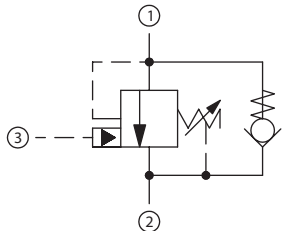
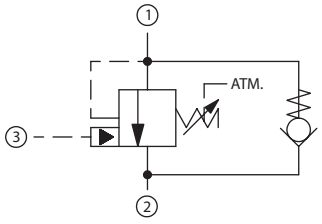
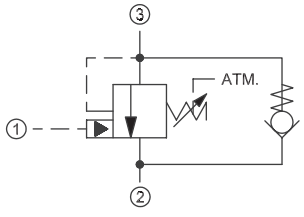
Comatrol
RESPONSIVENESS IN MOTION
MEMBER OF THE SAUER-DANFOSS GROUP

Cartridge Valves Technical Information
Counterbalance valves
Quick reference

Hydraulic Vent	Model No.	Cavity	Description	Flow*	Pressure	Page
	CP448-1	CP08-3L	Counterbalance Valve, Hydraulic Vent	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

Atmospheric Vent	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]	09.10

Atmospheric Vent	Model No.	Cavity	Description	Flow*	Pressure	Page
	VCB 12-CN	NCS12/3	Counterbalance Valve, Atmospheric Vent	140 l/min [37 US gal/min]	350 bar [5000 psi]	09.11

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

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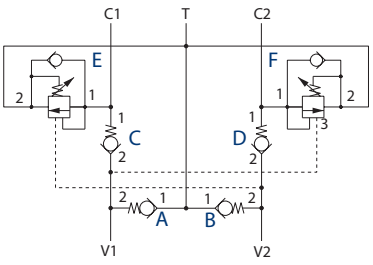
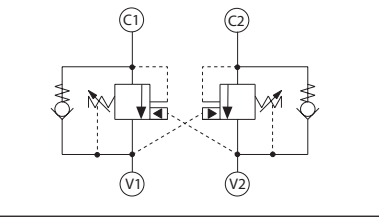
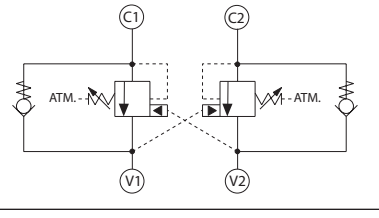
Cartridge Valves Technical Information
Counterbalance valves
Quick reference

Dual Counterbalance	Model No.	Cavity	Description	Flow*	Pressure	Page
	1EEC11-1	None	Dual-Counterbalance Valve, with Makeup Checks, Catalog HIC	57 l/min [15 US gal/min]	345 bar [5000 psi]	09.12

Dual Counterbalance	Model No.	Cavity	Description	Flow*	Pressure	Page
	CP448-2	None	Counterbalance Valve, Hydraulic Vent, Catalog HIC	20 l/min [5 US gal/min]	350 bar [5000 psi]	09.13
	DCB10-HV	None		60 l/min [16 US gal/min]	350 bar [5075 psi]	09.14
	CP441-2	None		115 l/min [30 US gal/min]	350 bar [5000 psi]	09.15

Dual Counterbalance	Model No.	Cavity	Description	Flow*	Pressure	Page
	DCB10-AV	None	Counterbalance Valve, Atmospheric Vent, Catalog HIC	60 l/min [16 US gal/min]	350 bar [5075 psi]	09.16

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

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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

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.

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Cartridge Valves Technical Information
Counterbalance valves
Application notes

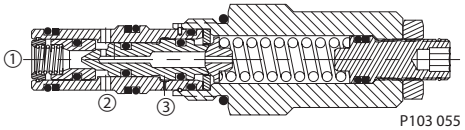
COUNTERBALANCE VALVES (continued)

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.

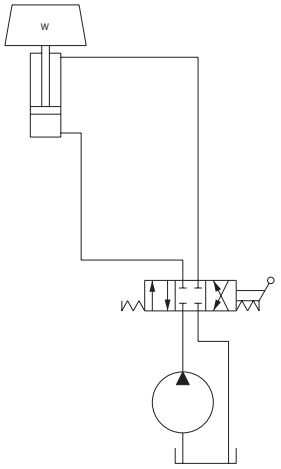
Adding a counterbalance valve controls motion and provides protection against hose or tube failure. In this circuit, moving the directional control valve to the left causes the cylinder to extend, raising the load with free flow going through the check valve portion of the counterbalance valve. When 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



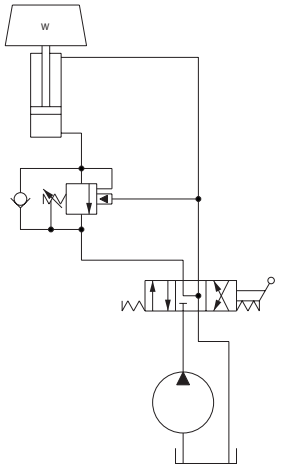
P103 055

Circuit without a counterbalance valve



P103 121

Circuit with a counterbalance valve



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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:

$$P = \frac{(Ps \cdot Ab) - W}{(Ab \cdot R) + Ar}$$ (load retracts cylinder)

