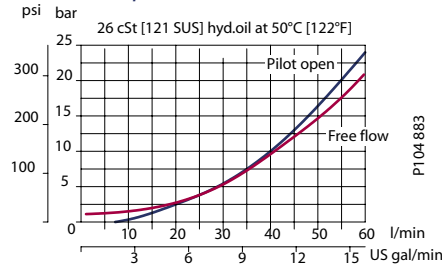
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



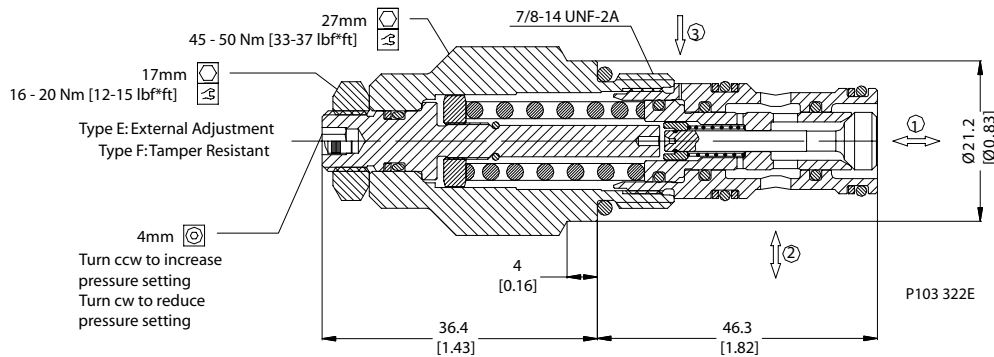
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	60 l/min [16 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.22 kg [0.47 lb]
Pilot ratio	1.5:1, 3:1, 4.5:1, 10:1
Cavity	SDC10-3S

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CB10-HV-1-A-1-E-70-B-XXXX

Spring Range

For Pilot Ratio Z (1.5:1)

1 = 20-70 bar [290-1015 psi]

2 = 30-90 bar [435-1305 psi]

3 = 50-140 bar [725-2030 psi]

For Pilot Ratio A (3:1)

1 = 35-110 bar [507-1595 psi]

2 = 60-150 bar [870-2175 psi]

3 = 80-230 bar [1160-3335 psi]

For Pilot Ratio B (4.5:1)

1 = 55-180 bar [797-2610 psi]

2 = 75-240 bar [1087-3480 psi]

3 = 90-350 bar [1305-5075 psi]

For Pilot Ratio C (10:1)

1 = 90-350 bar [1305-5075 psi]

Pilot Ratio

Z = 1.5 to 1

A = 3 to 1

B = 4.5 to 1

C = 10 to 1

Adjustment type

E = external adjustment

F = tamper resistant

Body and ports

00 = Cartridge only

6S = Aluminium, #6 SAE

8S = Aluminium, #8 SAE

SE3B = Aluminium, 3/8" BSPP

SE4B = Aluminium, 1/2" BSPP

Body Nomenclature

No Body

SDC10-3S-6S

SDC10-3S-8S

SDC10-3S-SE3B

SDC10-3S-SE4B

Seals

B = Buna-N

V = Viton

Seals kit

3540141

3540151

Std. setting

45 = 45 bar [650 psi] Set in Spring 1 For Pilot Ratio Z

60 = 60 bar [870 psi] Set in Spring 2 For Pilot Ratio Z

70 = 70 bar [1015 psi] Set in Spring 1 For Pilot Ratio A

100 = 100 bar [1450 psi] Set in Spring 3 For Pilot Ratio Z

100 = 100 bar [1450 psi] Set in Spring 1 For Pilot Ratio B

100 = 100 bar [1450 psi] Set in Spring 2 For Pilot Ratio A,B

175 = 175 bar [2537 psi] Set in Spring 3 For Pilot Ratio A,B

175 = 175 bar [2537 psi] Set in Spring 1 For Pilot Ratio C

P103 324E

Counterbalance valves
CB10 HV



Cartridge Valves Technical Information

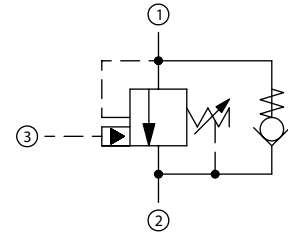
Counterbalance valves

CP441-1

OPERATION

This is a pilot-operated counterbalance valve.

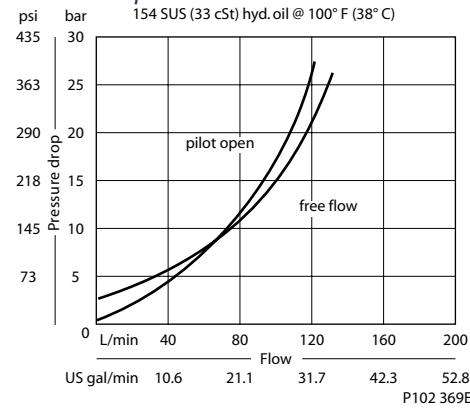
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



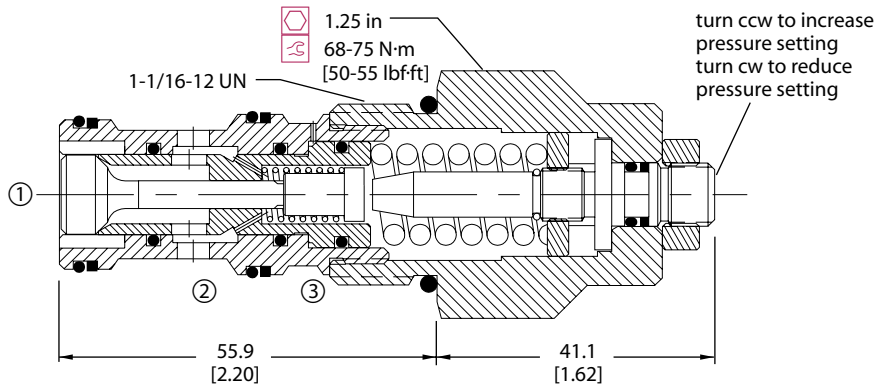
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	115 l/min [30 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.22 kg [0.48 lb]
Pilot ratio	3:1, 4.5:1, or 10:1
Cavity	CP12-3S

