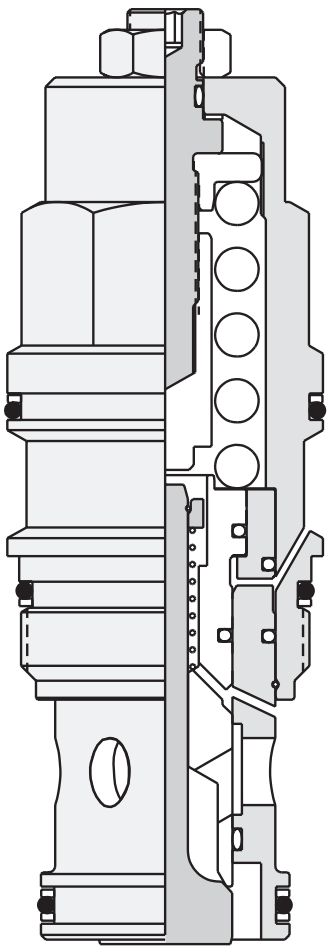
Counterbalance Cartridge Valves



COUNTERBALANCE CARTRIDGE VALVE TECHNICAL INFORMATION

Adjustment Range

A, H:	70-280 bar	–	Standard Setting 210 bar
B, I:	30-105 bar	–	Standard Setting 70 bar
C, J:	140-350 bar	–	Standard Setting 210 bar
D, K:	70-175 bar	–	Standard Setting 140 bar
F:	70-175 bar	–	Standard Setting 140 bar
G:	140-420 bar	–	Standard Setting 280 bar

Cracking Pressure of Reverse Free Flow Check
Valves with pressure range A, B, C, D have a .3 bar cracking pressure for the reverse free flow check. All others are 1.5 to 3 bar cracking pressure. In applications with loads that change quickly, higher cracking pressures are recommended.

Influence of Back Pressure
Pressure downstream of the counterbalance valve (port 2) is additive to the setting with the given factor (influence of back pressure). The setting is the load pressure (on port 1) that opens the valve with no pilot pressure (on port 3).

In applications with proportional valves that throttle the return flow, Sun recommends using vented counterbalance valves (CW** or CA**). CW** counterbalance valves have a spring chamber drained to port 4. CA** valves have an atmospherically vented spring chamber. CA** valves can be used when some external leakage (drops) is acceptable. The spring chamber cannot corrode due to splash water.

Stability
Circuits with counterbalance valves can be unstable. In most cases the circuit will be more stable after replacing the counterbalance valve with a valve that has a lower pilot ratio or is restrictive or smaller. Pilot ratio 3:1 is very common and works in most cases.

Notes (see numbers within table at right)
(1) Fully restrictive valves have a very limited flow capacity as relief valves. Counterbalance restrictive valves can be used to limit the pressure due to thermal expansion.

(2) These counterbalance valves have an internal bleed-off orifice between port 3 and 2 to reduce the effective pilot ratio. The pilot flow between port 3 and 2 is about .6 L/min. at 70 bar pilot pressure.

(3) These valves have no sealed pilot piston. The leakage from port 3 to port 2 is .93 L/min. at 70 bar pilot pressure.

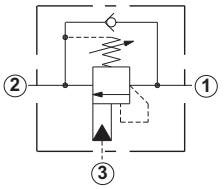
(4) These are valves with no sealed pilot piston. Leakage between port 3 and port 2 is between .03 and .3 L/min. The high leakage occurs when the pilot pressure is half the load pressure or higher.

CBCA and CBEA are available with sealed pilot piston (these would be custom numbered valves).

All Model Codes shown in boldface type are in the counterbalance section of this catalogue. Consult www.sunhydraulics.com for our complete line of counterbalance cartridge products.

Cavity Adapters
T-17A to T-2A: XHOC-BXN
T-17A to T-11A: XHOC-EXN
T-19A to T-17A: XJOC-GXN
T-23A to T-22A: XPOC-NXN
T-24A to T-23A: XQOC-PXN

COUNTERBALANCE CARTRIDGE VALVES / NON-VENTED



Fully Restricted — ***Series 1***

Cavity	T-11A
Nominal Capacity	10 L/min.

Model Code	*Adjustment Range*
CBAB	H; I; A; B
CBAA	H; I; A; B
CBAG	J; K; C; D

Restrictive **(1)** — ***Series 1***

Cavity	T-11A
Nominal Capacity	20 L/min.

Model Code	*Adjustment Range*
CBBY (2)	**H; I; A; B**
CBBA	**H; I; A; B**
CBBG	**J; K; C; D**
CBBH (3)	J; K; C; D

Semi-restrictive — ***Series 1***

Cavity	T-11A
Nominal Capacity	40 L/min.

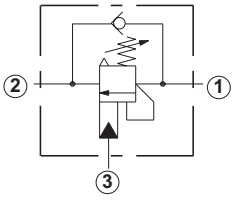
Model Code	*Adjustment Range*
CBBB	**H; I; A; B**
CBBL	**J; K; C; D**
CBBC	**H; I; A; B**
CBBD	**J; K; C; D**

Standard — ***Series 1***

Cavity	T-11A
Nominal Capacity	60 L/min.