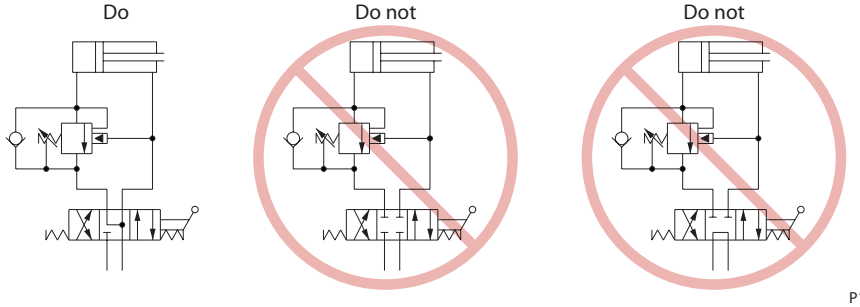
$$P = \frac{(Ps \cdot Ar) - W}{(Ar \cdot R) + Ab}$$ (load extends cylinder)

W = Load
Ps = Counterbalance valve relief setting; see below for more information
Ab = Cylinder bore area
Ar = 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.



P103 056E

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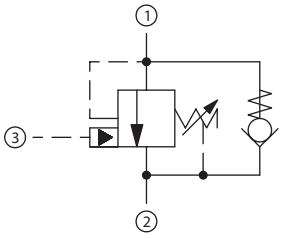
Cartridge Valves Technical Information
Counterbalance valves
Hydraulic Vent
CP448-1

OPERATION

This is a pilot-operated counterbalance valve.

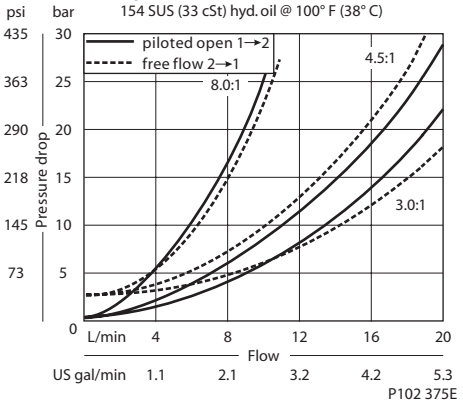
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



P102 375E

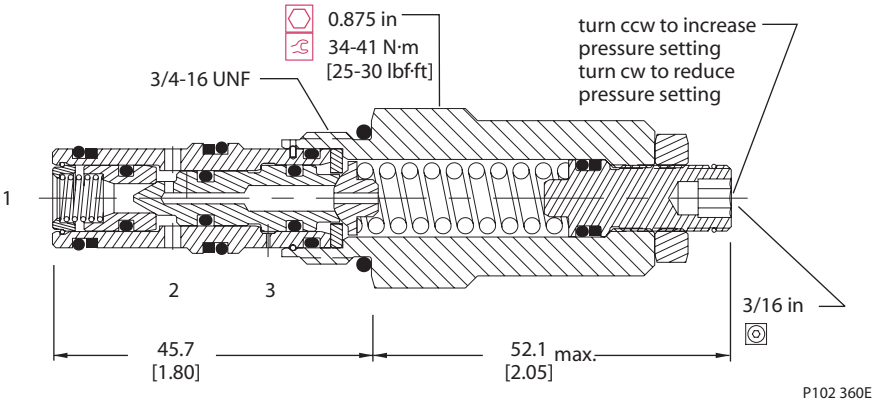
Specifications

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, 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

Seal kit
120238
120239

Housing P/N
No Housing
CP08-3L-2B
CP08-3L-3B
CP08-3L-4S
CP08-3L-6S

Adjustment option
E = External

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]

Pilot ratio
3.0:1
4.5:1
8.0:1

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

Free flow check crack pressure

	bar	[psi]
040 =	2.76	[40]

P102 102E

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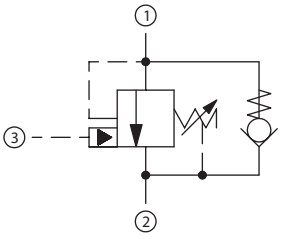
Cartridge Valves Technical Information
Counterbalance valves
Hydraulic Vent
CB10-HV

OPERATION

This is a pilot-operated counterbalance valve.