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CP441 - 1 - B - 12S - E - B - 250 - 4.5 - 015

Seals
B = Buna-N
V = Viton

Housing and ports
0 = No Housing
4B = AL, 1/2 BSP
6B = AL, 3/8 BSP
10S = AL, #10 SAE
12S = AL, #12 SAE
Other housings available

Adjustment option
E = External adjustment

Seal kit
120335
120336

Housing P/N
No Housing
CP12-3S-4B/2B
CP12-3S-6B/2B
CP12-3S-10S/4S
CP12-3S-12S/4S

Pressure range

Pilot ratio	bar	[psi]
3.0:1	A = 34-103	[500-1500]
4.5:1	A = 34-138	[500-2000]
10.0:1	A = 69-345	[1000-5000]

Free flow check Crack Pressure

Code	bar	[psi]
005	= .34	[5]
015	= 1.03	[15]

Crack pressure
Code x 10 = psi
Example: 250 = 2500 psi
XXX=Std. setting w/no stamping

Pilot ratio	bar	[psi]
3.0	A = 34-103	[500-1500]
4.5	A = 34-138	[500-2000]
10.0	A = 69-345	[1000-5000]

Std. setting 69 [1000] Std. setting 103 [1500] Std. setting 172 [2500]
B = 103-207 [1500-3000] B = 103-345 [1500-5000] Std. setting 207 [3000]

P102 097E

Counterbalance valves CP441-1



Cartridge Valves Technical Information

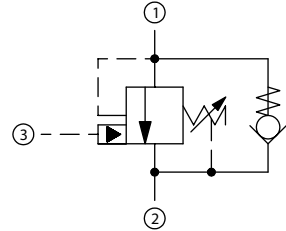
Counterbalance valves

CP443-1

OPERATION

This is a pilot-operated counterbalance valve.

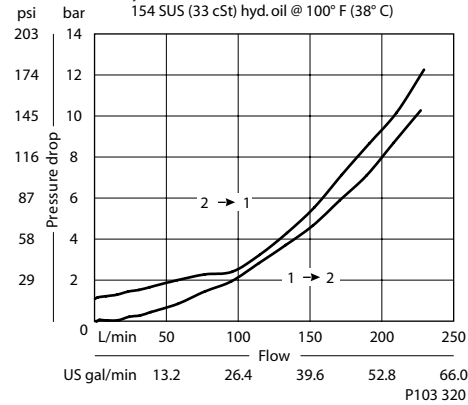
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



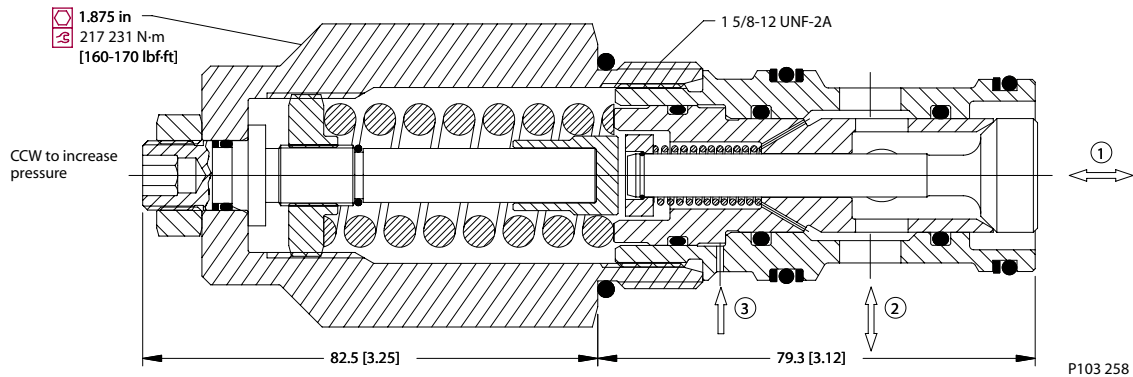
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 7 bar [100 psi]	190 l/min [50 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	1.22 kg [2.69 lb]
Pilot ratio	3:1, 4.5:1, or 10:1
Cavity	CP20-3S

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CP443 - 1 - B - 16S - E - A - 100 - 3.0 - 015

- Seals**
B = Buna-N
V = Viton
- Housing and ports**
0 = No Housing
8B = AL, 1 BSP
10B = AL, 1-1/4 BSP
16S = AL, #16 SAE
20S = AL, #20 SAE
Other housings available
- Adjustment option**
E = External
- Seal kit**
120380
120381
- Housing P/N**
No Housing
CP20-3S-8B/2B
CP20-3S-10B/2B
CP20-3S-16S/4S
CP20-3S-20S/4S
- Pilot ratio**
3.0 = 3.0:1
4.5 = 4.5:1
10.0 = 10.0:1
- Free flow check Cracking Pressure**
bar [psi]
015 = 1.00 [15]
- Cracking pressure**
Code x 10 = psi
Example: 100 = 1000 psi
XXX = Std. setting w/no stamping
- Pressure range**
 - Pilot ratio 3.0**
bar [psi]
A = 34-103 [500-1500]
Std setting 69 [1000]
B = 103-207 [1500-3000]
Std setting 172 [2500]
 - Pilot ratio 4.5**
bar [psi]
A = 34-138 [500-2000]
Std setting 103 [1500]
B = 103-345 [1500-5000]
Std setting 207 [3000]
 - Pilot ratio 10.0**
bar [psi]
A = 69-345 [1000-5000]
Std setting 172 [2500]

