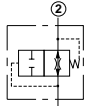


Circuit Savers

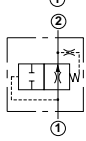
Cartridge Type

Page



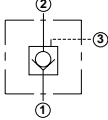
Flow Fuse

78



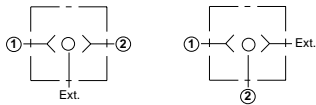
Air Bleed and Start-up

78



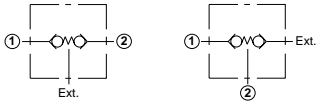
Check, Pilot-to-Close

79



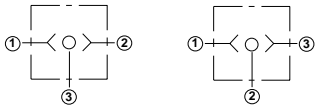
Shuttle, Single Ball, 2 Port, External Port

80



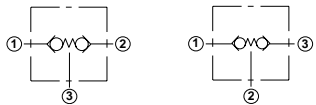
Shuttle, Back-to-Back Checks, 2 Port, External Port

80



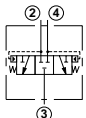
Shuttle, Single Ball, 3 Port

81



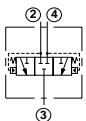
Shuttle, Back-to-Back Checks, 3 Port

81



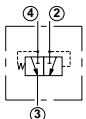
Shuttle, Low Side (Hot Oil) 3 Position, Blocked Center

82



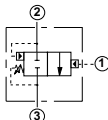
Shuttle, High Side, Blocked Center

82



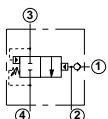
Shuttle, High Side, 2 Position 2-Way, Spring Offset

83



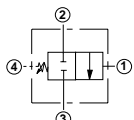
Unloading, 3 Port Pilot Stage

84



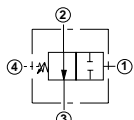
Unloading, 4 Port Pilot Stage with Check

84



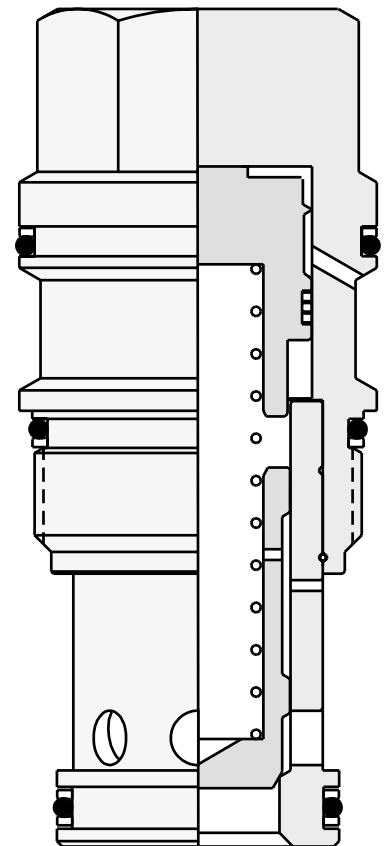
Sequence, Direct Acting, Remote Pilot, Normally Closed, 2-Way

85

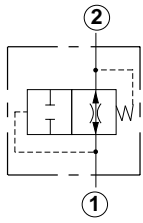


Sequence, Direct Acting, Remote Pilot, Normally Open, 2-Way

85

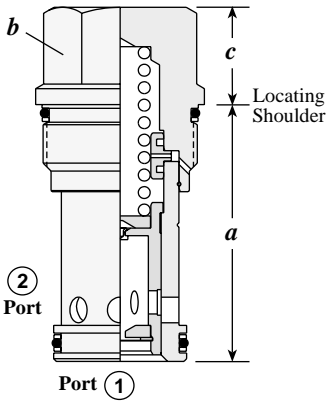


FLOW FUSE



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
.5-6 GPM	FQCA - XAN	T - 13A	1.38	7/8"	.75	30/35
1-15 GPM	FQEA - XAN	T - 5A	1.62	1 1/8"	.69	45/50
1-25 GPM	FQGA - XAN	T - 16A	2.44	1 1/4"	.97	150/160
1-50 GPM	FQIA - XAN	T - 18A	3.13	1 5/8"	1.19	350/375