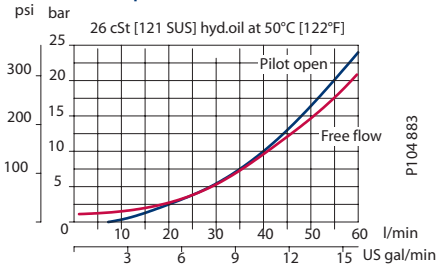
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



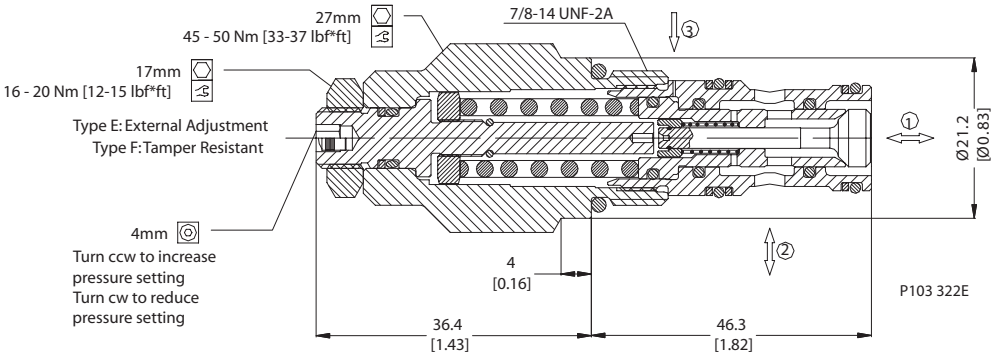
Specifications

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



P103 322E

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

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 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

Seal kit
230001020
35401519

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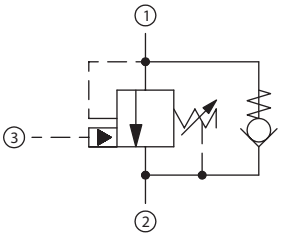
Cartridge Valves Technical Information
Counterbalance valves
Hydraulic Vent
CP441-1

OPERATION

This is a pilot-operated counterbalance valve.

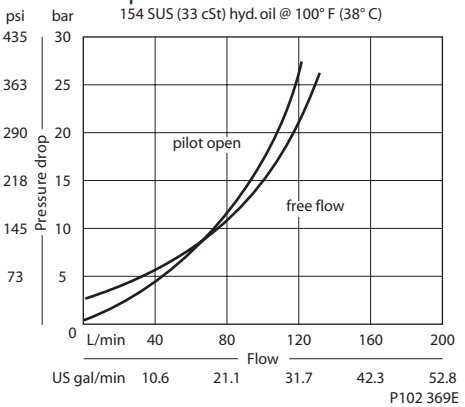
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



P102 369E

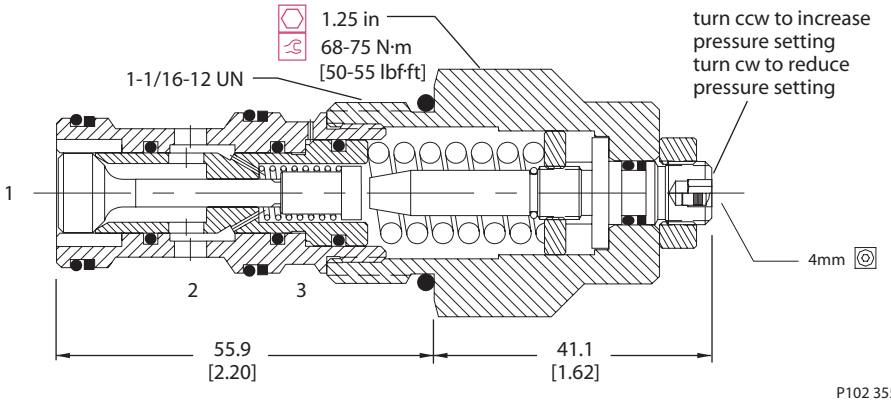
Specifications

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, 10:1
Cavity	CP12-3S

DIMENSIONS

mm [in]

Cross-sectional view



P102 355E

ORDERING INFORMATION

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

Seals
B = Buna-N
V = Viton

Seal kit
120335
120336

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

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

Adjustment option
E = External adjustment

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]

Pilot ratio
3.0:1
4.5:1
10.0:1

Free flow check Crack Pressure

	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

P102 097E

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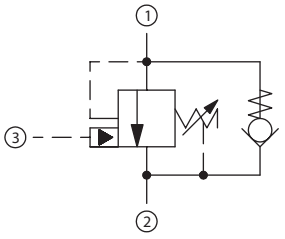
Cartridge Valves Technical Information
Counterbalance valves
Hydraulic Vent
CP443-1

OPERATION

This is a pilot-operated counterbalance valve.