P103 257

Counterbalance valves
CP443-1



Cartridge Valves Technical Information

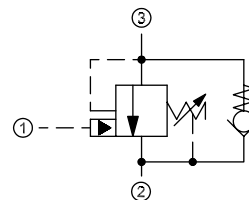
Counterbalance valves

VCB 12-EN

OPERATION

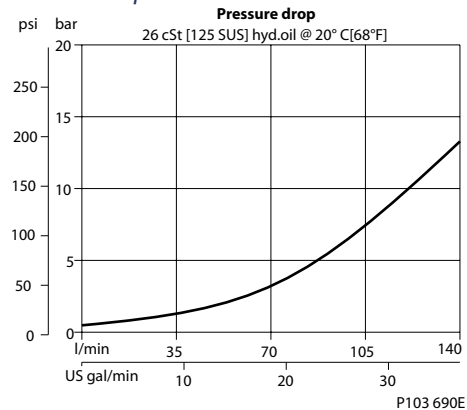
This is a pilot-operated counterbalance valve.

Schematic



SPECIFICATIONS

Theoretical performance



P103 501

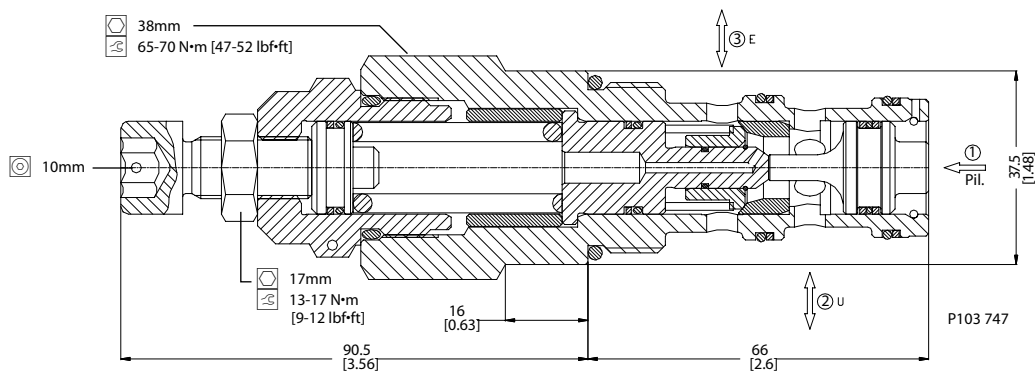
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	140 l/min [37 US gal/min]
Weight	0.70 kg [1.54 lb]
Pilot ratio	4.7:1, 5.9:1, or 6.9:1
Cavity	NCS12/3

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

VCB 12-EN-2-A-SE3/8-V

Spring range

- Pilot ratio A & C
 1 = 25 to 140 bar [363 to 2031 psi]
 2 = 70 to 250 bar [1015 to 3626 psi]
 3 = 105 to 350 bar [1523 to 5076 psi]

Pilot ratio B

- 1 = 25 to 120 bar [363 to 1740 psi]
 2 = 60 to 200 bar [870 to 2901 psi]
 3 = 90 to 280 bar [1305 to 4061 psi]

Pilot ratio:

- A = 6.9:1
 B = 4.7:1
 C = 5.9:1

Seals

- B = Buna-N
 V = Viton

Seal kit

- 230000130
 230000360

Housing and ports

- 00 = No Housing
 SE1/2 = AL, 1/2 BSP
 SE3/4 = AL, 3/4 BSP
 SE8S = AL, #8 SAE
 SE12S = AL, #12 SAE
 Other housings available

Housing P/N

- No Housing
 NCS12/3-SE-1/2
 NCS12/3-SE-3/4
 NCS12/3-SE-8S
 NCS12/3-SE-12S

To order this valve with a specific factory setting, contact your Sauer-Danfoss representative

P103 858E

Counterbalance valves
VCB 12-EN



Cartridge Valves Technical Information

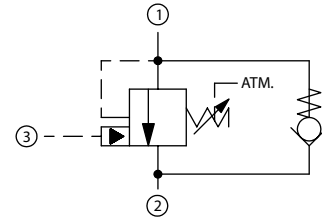
Counterbalance valves

CB10 AV

OPERATION

This is a pilot-operated counterbalance valve with an atmospheric vent.

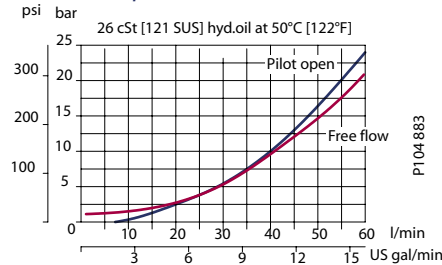
Schematic



P103 325

SPECIFICATIONS

Theoretical performance



P104-883

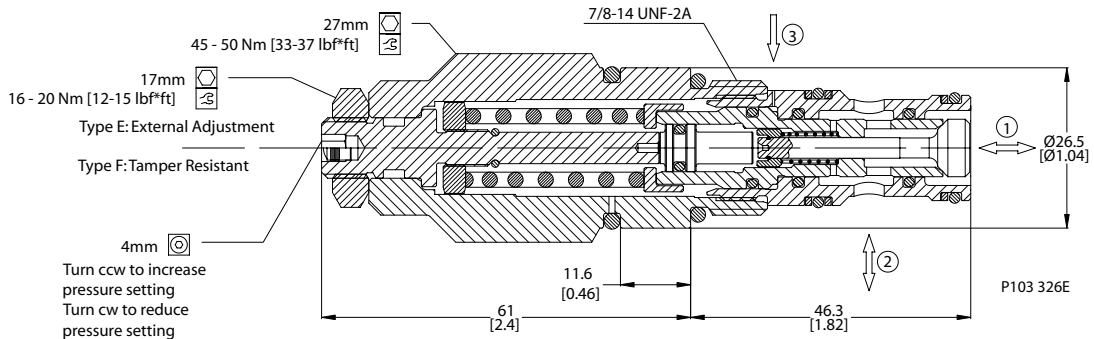
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	60 l/min [16 US gal/min]
Leakage	10 drops/min @ 70% of crack pressure
Weight	0.27 kg [0.60 lb]
Pilot ratio	1.5:1, 3:1, 4.5:1, 10:1
Cavity	SDC10-3S