Model Code	*Adjustment Range*
CBCB	H; I; A; B
CBCY (2)	**H; I; A; B**
CBCL	**J; K; C; D**
CBCA(3)	**H; I; A; B**
CBCG (3)	**J; K; C; D**
CBCH (4)	**J; K; C; D**

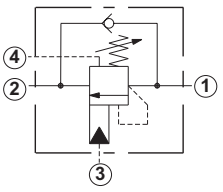
COUNTERBALANCE CARTRIDGE VALVES / VENTED



Standard — ***Series 1***

Cavity	T-11A
Nominal Capacity	60 L/min.

Model Code	*Adjustment Range*
CACK	**H; I**
CACL	**F; G**
CACA	**H; I**
CACG	**F; G**



Standard — ***Series 1***

Cavity	T-21A
Nominal Capacity	60 L/min.

Model Code	*Adjustment Range*
CWCK	**H; I**
CWCL	**F; G**
CWCA	**H; I**
CWCG	**F; G**

Series 2		Series 3		Series 4				
						Pilot Ratio	Max. Setting Depends on Pressure Range	Influence of Back Pressure
						1.5:1	280 bar	2.5
						3:1	280 bar	4
						4.5:1	350 bar	5.5

Series 2		Series 3		Series 4				
T-2A		T-17A		T-19A				
20 L/min.		40 L/min.		80 L/min.				
Model Code	Adjustment Range	Model Code	Adjustment Range	Model Code	Adjustment Range	Pilot Ratio	Max. Setting Depends on Pressure Range	Influence of Back Pressure
						2:1	280 bar	3
CBDA	**H; I; A; B**	**CBFA**	**H; I; A; B**	**CBHA**	**H; I; A; B**	3:1	280 bar	4
CBDG	**J; K; C; D**	**CBFG**	**J; K; C; D**	**CBHG**	**J; K; C; D**	4.5:1	350 bar	5.5
CBDH	J; K; C; D	CBFH	J; K; C; D			10:1	350 bar	11

Series 2		Series 3		Series 4			
T-2A		T-2A					
80 L/min.		160 L/min.					
Model Code	Adjustment Range	Model Code	Adjustment Range			Pilot Ratio	Max. Setting Depends on Pressure Range	Influence of Back Pressure
CBDB	**H; I; A; B**	**CBFB**	**H; I; A; B**			1.5:1	280 bar	2.5
CBDL	**I; J; K; B; C; D**	**CBFL**	**J; K; C; D**			2.3:1	350 bar	3.3
CBDC	**H; I; A; B**	**CBFC**	**H; I; A; B**			3:1	280 bar	4
CBDD	**J; C; K; D**	**CBFD**	**J; K; C; D**			4.5:1	350 bar	5.5

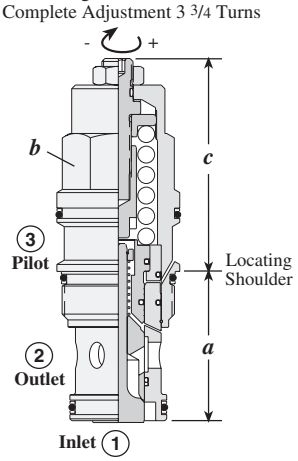
Series 2		Series 3		Series 4				
T-2A		T-17A		T-19A				
120 L/min.		240 L/min.		480 L/min.				
Model Code	Adjustment Range	Model Code	Adjustment Range	Model Code	Adjustment Range	Pilot Ratio	Max. Setting Depends on Pressure Range	Influence of Back Pressure
CBEB	**H; I; A; B**	**CBGB**	**H; I; A; B**	**CBIB**	**H; I; A; B**	1.5:1	280 bar	2.5
CBEY (2)	**H; A; B**	**CBGY (2)**	**H; A; B; I**	**CBIY (2)**	**H; I; A; B**	2:1	280 bar	3
CBEL	**I; J; K; B; C; D**	**CBGL**	**J; K; C; D**	**CBIL**	**J; K; C; D**	2.3:1	350 bar	3.3
CBEA(3)	**H; I; A; B**	**CBGA**	**H; I; A; B**	**CBIA**	**H; I; A; B**	3:1	280 bar	4
CBEG (3)	**I; J; K; B; C; D**	**CBGG**	**J; K; C; D**	**CBIG**	**J; K; C; D**	4.5:1	350 bar	5.5
CBEH (4)	**I; J; K; B; C; D**	**CBGH**	**J; K; C; D**	**CBIH**	**J; K; C; D**	10:1	350 bar	11

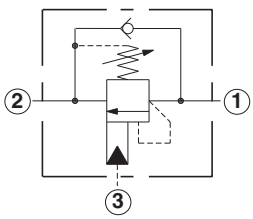
Series 2		Series 3		Series 4				
T-2A		T-17A		T-19A				
120 L/min.		240 L/min.		480 L/min.				
Model Code	Adjustment Range	Model Code	Adjustment Range	Model Code	Adjustment Range	Pilot Ratio	Max. Setting Depends on Pressure Range	Influence of Back Pressure
CAEK	**H; I**	**CAGK**	**H; I**	**CAIK**	**H; I**	1:1	280 bar	0
CAEL	**F; G**	**CAGL**	**F; G**	**CAIL**	**F; G**	2:1	420 bar	0
CAEA	**H; I**	**CAGA**	**H; I**	**CAIA**	**H; I**	3:1	280 bar	0
CAEG	**F; G**	**CAGG**	**F; G**	**CAIG**	**F; G**	5:1	420 bar	0