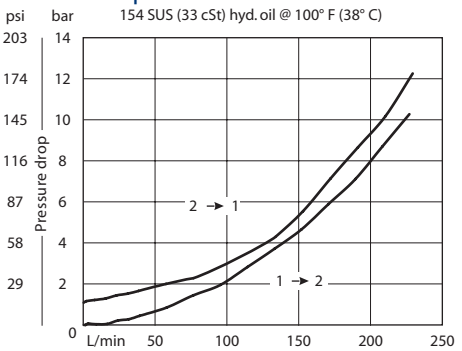
Schematic



P102 376E

SPECIFICATIONS

Theoretical performance



P103 320

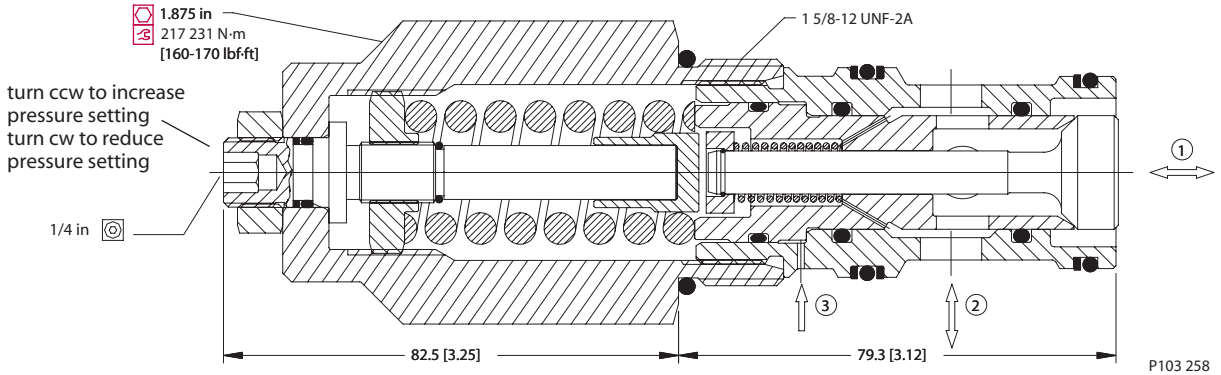
Specifications

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, 10:1
Cavity	CP20-3S

DIMENSIONS

mm [in]

Cross-sectional view



P103 258

ORDERING INFORMATION

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

Seals
B = Buna-N
V = Viton

Seal kit
120380
120381

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

Housing P/N
No Housing
CP20-3S-8B/2B
CP20-3S-10B/2B
CP20-3S-16S/4S
CP20-3S-20S/4S

Adjustment option
E = External

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]

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Cracking pressure
Code x 10 = psi
Example: 100 = 1000 psi
XXX = Std. setting w/no stamping

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]

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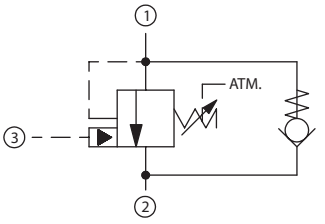
Cartridge Valves Technical Information
Counterbalance valves
Atmospheric Vent
CB10-AV

OPERATION

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

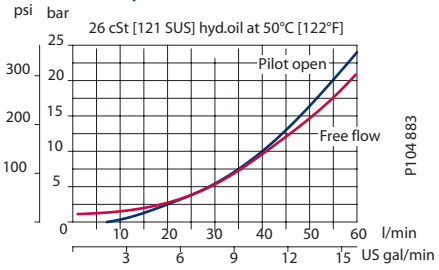
Schematic



P103 325

SPECIFICATIONS

Theoretical performance



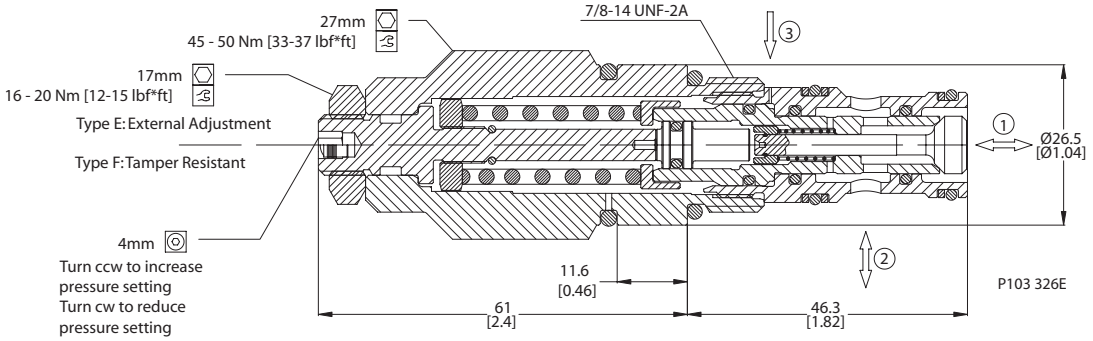
Specifications

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	0.27 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



ORDERING INFORMATION

CB10-AV-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

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 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

Seal kit
230001020
35401519

P103 327E

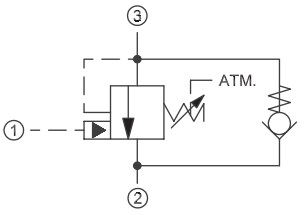
Comatrol
RESPONSIVENESS IN MOTION
MEMBER OF THE SAUER-DANFOSS GROUP

Cartridge Valves Technical Information
Counterbalance valves
Atmospheric Vent
VCB 12-CN