DIMENSIONS

mm [in]

Cross-sectional view



P103 326E

ORDERING INFORMATION

CB10-AV-1-A-1-E-70-B-XXXX

<p>Spring Range</p> <p>For Pilot Ratio Z (1.5:1)</p> <p>1 = 20-70 bar [290-1015 psi]</p> <p>2 = 30-90 bar [435-1305 psi]</p> <p>3 = 50-140 bar [725-2030 psi]</p> <p>For Pilot Ratio A (3:1)</p> <p>1 = 35-110 bar [507-1595 psi]</p> <p>2 = 60-150 bar [870-2175 psi]</p> <p>3 = 80-230 bar [1160-3335 psi]</p> <p>For Pilot Ratio B (4.5:1)</p> <p>1 = 55-180 bar [797-2610 psi]</p> <p>2 = 75-240 bar [1087-3480 psi]</p> <p>3 = 90-350 bar [1305-5075 psi]</p> <p>For Pilot Ratio C (10:1)</p> <p>1 = 90-350 bar [1305-5075 psi]</p>	<p>Pilot Ratio</p> <p>Z = 1.5 to 1</p> <p>A = 3 to 1</p> <p>B = 4.5 to 1</p> <p>C = 10 to 1</p>	<p>Body and ports</p> <p>00 = Cartridge only</p> <p>6S = Aluminium, #6 SAE</p> <p>8S = Aluminium, #8 SAE</p> <p>SE3B = Aluminium, 3/8" BSPP</p> <p>SE4B = Aluminium, 1/2" BSPP</p>	<p>Body Nomenclature</p> <p>No Body</p> <p>SDC10-3S-6S</p> <p>SDC10-3S-8S</p> <p>SDC10-3S-SE3B</p> <p>SDC10-3S-SE4B</p>	<p>Std. setting</p> <p>45 = 45 bar [650 psi] Set in Spring 1 For Pilot Ratio Z</p> <p>60 = 60 bar [870 psi] Set in Spring 2 For Pilot Ratio Z</p> <p>70 = 70 bar [1015 psi] Set in Spring 1 For Pilot Ratio A</p> <p>100 = 100 bar [1450 psi] Set in Spring 3 For Pilot Ratio Z</p> <p>100 = 100 bar [1450 psi] Set in Spring 1 For Pilot Ratio B</p> <p>100 = 100 bar [1450 psi] Set in Spring 2 For Pilot Ratio A,B</p> <p>175 = 175 bar [2537 psi] Set in Spring 3 For Pilot Ratio A,B</p> <p>175 = 175 bar [2537 psi] Set in Spring 1 For Pilot Ratio C</p>	<p>Adjustment type</p> <p>E = external adjustment</p> <p>F = tamper resistant</p>	<p>Seals</p> <p>B = Buna-N</p> <p>V = Viton</p>	<p>Seals kit</p> <p>3540141</p> <p>3540151</p>
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P103 327E

Counterbalance valves
CB10 AV



Cartridge Valves Technical Information

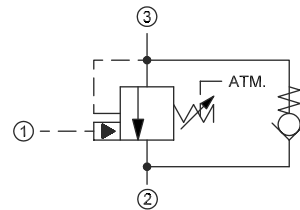
Counterbalance valves

VCB 12-CN

OPERATION

This is a pilot-operated counterbalance valve with an atmospheric vent.

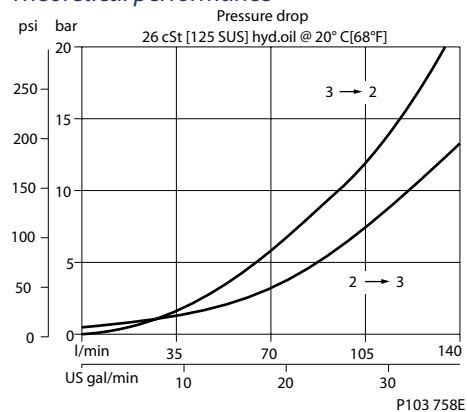
Schematic



P103 502

SPECIFICATIONS

Theoretical performance



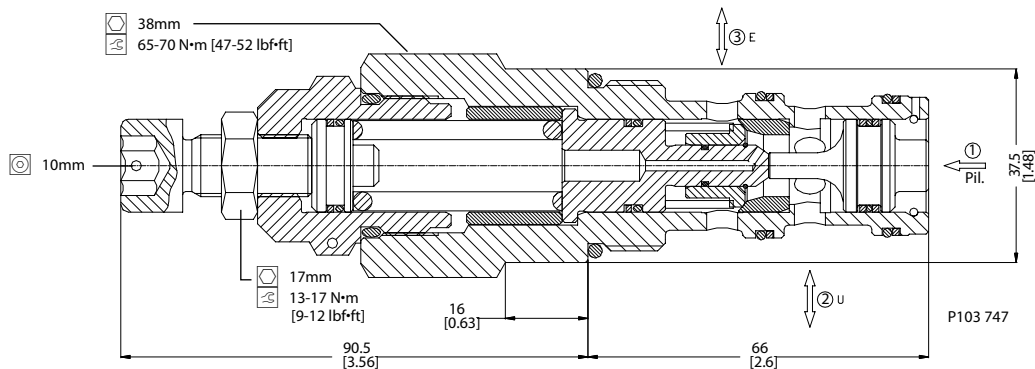
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	140 l/min [37 US gal/min]
Weight	0.93 kg [2.05 lb]
Pilot ratio	4.7:1, 5.9:1, or 6.9:1
Cavity	NCS12/3