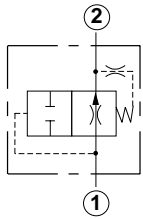
OPTION ORDERING INFORMATION



FQ * A - X A *

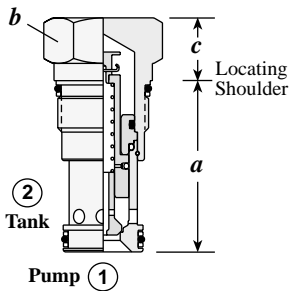
<p>Nominal Capacity</p> <p>C .5-6 GPM</p> <p>E 1-15 GPM</p> <p>G 1-25 GPM</p> <p>I 1-50 GPM</p>	<p>Control**</p> <p>X Non-adjustable</p>	<p>Flow Rate</p> <p>A</p>	<p>Seal</p> <p>N Buna-N</p> <p>V Viton</p>
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AIR BLEED AND START-UP



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
4-50 GPM	NQEB - XAN	T - 3A	1.88	1 1/8"	.69	45/50

OPTION ORDERING INFORMATION

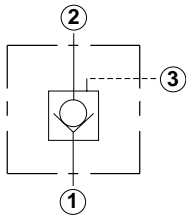


NQ E B - X A *

<p>Nominal Capacity</p> <p>E 4-50 GPM</p>	<p>Control**</p> <p>X Non-adjustable</p>	<p>Flow Rate</p> <p>A</p>	<p>Seal</p> <p>N Buna-N</p> <p>V Viton</p>
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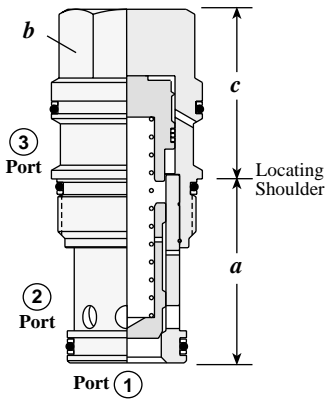
After air has been purged, closing times vary from approximately 12 seconds at 4 GPM to 0.5 seconds at 0.5 GPM.

CHECK, PILOT-TO-CLOSE



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
10 GPM	COBA - XCN	T - 163A	1.22	3/4"	1.22	25/30
20 GPM	CODA - XCN	T - 11A	1.38	7/8"	1.19	30/35
40 GPM	COFA - XCN	T - 2A	1.38	1 1/8"	1.38	45/50
80 GPM	COHA - XCN	T - 17A	1.81	1 1/4"	1.81	150/160
160 GPM	COJA - XCN	T - 19A	2.50	1 5/8"	2.31	350/375

OPTION ORDERING INFORMATION



CO * A - * * *

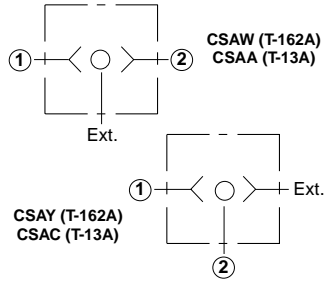
Nominal Capacity	Control**	Cracking Pressure	Seal
B 10 GPM	X Standard Pilot	A * 4 psi	N Buna-N
D 20 GPM		B * 15 psi	V Viton
F 40 GPM		C 30 psi	
H 80 GPM		D 50 psi	
J 160 GPM		E 75 psi	
		F 100 psi	

Pilot Ratio is 1.8:1

** See page 92 for information on Control Options

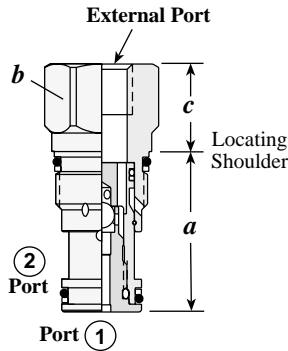
* COBA and COFA are not available in A and B Cracking Pressures.