OPERATION

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

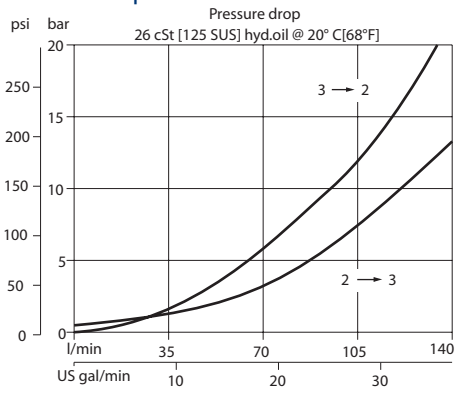
Schematic



P103 502

SPECIFICATIONS

Theoretical performance



P103 758E

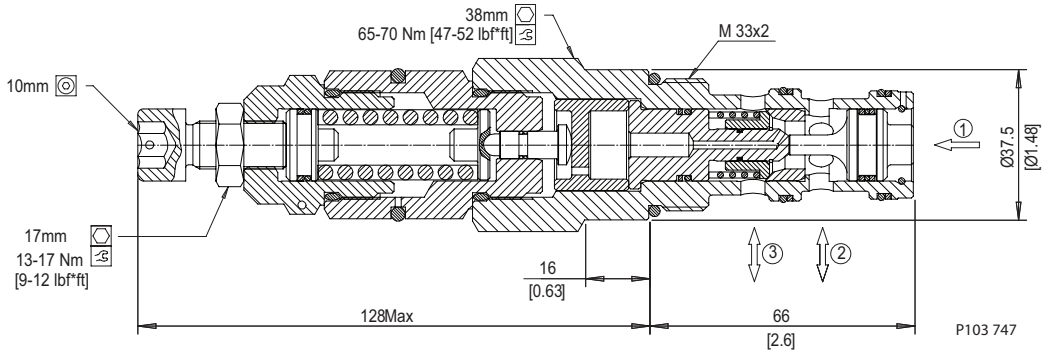
Specifications

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, 6.9:1
Cavity	NCS12/3

DIMENSIONS

mm [in]

Cross-sectional view



P103 747

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

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

Seals
Omit = Buna N
V = Viton

Seal kit
230000130
230000360

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

Comatrol
RESPONSIVENESS IN MOTION
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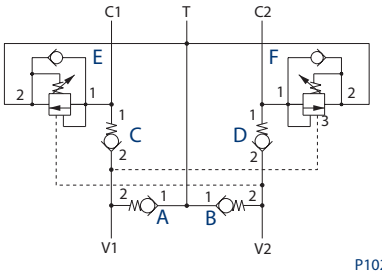
Cartridge Valves Technical Information
Counterbalance valves
Dual Counterbalance
1EEC11

OPERATION

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

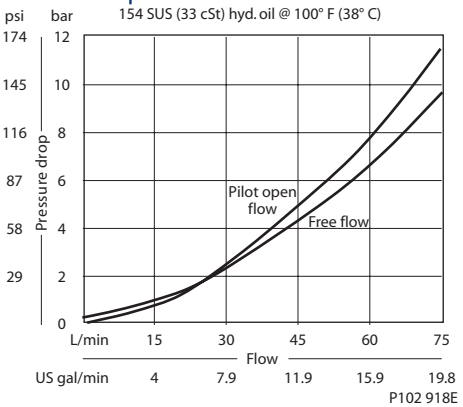
Schematic



P102 686

SPECIFICATIONS

Theoretical performance



P102 918E

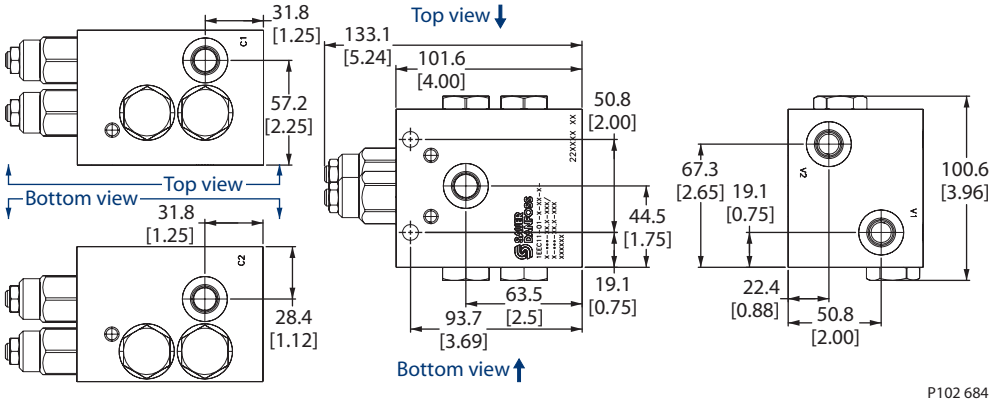
Specifications

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



P102 684

ORDERING INFORMATION

1EEC11-01-B-85-E-A- 100 - 3.0 - 005

Seals
B = Buna-N
V = Viton

Body and ports
6S = #6 SAE (T, C and V ports)
8S = #8 SAE (T, C and V ports)

Relief adjustment option
E = External adjustment
K = Knob adjustment

Pressure range

	Pilot ratio 3.0	Pilot ratio 4.5	Pilot ratio 10.0
A = Standard setting	34-103 bar [500-1500 psi] 69 bar [1000 psi]	34-172 bar [500-2500 psi] 103 bar [1500 psi]	103-345 bar [1500-5000 psi] 172 bar [2500 psi]
B = Standard setting	69-172 bar [1000-2500 psi] 103 bar [1500 psi]	69-241 bar [1000-3500 psi] 103 bar [1500 psi]	
C = Standard setting	103-241 bar [1500-3500 psi] 172 bar [2500 psi]	103-345 bar [1500-5000 psi] 172 bar [2500 psi]	