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

VCB 12-CN-2-A-SE3/8-V

Spring range

Pilot ratio A & C

- 1 = 25 to 140 bar [363 to 2031 psi]
- 2 = 70 to 250 bar [1015 to 3626 psi]
- 3 = 105 to 350 bar [1523 to 5076 psi]

Pilot ratio B

- 1 = 25 to 120 bar [363 to 1740 psi]
- 2 = 60 to 200 bar [870 to 2901 psi]
- 3 = 90 to 280 bar [1305 to 4061 psi]

Pilot ratio:

- A = 6.9:1
- B = 4.7:1
- C = 5.9:1

Seals

- B = Buna-N
- V = Viton

Seal kit

- 230000130
- 230000360

Housing and ports

- 00 = No Housing
- SE1/2 = AL, 1/2 BSP
- SE3/4 = AL, 3/4 BSP
- SE8S = AL, #8 SAE
- SE12S = AL, #12 SAE
- Other housings available

Housing P/N

- No Housing
- NCS12/3-SE-1/2
- NCS12/3-SE-3/4
- NCS12/3-SE-8S
- NCS12/3-SE-12S

To order this valve with a specific factory setting, contact your Sauer-Danfoss representative

P103 859



Cartridge Valves Technical Information

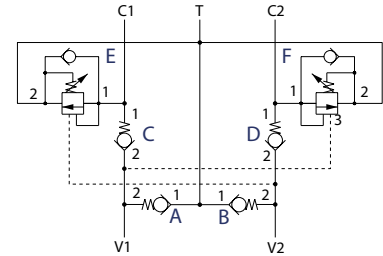
Counterbalance valves

1EEC11

OPERATION

This valve is a dual counterbalance valve with make up checks.

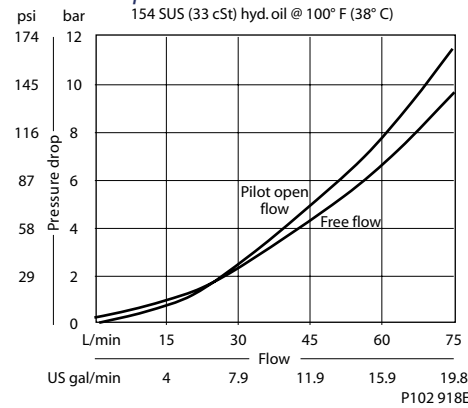
Schematic



P102 686

SPECIFICATIONS

Theoretical performance



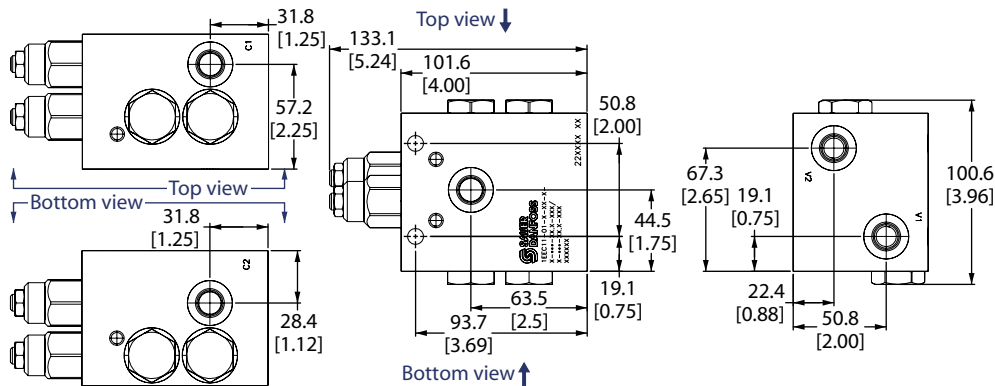
Specifications

Rated pressure	345 bar [5000 psi]
Rated flow at 7 bar [100 psi]	57 l/min [15 US gal/min]
Weight	2.04 kg [4.50 lb]
Pilot ratio	3:1, 4.5:1, or 10:1
Cavity	none

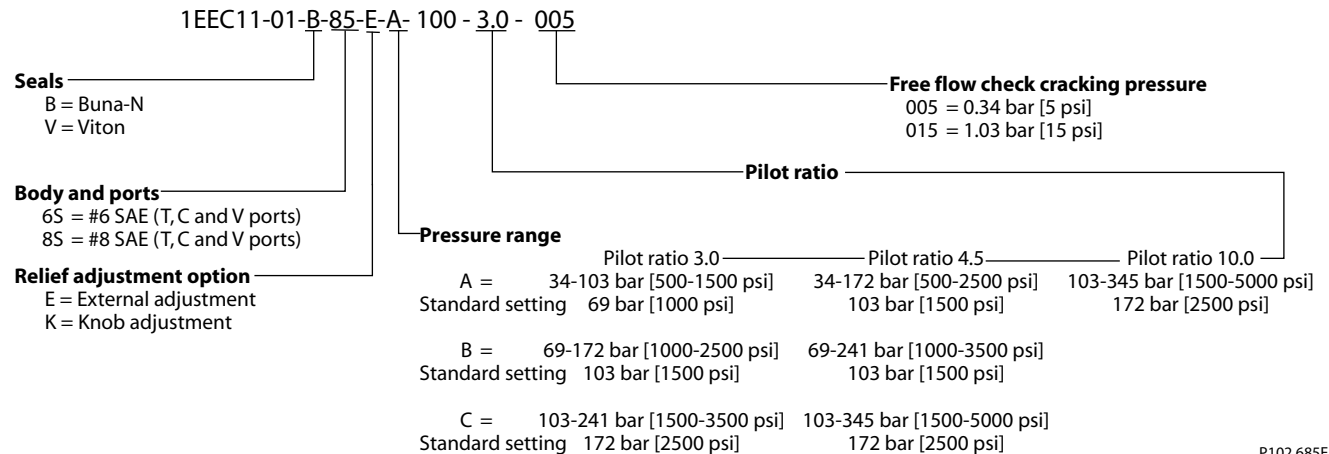
DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION



Counterbalance valves
1EEC11



Cartridge Valves Technical Information

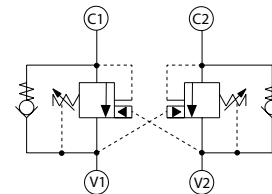
Counterbalance valves

CP448-2

OPERATION

This valve is a dual counterbalance valve. It uses two CP448-1 cartridges.