Series 1		Series 3		Series 4				
T-22A		T-23A		T-24A				
120 L/min.		240 L/min.		480 L/min.				
Model Code	Adjustment Range	Model Code	Adjustment Range	Model Code	Adjustment Range	Pilot Ratio	Max. Setting Depends on Pressure Range	Influence of Back Pressure
CWEK	**H; I**	**CWGK**	**H; I**	**CWIK**	**H; I**	1:1	280 bar	0
CWEL	**F; G**	**CWGL**	**F; G**	**CWIL**	**F; G**	2:1	420 bar	0
CWEA	**H; I**	**CWGA**	**H; I**	**CWIA**	**H; I**	3:1	280 bar	0
CWEG	**F; G**	**CWGG**	**F; G**	**CWIG**	**F; G**	5:1	420 bar	0

NON-VENTED, STANDARD, 280 BAR MAXIMUM SETTING, 3:1, 1.5:1, 2:1 PILOT RATIOS

Turn screw clockwise to reduce setting and release load.
Complete Adjustment 3 3/4 Turns



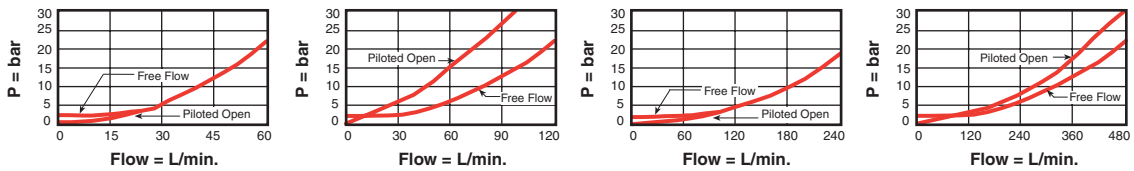


Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* *a*	*b*	*c* L	*c* C	*Installation Torque (Nm)*
60 L/min.	**CBCA – LHN**	T - 11A	35,1	22,2	49,8	58,2	45 - 50
120 L/min.	**CBEA – LHN**	T - 2A	35,1	28,6	60,5	63,5	60 - 70
240 L/min.	**CBGA – LHN**	T - 17A	46,0	31,8	69,9	84,1	200 - 215
480 L/min.	**CBIA – LHN**	T - 19A	63,5	41,3	89,9	103,9	465 - 500

Performance Curves

CBC* **CBE*** **CBG*** **CBI***

Free Flow and Piloted Open Pressure Drop



- Maximum recommended load pressure at maximum setting = 215 bar.
- Maximum setting = 280 bar.
- Maximum valve leakage at reseat = 0,4 cc/mm.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when valve is standard set. Settings lower than the standard pressure may result in lower reseat percentage.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Back pressure at port 2 adds to the effective relief setting at a ratio of 1 plus the pilot ratio times the back pressure.
- Two check valve cracking pressures are available. Use the 1,7 bar check unless actuator cavitation is a concern.

OPTION ORDERING INFORMATION

CB ✱✱ – ✱✱✱

Nominal Capacity

- **C** 60 L/min.
- **E** 120 L/min.
- **G** 240 L/min.
- **I** 480 L/min.

Version

- **A** 3:1 Pilot Ratio
- **B** 1.5:1 Pilot Ratio (Sealed Pilot)
- **Y** 2:1 Pilot Ratio (Bleed through Pilot)

*Control***

- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set

** Special setting required. Specify at time of order.*

*** See page 178 for information on Control Options*

Customer specified special setting stamped on hex.

Functional Setting Range

- **H** 70 - 280 bar with 1,7 bar check Standard set at 210 bar
- **I** 28 - 105 bar with 1,7 bar check Standard set at 70 bar
- **A** 70 - 280 bar with 0,3 bar check Standard set at 210 bar
- **B** 28 - 105 bar with 0,3 bar check Standard set at 70 bar

Seal Material

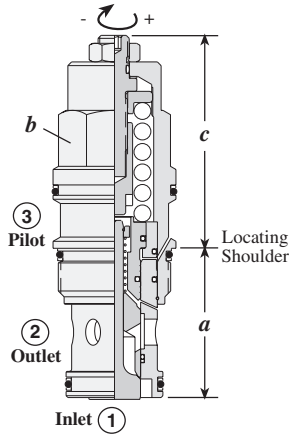
- **N** Buna-N
- **V** Viton

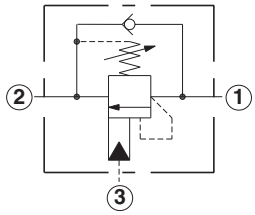
Consult the Sun website for our most recent and complete information on the full Corrosion Resistant line of products.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

NON-VENTED, STANDARD, 350 BAR MAXIMUM SETTING, 4.5:1, 10:1, 2.3:1 PILOT RATIOS

Turn screw clockwise to reduce setting and release load.
Complete Adjustment 3 3/4 Turns