Pilot ratio

Free flow check cracking pressure
005 = 0.34 bar [5 psi]
015 = 1.03 bar [15 psi]

P102 685E

Comatrol
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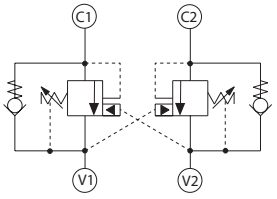
Cartridge Valves Technical Information
Counterbalance valves
Dual Counterbalance
CP448-2

OPERATION

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

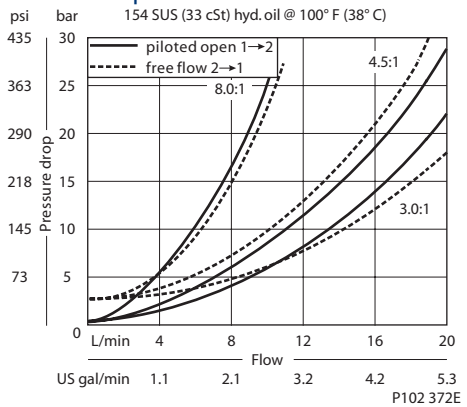
Schematic



P102 379E

SPECIFICATIONS

Theoretical performance



P102 372E

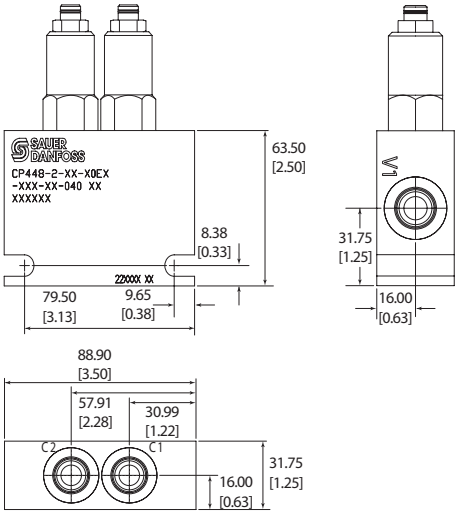
Specifications

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, 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

Housing and ports
4S = AL, #4 SAE
6S = AL, #6 SAE
other housings available, consult factory

Seals

	Seal kits
B = Buna N	120238
V = Viton	120239

Adjustment option
E = External

Crack pressure
Code x 10 = psi
Example: 050 = 500 psi

Pressure range

Pilot ratio	1.5	3.0	4.5	8.0
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	34-117 bar [500-1700 psi]	69-241 bar [1000-3500 psi]	103-345 bar [1500-5000 psi]	
C	55-207 bar [800-3000 psi]	124-345 bar [1800-5000 psi]		

Check crack pressure
040 = 2.8 bar [40 psi]

P102 750E

Comatrol
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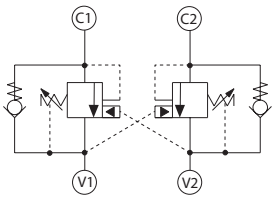
Cartridge Valves Technical Information
Counterbalance valves
Dual Counterbalance
DCB10-HV



P102 379E

OPERATION

This is a dual counterbalance valve with hydraulic vent. This assembly uses 2 CB10-HV cartridges.

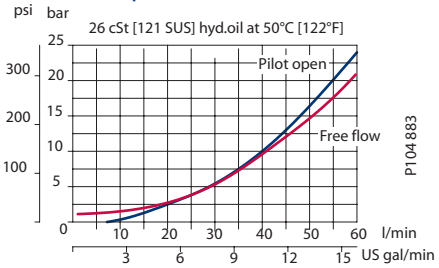
SPECIFICATIONS

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

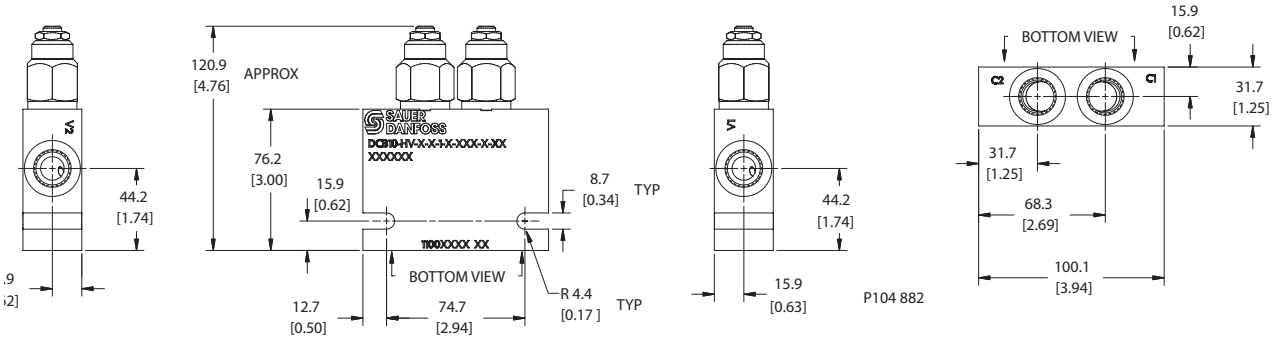
* 350 bar with steel housing
210 bar with aluminum housing