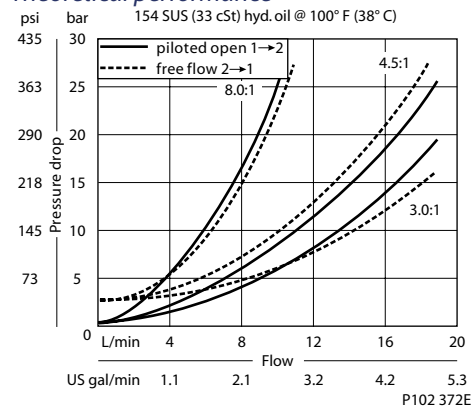
Schematic



P102 379E

SPECIFICATIONS

Theoretical performance



P102 372E

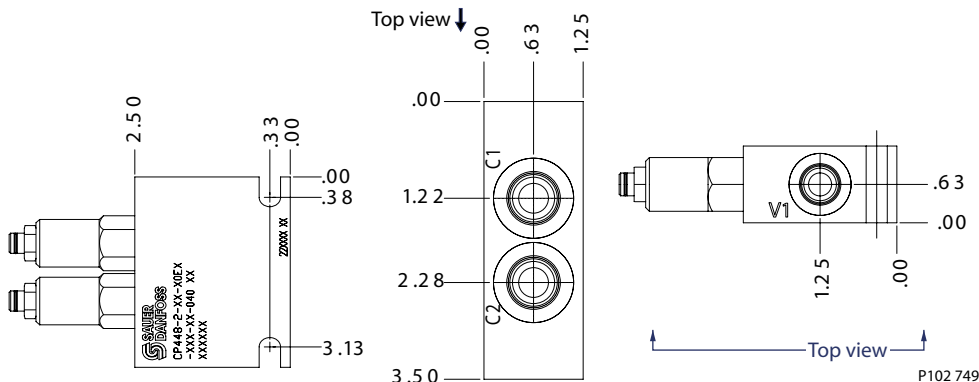
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 22 bar [319 psi]	20 l/min [5 US gal/min]
Weight	0.78 kg [1.72 lb]
Pilot ratio	3:1, 4.5:1, or 8:1
Cavity	none

DIMENSIONS

mm [in]

Cross-sectional view



P102 749

ORDERING INFORMATION

CP448-2-4S-B-0-E-B-150-4.5-040

- Check crack pressure**
040 = 2.8 bar [40 psi]
- Pilot ratio**
1.5 — 3.0 — 4.5 — 8.0
- Crack pressure**
Code x 10 = psi
Example: 050 = 500 psi
- Pressure range**

A	14-55 bar [200-300 psi]	41-124 bar [600-1800 psi]	55-186 bar [800-2700 psi]	103-345 bar [1500-5000 psi]
B	[500-1700 psi]	[1000-3500 psi]	[1500-5000 psi]	
C	55-207 bar [800-3000 psi]	124-345 bar [1800-5000 psi]		
- Adjustment option**
E = External
- Seals**
B = Buna N
V = Viton
- Seal kits**
120238
120239
- Housing and ports**
4S = AL, #4 SAE
6S = AL, #6 SAE
other housings available, consult factory

P102 750E

Counterbalance valves CP448-2



Cartridge Valves Technical Information

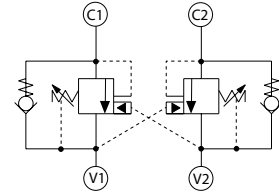
Counterbalance valves

DCB10-HV

OPERATION

This is a dual counterbalance valve with hydraulic vent. This assembly uses the CB10-HV valve.

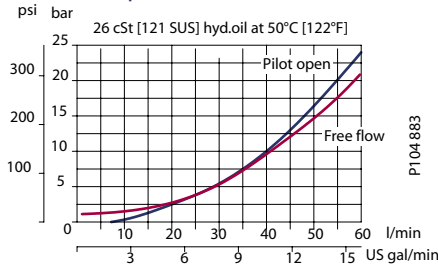
Schematic



P102 379E

SPECIFICATIONS

Theoretical performance



P104-883

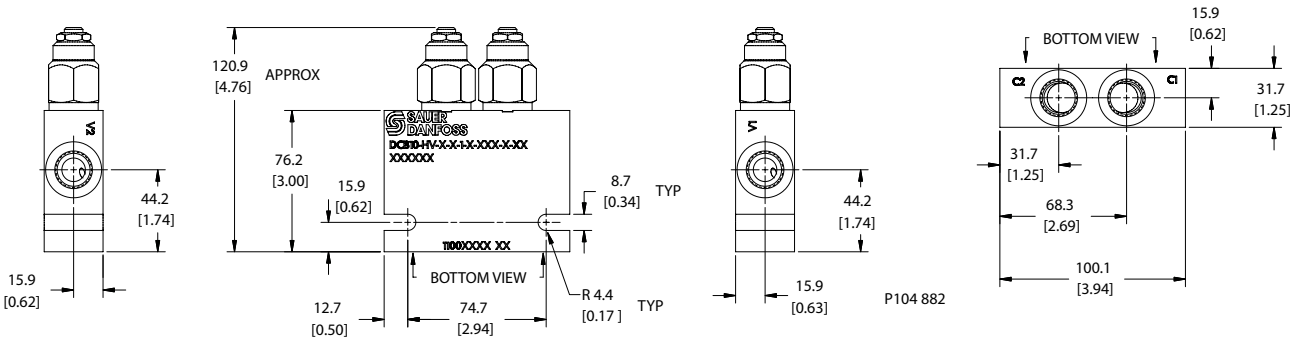
Specifications

Rated pressure	350 bar [5075 psi]
Rated flow at 22 bar [319 psi]	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.90 kg [1.98 lb]
Pilot ratio	1.5:1, 3.0:1, 4.5:1, 10.0:1
Cavity	None