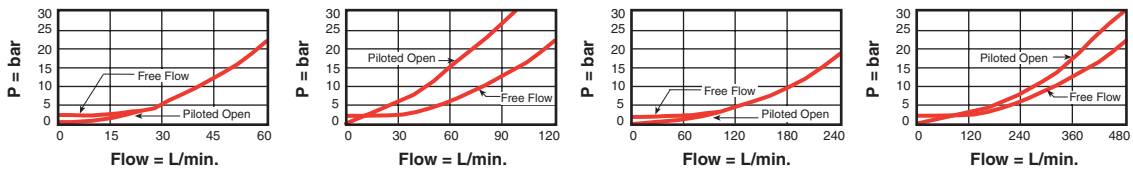


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	Cartridge Dimensions b	Cartridge Dimensions c L	Cartridge Dimensions c C	Installation Torque (Nm)
60 L/min.	**CBCG – LJN**	T - 11A	35,1	22,2	50,0	58,2	45 - 50
120 L/min.	**CBEG – LJN**	T - 2A	35,1	28,6	60,5	63,5	60 - 70
240 L/min.	**CBGG – LJN**	T - 17A	46,0	31,8	69,9	84,1	200 - 215
480 L/min.	**CBIG – LJN**	T - 19A	63,5	41,3	89,9	103,9	465 - 500

Performance Curves

CBC* **CBE*** **CBG*** **CBI***

Free Flow and Piloted Open Pressure Drop



- Maximum recommended load pressure at maximum setting = 270 bar.
- Maximum setting = 350 bar.
- Maximum valve leakage at reseat = 0,4 cc/mm.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when valve is standard set. Settings lower than the standard pressure may result in lower reseat percentage.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Back pressure at port 2 adds to the effective relief setting at a ratio of 1 plus the pilot ratio times the back pressure.
- Two check valve cracking pressures are available. Use the 1,7 bar check unless actuator cavitation is a concern.

OPTION ORDERING INFORMATION

CB ** – *

Nominal Capacity
- **C** 60 L/min.
- **E** 120 L/min.
- **G** 240 L/min.
- **I** 480 L/min.

Version
- **G** 4.5:1 Pilot Ratio
- **H** 10:1 Pilot Ratio
- **L** 2.3:1 Pilot Ratio (Sealed Pilot)

*Control***
- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set

* *Special setting required. Specify at time of order.*

** *See page 178 for information on Control Options*

Customer specified special setting stamped on hex.

Functional Setting Range
- **J** 140 - 350 bar with 1,7 bar check Standard set at 210 bar
- **K** 70 - 175 bar with 1,7 bar check Standard set at 140 bar
- **C** 140 - 350 bar with 0,3 bar check Standard set at 210 bar
- **D** 70 - 175 bar with 0,3 bar check Standard set at 140 bar

Seal Material
- **N** Buna-N
- **V** Viton

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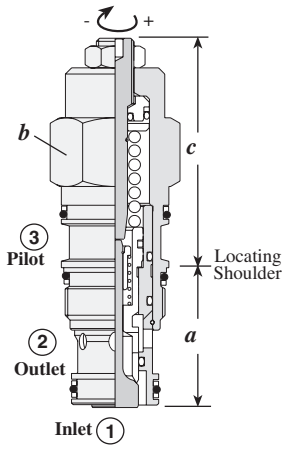
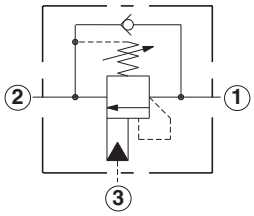
NON-VENTED, SEMI-RESTRICTIVE, 280 BAR MAXIMUM SETTING, 1.5:1, 3:1 PILOT RATIOS

Turn screw clockwise to reduce setting and release load.
Complete Adjustment 3 3/4 Turns



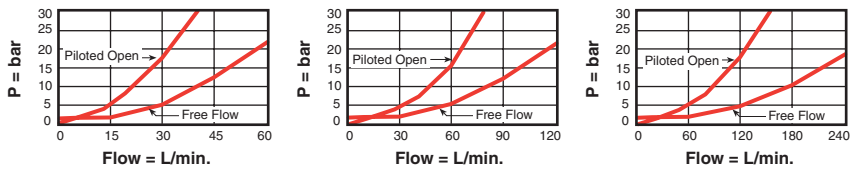


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c L	c C	Installation Torque (Nm)
40 L/min.	**CBBC – LHN**	T - 11A	35,1	22,2	50,0	58,2	45 - 50
80 L/min.	**CBDC – LHN**	T - 2A	35,1	28,6	60,5	63,5	60 - 70
160 L/min.	**CBFC – LHN**	T - 17A	46,0	31,8	69,9	84,1	200 - 215

Performance Curves

CBB* **CBD*** **CBF***

Free Flow and Piloted Open Pressure Drop



- Maximum recommended load pressure at maximum setting = 215 bar.
- Maximum setting = 280 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when the valve is standard set. Settings lower than the standard sets pressure may result in lower reseat percentages.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Back pressure at port 2 adds to the effective relief setting at a ratio of 1 plus the pilot ratio times the back pressure.
- Two check valve cracking pressures are available. Use the 1,7 bar check unless actuator cavitation is a concern.

OPTION ORDERING INFORMATION

CB ✱ ✱ – ✱ ✱ ✱

Nominal Capacity

B 40 L/min.

D 80 L/min.

F 160 L/min.

Version

C 3:1 Pilot Ratio (Sealed Pilot)

B 1.5:1 Pilot Ratio (Sealed Pilot)

Control**

L Standard Screw Adjustment

C* Tamper Resistant Factory Set

** **Special setting required. Specify at time of order.***

*** **See page 178 for information on Control Options***

Customer specified special setting stamped on hex.