Theoretical performance

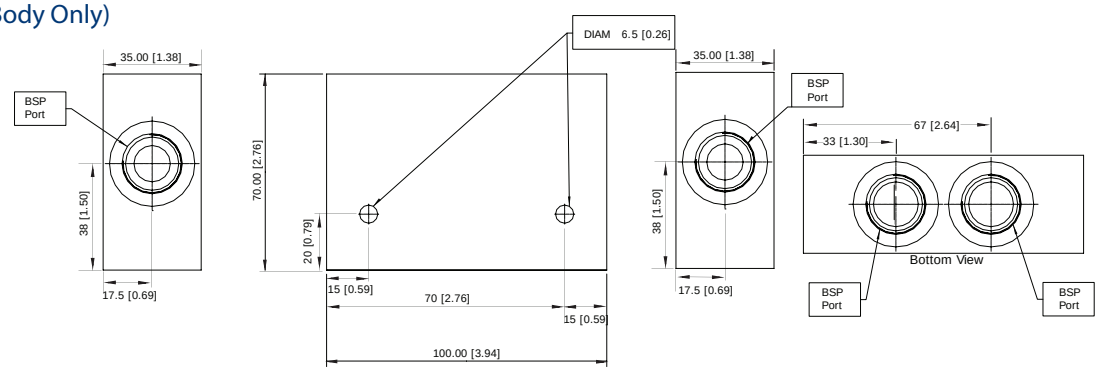


mm [in]

Cross-sectional view
SAE - Ported



BSP Ported - (Body Only)



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

Spring range
For plot 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

	Body P/N
6S = Aluminium, #6 SAE	11002669
8S = Aluminium, #8 SAE	11001779
SE3B = Aluminium, 3/8" BSPP	922518510
SE4B = Aluminium, 1/2" BSPP	922518610
S6S = Steel, #6 SAE	11009171
S6S = Steel, #8 SAE	11009170

Seals

	Seal kit
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

P104 884

Comatrol
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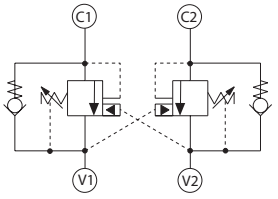
Cartridge Valves Technical Information
Counterbalance valves
Dual Counterbalance
CP441-2

OPERATION

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

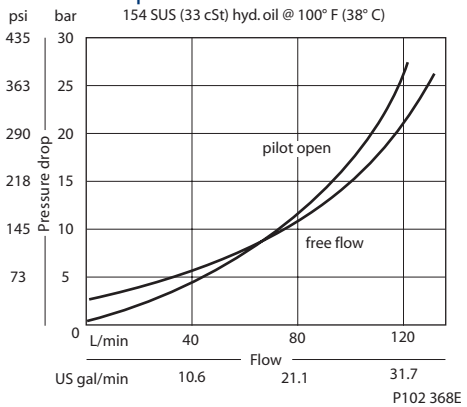
Schematic



P102 379E

SPECIFICATIONS

Theoretical performance



P102 368E

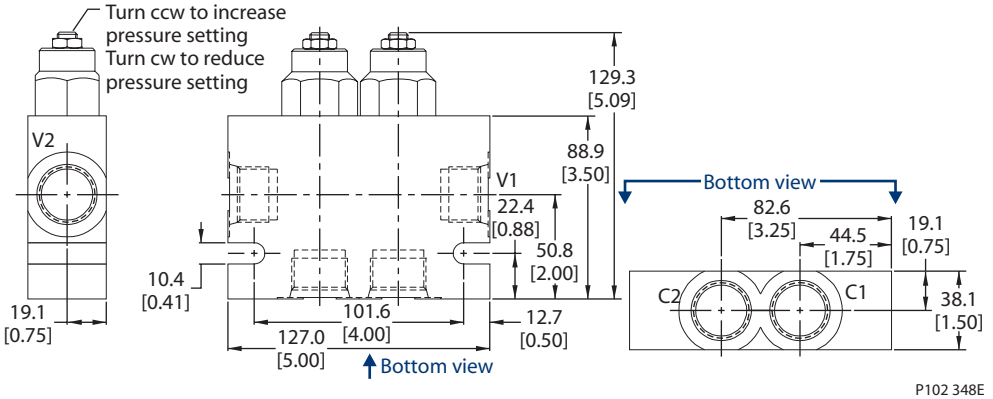
Specifications

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, 10:1
Cavity	none

DIMENSIONS

mm [in]

Cross-sectional view



P102 348E

ORDERING INFORMATION

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

Housing and ports / **Housing P/N**
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 / **Seal kit**
B = Buna-N — 120414
V = Viton — 120415