DIMENSIONS

mm [in]

Cross-sectional view



P104 882

ORDERING INFORMATION

DCB10-HV-1-B-1-E-100-B-8S

- Spring range**
 - For pilot ratio Z (1.5:1)
 - 1 = 20-70 bar [290-1015 psi]
 - 2 = 30-90 bar [435-1305 psi]
 - 3 = 50-140 bar [725-2030 psi]
 - For pilot ratio A (3:1)**
 - 1 = 35-110 bar [507-1595 psi]
 - 2 = 60-150 bar [870-2175 psi]
 - 3 = 80-230 bar [1160-3335 psi]
 - For pilot ratio B (4.5:1)**
 - 1 = 55-180 bar [797-2610 psi]
 - 2 = 75-240 bar [1087-3480 psi]
 - 3 = 90-350 bar [1305-5075 psi]
 - For pilot ratio C (10:1)**
 - 1 = 90-350 bar [1305-5075 psi]
- Pilot ratio**
 - Z = 1.5 to 1
 - A = 3 to 1
 - B = 4.5 to 1
 - C = 10 to 1
- Check crack pressure**
 - 1 = 1 bar (14.5 psi)
- Adjust type**
 - E = External adjustment
 - F = Tamper resistant
- Body and ports**
 - 6S = Aluminium, #6 SAE
 - 8S = Aluminium, #8 SAE
 - SE3B = Aluminium, 3/8" BSPP
 - SE4B = Aluminium, 1/2" BSPP
- Seals**
 - B = Buna-N 11002672
 - V = Viton 11002673
- Std. setting**
 - 45 = 45 bar [650 psi] Set in Spring 1 For Pilot Ratio Z
 - 60 = 60 bar [870 psi] Set in Spring 2 For Pilot Ratio Z
 - 70 = 70 bar [1015 psi] Set in Spring 1 For Pilot Ratio A
 - 100 = 100 bar [1450 psi] Set in Spring 3 For Pilot Ratio Z
 - 100 = 100 bar [1450 psi] Set in Spring 1 For Pilot Ratio B
 - 100 = 100 bar [1450 psi] Set in Spring 2 For Pilot Ratio A,B
 - 175 = 175 bar [2537 psi] Set in Spring 3 For Pilot Ratio A,B
 - 175 = 175 bar [2537 psi] Set in Spring 1 For Pilot Ratio C
- Body P/N**
 - 11002669
 - 11001779
 - 11008008
 - 11008009

P104-884

Counterbalance valves
DCB10-HV



Cartridge Valves Technical Information

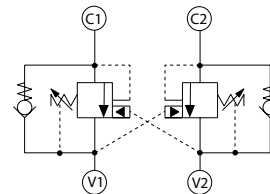
Counterbalance valves

CP441-2

OPERATION

This valve is a dual counterbalance valve. It uses two CP441-1 cartridges.

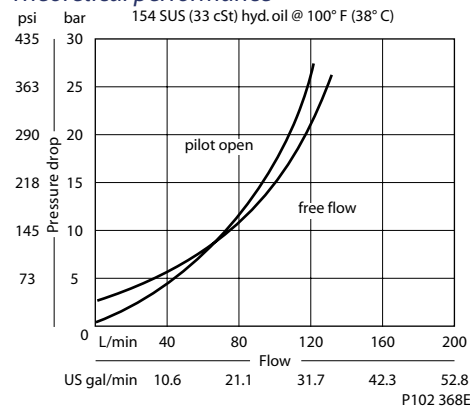
Schematic



P102 379E

SPECIFICATIONS

Theoretical performance



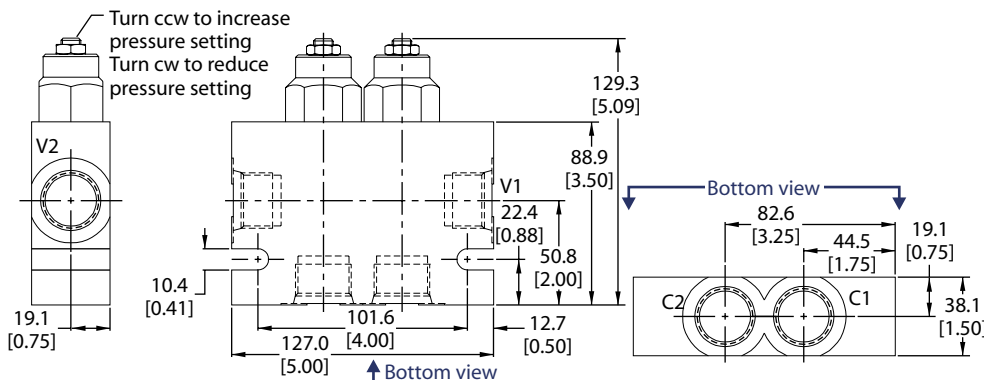
Specifications

Rated pressure	350 bar [5000 psi]
Rated flow at 7 bar [100 psi]	115 l/min [30 US gal/min]
Weight	1.26 kg [2.77 lb]
Pilot ratio	3:1, 4.5:1, or 10:1
Cavity	none

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CP441 - 2 - 12S - B - E - B - 250 - 4.5 - 015

Housing and ports

10S = AL, #10 SAE 220752
 12S = AL, #12 SAE 220753

6B = AL, 3/4 BSP
 4B = AL, 1/2 BSP
 other housings available, consult factory

Seals

B = Buna-N 120414
 V = Viton 120415

Adjustment option

E = External adjustment

Free flow check

Cracking pressure
 bar [psi]
 005 = .34 [5]
 015 = 1.03 [15]