Functional Setting Range

H 70 - 280 bar with 1,7 bar check Standard set at 210 bar

I 28 - 105 bar with 1,7 bar check Standard set at 70 bar

A 70 - 280 bar with 0,3 bar check Standard set at 210 bar

B 28 - 105 bar with 0,3 bar check Standard set at 70 bar

Seal Material

N Buna-N

V Viton

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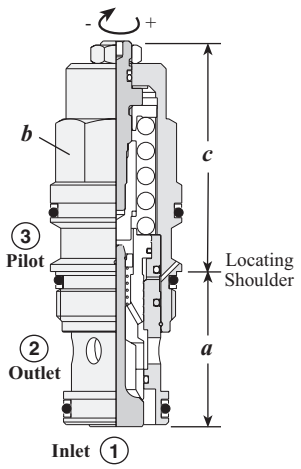
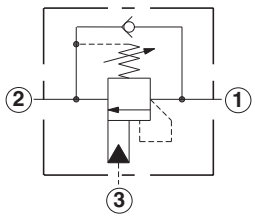
NON-VENTED, SEMI-RESTRICTIVE, 350 BAR MAXIMUM SETTING, 4.5:1, 2.3:1 PILOT RATIOS

Turn screw clockwise to reduce setting and release load.
Complete Adjustment 3 3/4 Turns



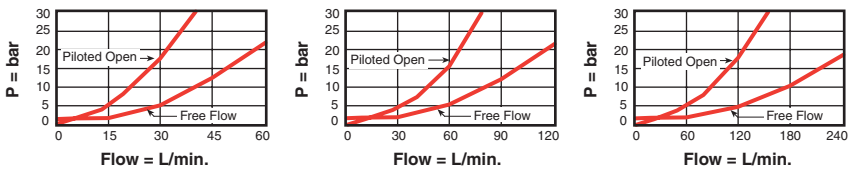


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c L	c C	Installation Torque (Nm)
40 L/min.	**CBBD – LJN**	T - 11A	35,1	22,2	49,8	58,2	45 - 50
80 L/min.	**CBDD – LJN**	T - 2A	35,1	28,6	60,5	63,5	60 - 70
160 L/min.	**CBFD – LJN**	T - 17A	46,0	31,8	69,9	84,1	200 - 215

Performance Curves

CBB* **CBD*** **CBF***

Free Flow and Piloted Open Pressure Drop



- Maximum recommended load pressure at maximum setting = 270 bar.
- Maximum setting = 350 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when valve is standard set. Settings lower than the standard pressure may result in lower reseat percentage.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Back pressure at port 2 adds to the effective relief setting at a ratio of 1 plus the pilot ratio times the back pressure.
- Two check valve cracking pressures are available. Use the 1,7 bar check unless actuator cavitation is a concern.

OPTION ORDERING INFORMATION

CB ✱ ✱ – ✱ ✱ ✱

Nominal Capacity

- **B** 40 L/min.
- **D** 80 L/min.
- **F** 160 L/min.

Version

- **D** 4.5:1 Pilot Ratio (Sealed Pilot)
- **L** 2.3:1 Pilot Ratio (Sealed Pilot)

Control**

- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set

* ***Special setting required. Specify at time of order.***

** ***See page 178 for information on Control Options***

Customer specified special setting stamped on hex.

Functional Setting Range

- **J** 140 - 350 bar with 1,7 bar check Standard set at 210 bar
- **K** 70 - 175 bar with 1,7 bar check Standard set at 140 bar
- **C** 140 - 350 bar with 0,3 bar check Standard set at 210 bar
- **D** 70 - 175 bar with 0,3 bar check Standard set at 140 bar

Seal Material

- **N** Buna-N
- **V** Viton

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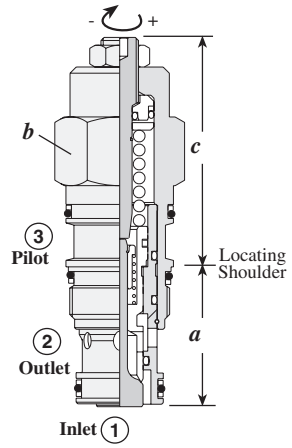
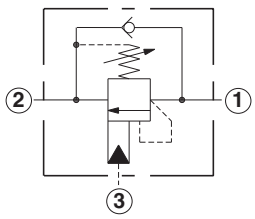
NON-VENTED, RESTRICTIVE, 280 BAR MAXIMUM SETTING, 3:1, 2:1 PILOT RATIOS

Turn screw clockwise to reduce setting and release load.
Complete Adjustment 3 3/4 Turns



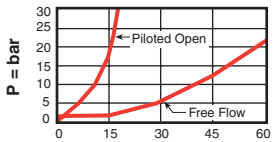


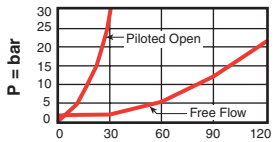
Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* *a*	*b*	*c* L	*c* C	*Installation Torque (Nm)*
15 L/min.	**CBBA – LHN**	T - 11A	35,1	22,2	50,0	58,2	45 - 50
30 L/min.	**CBDA – LHN**	T - 2A	35,1	28,6	60,5	63,5	60 - 70
60 L/min.	**CBFA – LHN**	T - 17A	46,0	31,8	69,9	84,1	200 - 215
80 L/min.	**CBHA – LHN**	T - 19A	63,5	41,3	89,9	103,9	465 - 500

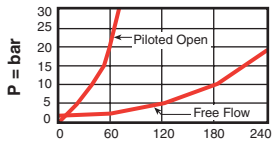
Performance Curves

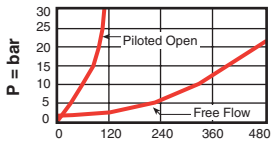
CBB* **CBD*** **CBF*** **CBH***

Free Flow and Piloted Open Pressure Drop









- Maximum recommended load pressure at maximum setting = 215 bar.
- Maximum setting = 280 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when valve is standard set. Settings lower than the standard pressure may result in lower reseat percentage.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Back pressure at port 2 adds to the effective relief setting at a ratio of 1 plus the pilot ratio times the back pressure.
- Restrictive valves have no relief capacity other than as a thermal relief.
- Two check valve cracking pressures are available. Use the 1,7 bar check unless actuator cavitation is a concern.