Adjustment option
E = External adjustment

Pressure range

Pilot ratio 3.0

	bar	[psi]
A =	34-103	[500-1500]
Std. setting	69	[1000]
B =	103-207	[1500-3000]
Std. setting	103	[1500]

Pilot ratio 4.5

	bar	[psi]
A =	34-138	[500-2000]
Std. setting	103	[1500]
B =	103-345	[1500-5000]
Std. setting	103	[1500]

Pilot ratio 10.0

	bar	[psi]
A =	69-345	[1000-5000]
Std. setting	172	[2500]
B =	N/a	N/a

Crack pressure
Code x 10 = psi
Example: 250 = 2500 psi

Free flow check
Cracking pressure

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

Pilot ratio

P102 089E

Comatrol
RESPONSIVENESS IN MOTION
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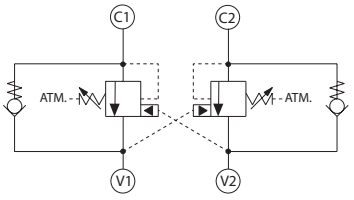
Cartridge Valves Technical Information
Counterbalance valves
Dual Counterbalance
DCB10-AV



P104 885

OPERATION

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

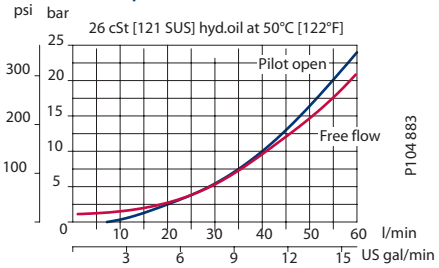
SPECIFICATIONS

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

* 350 bar with steel housing
210 bar with aluminum housing

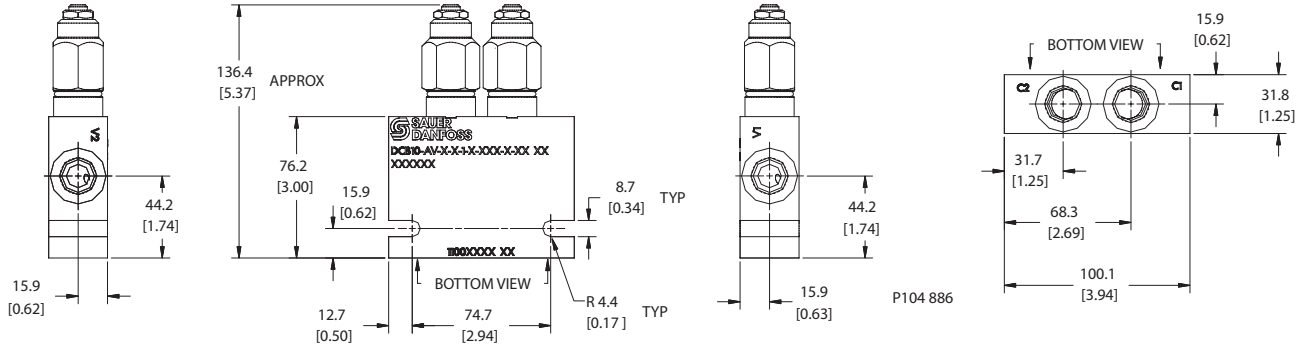
Theoretical performance



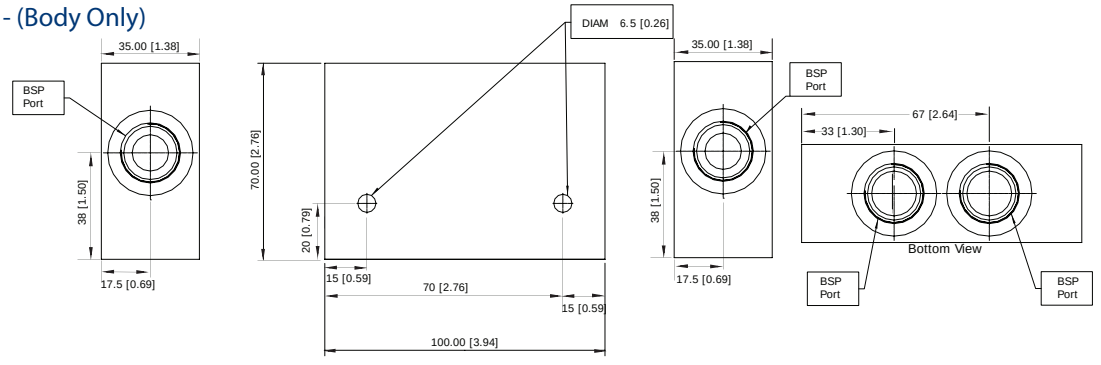
mm [in]

Cross-sectional view

SAE - Ported



BSP Ported - (Body Only)



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

Spring range
For plot 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 / **Body P/N**
6S = Aluminium, #6 SAE — 11002669
8S = Aluminium, #8 SAE — 11001779
SE3B = Aluminium, 3/8" BSPP — 922518510
SE4B = Aluminium, 1/2" BSPP — 922518610
S6S = Steel, #6 SAE — 11009171
S6S = Steel, #8 SAE — 11009170

Seals / **Seal kit**
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

P104 887