Crack pressure

Code x 10 = psi
 Example: 250 = 2500 psi

Pressure range

Pilot ratio

Pilot ratio 3.0		Pilot ratio 4.5		Pilot ratio 10.0	
bar	[psi]	bar	[psi]	bar	[psi]
A = 34-103	[500-1500]	A = 34-138	[500-2000]	A = 69-345	[1000-5000]
Std. setting 69	[1000]	Std. setting 103	[1500]	Std. setting 172	[2500]
B = 103-207	[1500-3000]	B = 103-345	[1500-5000]	B = N/a	N/a
Std. setting 103	[1500]	Std. setting 103	[1500]		

P102 089E

Counterbalance valves CP441-2



Cartridge Valves Technical Information

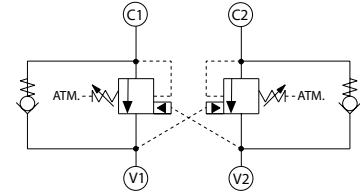
Counterbalance valves

DCB10-AV

OPERATION

This is a dual counterbalance valve with atmospheric vent. This assembly uses the CB10-AV valve.

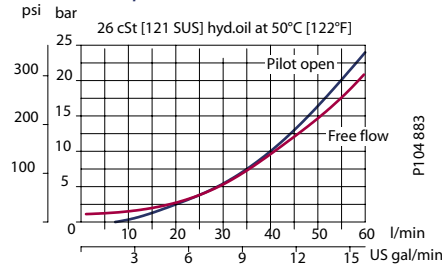
Schematic



P104 885

SPECIFICATIONS

Theoretical performance



P104 883

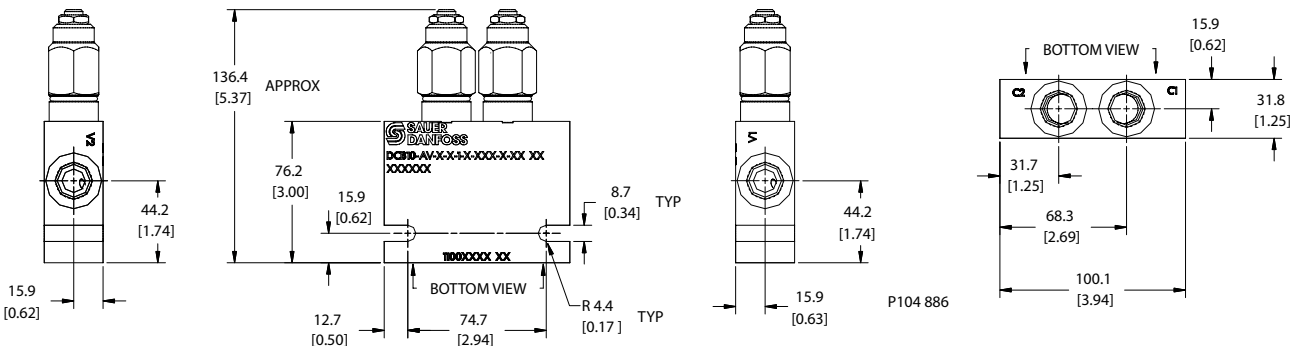
Specifications

Rated pressure	350 bar [5075 psi]
Rated flow at 22 bar [319 psi]	60 l/min [16 US gal/min]
Leakage	10 drops/min @ at 70% of crack pressure
Weight	0.90 kg [1.98 lb]
Pilot ratio	1.5:1, 3.0:1, 4.5:1, 10.0:1
Cavity	None

DIMENSIONS

mm [in]

Cross-sectional view



P104 886

ORDERING INFORMATION

DCB10-AV-1-B-1-E-100-B-8S

Spring range

- For pilot ratio Z (1.5:1)
 - 1 = 20-70 bar [290-1015 psi]
 - 2 = 30-90 bar [435-1305 psi]
 - 3 = 50-140 bar [725-2030 psi]
- For pilot ratio A (3:1)**
 - 1 = 35-110 bar [507-1595 psi]
 - 2 = 60-150 bar [870-2175 psi]
 - 3 = 80-230 bar [1160-3335 psi]
- For pilot ratio B (4.5:1)**
 - 1 = 55-180 bar [797-2610 psi]
 - 2 = 75-240 bar [1087-3480 psi]
 - 3 = 90-350 bar [1305-5075 psi]
- For pilot ratio C (10:1)**
 - 1 = 90-350 bar [1305-5075 psi]

Pilot ratio

- Z = 1.5 to 1
- A = 3 to 1
- B = 4.5 to 1
- C = 10 to 1

Check crack pressure

- 1 = 1 bar (14.5 psi)

Adjust type

- E = External adjustment
- F = Tamper resistant

Body and ports

- 6S = Aluminium, #6 SAE
- 8S = Aluminium, #8 SAE
- SE3B = Aluminium, 3/8" BSPP
- SE4B = Aluminium, 1/2" BSPP

Body P/N

- 11002669
- 11001779
- 11008008
- 11008009

Seals

- B = Buna-N
- V = Viton

Seal kit

- 11002672
- 11002673

Std. setting

- 45 = 45 bar [650 psi] Set in Spring 1 For Pilot Ratio Z
- 60 = 60 bar [870 psi] Set in Spring 2 For Pilot Ratio Z
- 70 = 70 bar [1015 psi] Set in Spring 1 For Pilot Ratio A
- 100 = 100 bar [1450 psi] Set in Spring 3 For Pilot Ratio Z
- 100 = 100 bar [1450 psi] Set in Spring 1 For Pilot Ratio B
- 100 = 100 bar [1450 psi] Set in Spring 2 For Pilot Ratio A,B
- 175 = 175 bar [2537 psi] Set in Spring 3 For Pilot Ratio A,B
- 175 = 175 bar [2537 psi] Set in Spring 1 For Pilot Ratio C

P104 887

Counterbalance valves
DCB10-AV



Cartridge Valves Technical Information
Counterbalance valves
Notes