OPTION ORDERING INFORMATION

CB ** – *

Nominal Capacity

B 15 L/min.
D 30 L/min.
F 60 L/min.
H 80 L/min.

Version

A 3:1 Pilot Ratio (Sealed Pilot)

CBBY only:

Y 2:1 Pilot Ratio (Bleed through Pilot)

*Control***

L Standard Screw Adjustment

C* Tamper Resistant Factory Set

* ***Special setting required. Specify at time of order.***

** ***See page 178 for information on Control Options***

Customer specified special setting stamped on hex.

Functional Setting Range

H 70 - 280 bar with 1,7 bar check Standard set at 210 bar

I 28 - 105 bar with 1,7 bar check Standard set at 70 bar

A 70 - 280 bar with 0,3 bar check Standard set at 210 bar

B 28 - 105 bar with 0,3 bar check Standard set at 70 bar

Seal Material

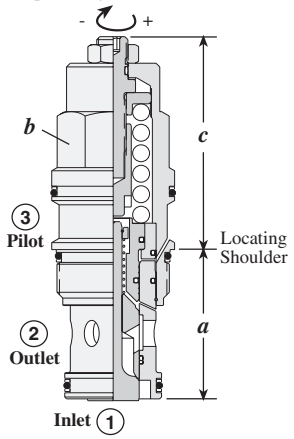
N Buna-N
V Viton

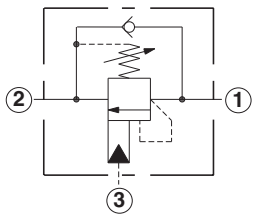
Consult the Sun website for our most recent and complete information on the full Corrosion Resistant line of products.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

NON-VENTED, RESTRICTIVE, 350 BAR MAXIMUM SETTING, 4.5:1 PILOT RATIO

Turn screw clockwise to reduce setting and release load.
Complete Adjustment 3 3/4 Turns



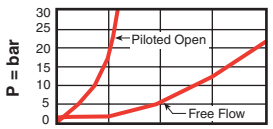


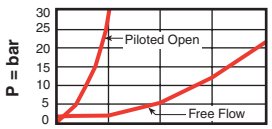
Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	Cartridge Dimensions b	Cartridge Dimensions c L	Cartridge Dimensions c C	Installation Torque (Nm)
15 L/min.	**CBBG – LJN**	T - 11A	35,1	22,2	50,0	58,2	45 - 50
30 L/min.	**CBDG – LJN**	T - 2A	35,1	28,6	60,5	63,5	60 - 70
60 L/min.	**CBFG – LJN**	T - 17A	46,0	31,8	69,9	84,1	200 - 215
80 L/min.	**CBHG – LJN**	T - 19A	63,5	41,3	89,9	103,9	465 - 500

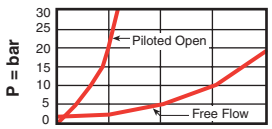
Performance Curves

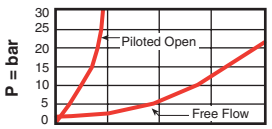
CBBG **CBDG** **CBFG** **CBHG**

Free Flow and Piloted Open Pressure Drop









- Maximum recommended load pressure at maximum setting = 270 bar.
- Maximum setting = 350 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when valve is standard set. Settings lower than the standard pressure may result in lower reseat percentage.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Back pressure at port 2 adds to the effective relief setting at a ratio of 1 plus the pilot ratio times the back pressure.
- Restrictive valves have no relief capacity other than as a thermal relief.
- Two check valve cracking pressures are available. Use the 1,7 bar check unless actuator cavitation is a concern.

OPTION ORDERING INFORMATION

CB ✱ G – ✱ ✱ ✱

Nominal Capacity

- **B** 15 L/min.
- **D** 30 L/min.
- **F** 60 L/min.
- **H** 80 L/min.

Version

- **G** 4.5:1 Pilot Ratio (Sealed Pilot)

Control**

- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set

* ***Special setting required. Specify at time of order.***

** ***See page 178 for information on Control Options***

Customer specified special setting stamped on hex.

Functional Setting Range

- **J** 140 - 350 bar with 1,7 bar check Standard set at 210 bar
- **K** 70 - 175 bar with 1,7 bar check Standard set at 140 bar
- **C** 140 - 350 bar with 0,3 bar check Standard set at 210 bar
- **D** 70 - 175 bar with 0,3 bar check Standard set at 140 bar

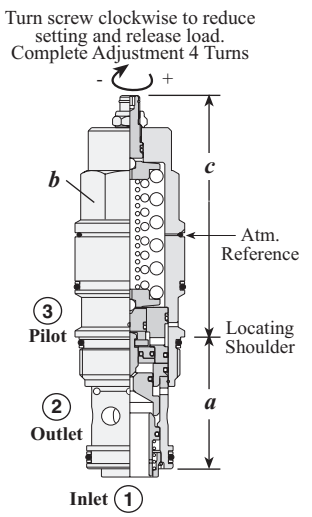
Seal Material

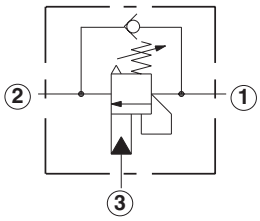
- **N** Buna-N
- **V** Viton

Consult the Sun website for our most recent and complete information on the full Corrosion Resistant line of products.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

VENTED, ATMOSPHERICALLY REFERENCED, 3:1, 5:1, 1:1, 2:1 PILOT RATIOS



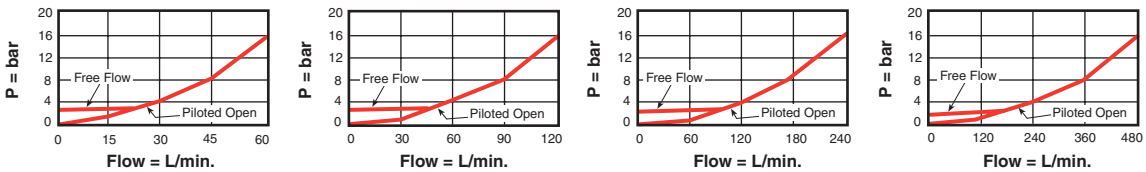


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c L	c C	Installation Torque (Nm)
60 L/min.	**CACA – LHN**	T - 11A	35,1	22,2	73,4	82,6	45 - 50
120 L/min.	**CAEA – LHN**	T - 2A	35,1	28,6	83,6	89,9	60 - 70
240 L/min.	**CAGA – LHN**	T - 17A	46,0	31,8	95,0	100,8	200 - 215
480 L/min.	**CAIA – LHN**	T - 19A	63,5	41,3	116,3	126,0	465 - 500

Performance Curves

CAC* **CAE*** **CAG*** **CAI***

Free Flow and Piloted Open Pressure Drop



- Maximum recommended load pressure at maximum setting = CA*A, CA*K: 215 bar, CA*G, CA*L: 320 bar.
- Maximum setting = CA*A, CA*K: 280 bar, CA*G, CA*L: 420 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Reverse flow check cracking pressure = CAC*: 2,8 bar, CAE*, CAG*: 1,7 bar, CAI*: 1,5 bar.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when the valve is standard set. Settings lower than the standards set pressure may result in lower reseats percentages.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.
- Approximately 1 drop of fluid will pass from the pilot area to the vented spring chamber every 4000 cycles.

OPTION ORDERING INFORMATION

CA ** – *

Nominal Capacity

C 60 L/min.
E 120 L/min.
G 240 L/min.
I 480 L/min.

Version

A 3:1 Pilot Ratio
G 5:1 Pilot Ratio
K 1:1 Pilot Ratio
L 2:1 Pilot Ratio

Control**

L Standard Screw Adjustment
C* Tamper Resistant Factory Set

** Special setting required. Specify at time of order.*

*** See page 178 for information on Control Options*

Customer specified special setting stamped on hex.

Functional Setting Range

CA*A, CA*K, only:

H 70 - 280 bar
Standard set at 210 bar
I 28 - 105 bar
Standard set at 70 bar

CA*G, CA*L only:

F 70 - 175 bar
Standard set at 140 bar
G 140 - 420 bar
Standard set at 280 bar

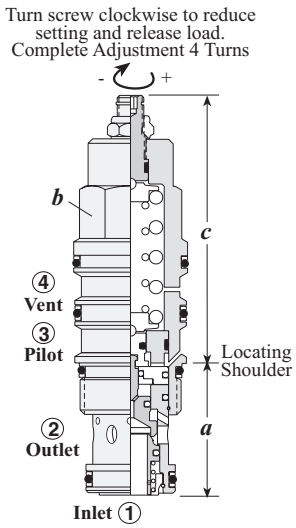
Seal Material

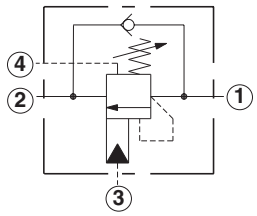
N Buna-N
V Viton

CA*A, CA*K, CA*G, CA*L:
Patent: U.S. #4,834,135

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

VENTED, 280 BAR MAXIMUM SETTING, 3:1, 1:1 PILOT RATIOS



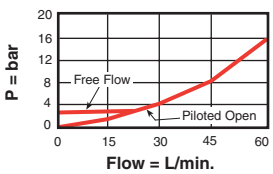


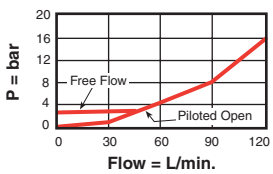
Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c L	c C	Installation Torque (Nm)
60 L/min.	**CWCA– LHN**	T - 21A	34,9	22,2	74,0	82,6	40 - 50
120 L/min.	**CWEA– LHN**	T - 22A	34,9	28,6	84,0	90,0	60 - 70
240 L/min.	**CWGA– LHN**	T - 23A	46,0	31,8	95,3	101,0	200 - 215
480 L/min.	**CWIA – LHN**	T - 24A	63,5	41,3	117,0	126,0	465 - 500

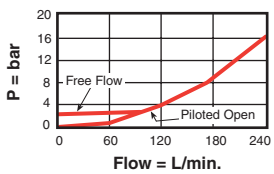
Performance Curves

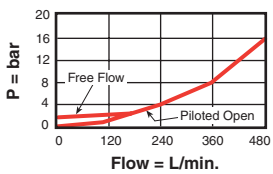
CWC* **CWE*** **CWG*** **CWI***

Free Flow and Piloted Open Pressure Drop









- Maximum recommended load pressure at maximum setting = 215 bar.
- Maximum setting = 280 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Reverse flow check cracking pressure = CWC*: 2,8 bar, CWE*, CWG*: 1,7 bar, CWI*: 1,5 bar.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when the valve is standard set. Settings lower than the standards set pressure may result in lower reseats percentages.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.

OPTION ORDERING INFORMATION

CW * * – * * ***

Nominal Capacity

- **C** 60 L/min.
- **E** 120 L/min.
- **G** 240 L/min.
- **I** 480 L/min.

Version

- **A** 3:1 Pilot Ratio
- **K** 1:1 Pilot Ratio

Control**

- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set

* ***Special setting required. Specify at time of order.***

Functional Setting Range

- **H** 70 - 280 bar Standard set at 210 bar
- **I** 28 - 105 bar Standard set at 70 bar

Seal Material

- **N** Buna-N
- **V** Viton

** ***See page 178 for information on Control Options***

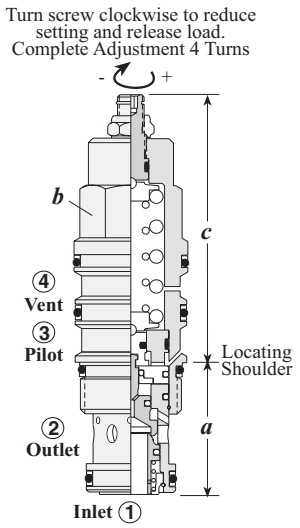
Customer specified special setting stamped on hex.

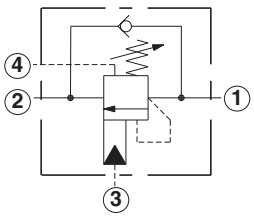
CW*A, CW*K:
Patent: U.S. #4,834,135

Consult the Sun website for our most recent and complete information on the full Corrosion Resistant line of products.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

VENTED, 420 BAR MAXIMUM SETTING, 5:1, 2:1 PILOT RATIOS



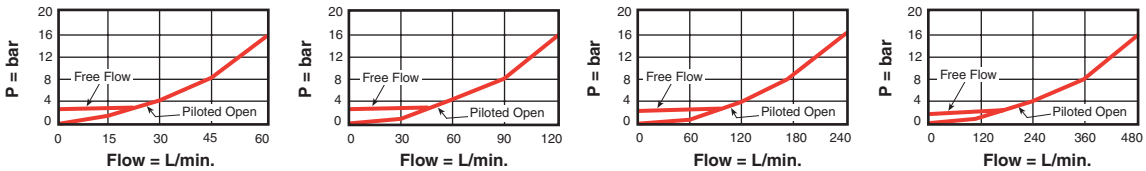


Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* *a*	*b*	*c* L	*c* C	*Installation Torque (Nm)*
60 L/min.	**CWCG– LFN**	T - 21A	35,0	22,2	74,0	82,6	40 - 50
120 L/min.	**CWEG– LFN**	T - 22A	35,0	28,6	83,6	90,0	60 - 70
240 L/min.	**CWGG– LFN**	T - 23A	46,0	31,8	93,3	101,0	200 - 215
480 L/min.	**CWIG – LFN**	T - 24A	63,5	41,3	117,0	126,0	465 - 500

Performance Curves

CWC* **CWE*** **CWG*** **CWI***

Free Flow and Piloted Open Pressure Drop



- Maximum recommended load pressure at maximum setting = 320 bar.
- Maximum setting = 420 bar.
- Maximum valve leakage at reseat = 0,4 cc/min.
- Reverse flow check cracking pressure = CWC*: 2,8 bar, CWE*, CWG*: 1,7 bar, CWI*: 1,5 bar.
- Factory pressure setting established at 30 cc/min.
- Reseat exceeds 85% of set pressure when the valve is standard set. Settings lower than the standards set pressure may result in lower reseats percentages.
- Counterbalance valves should be set at least 1.3 times the maximum load induced pressure.

OPTION ORDERING INFORMATION

CW * * – * * *

Nominal Capacity
- **C** 60 L/min.
- **E** 120 L/min.
- **G** 240 L/min.
- **I** 480 L/min.

Version
- **G** 5:1 Pilot Ratio
- **L** 2:1 Pilot Ratio

*Control***
- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set

* ***Special setting required. Specify at time of order.***

Functional Setting Range
- **F** 70 - 175 bar Standard set at 140 bar
- **G** 140 - 420 bar Standard set at 280 bar

Seal Material
- **N** Buna-N
- **V** Viton

** ***See page 178 for information on Control Options***

Customer specified special setting stamped on hex.

CW*G, CW*L:
Patent: U.S. #4,834,135

Consult the Sun website for our most recent and complete information on the full Corrosion Resistant line of products.

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