SHUTTLE, SINGLE BALL, 2 PORT, EXTERNAL PORT



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
1.25 GPM	CSAW – BXN	T - 162A	1.22	3/4"	.81	25/30
2.5 GPM	CSAA – BXN	T - 13A	1.38	7/8"	.750	30/35

OPTION ORDERING INFORMATION

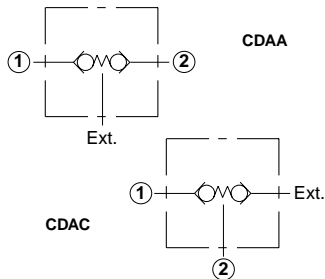


CS A * - * X *

Nominal Capacity and Version		Control**		Seal
AW	1.25 GPM, T-162A Cavity Signal at External Port	B	.25 BSPP External Port	N Buna-N
AY	1.25 GPM, T-162A Cavity Signal at Port 2	E	SAE-4 External Port	V Viton
AA	2.5 GPM, T-13A Cavity Signal at External Port			
AC	2.5 GPM, T-13A Cavity Signal at Port 2			

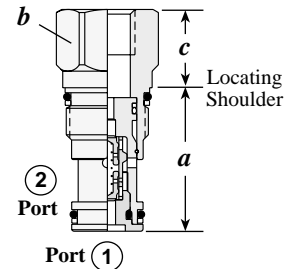
** See page 92 for information on Control Options

SHUTTLE, BACK-TO-BACK CHECKS, 2 PORT, EXTERNAL PORT



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
2.5 GPM	CDAA – BBN	T - 13A	1.38	7/8"	.750	30/35

OPTION ORDERING INFORMATION

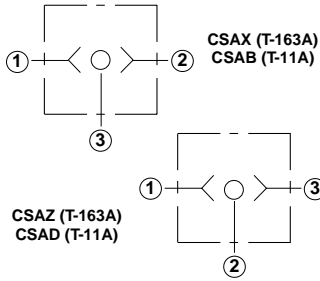


CD A * - * B *

Nominal Capacity	Version	Control**		Seal			
A	2.5 GPM	A	Signal at External Port	B	.25 BSPP External Port	N	Buna-N
		C	Signal at Port 2	E	SAE-4 External Port	V	Viton

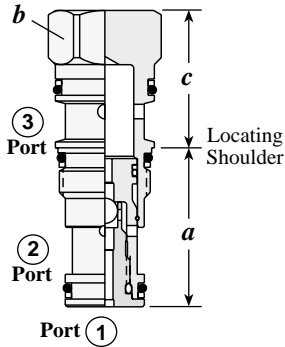
** See page 92 for information on Control Options

SHUTTLE, SINGLE BALL, 3 PORT



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
1.25 GPM	CSAX – XXN	T - 163A	1.22	3/4"	1.25	25/30
2.5 GPM	CSAB – XXN	T - 11A	1.38	7/8"	1.17	30/35

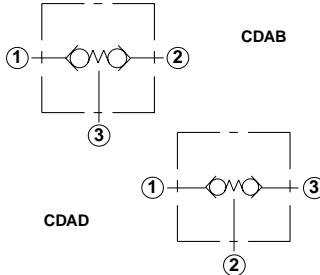
OPTION ORDERING INFORMATION



CS A ★ – X X ★

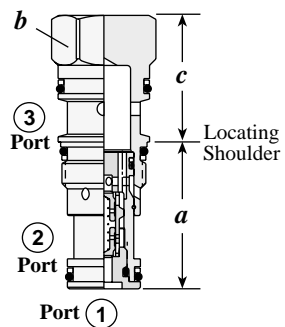
<i>Nominal Capacity and Version</i>		<i>Control**</i>		<i>Seal</i>
AX	1.25 GPM, T-163A Cavity Signal at Port 3	X	Non-adjustable	N Buna-N
AZ	1.25 GPM, T-163A Cavity Signal at Port 2			V Viton
AB	2.5 GPM, T-11A Cavity Signal at Port 3			
AD	2.5 GPM, T-11A Cavity Signal at Port 2			

SHUTTLE, BACK-TO-BACK CHECKS, 3 PORT



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
2.5 GPM	CDAB – XBN	T - 11A	1.38	7/8"	1.17	30/35

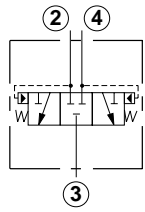
OPTION ORDERING INFORMATION



CD A ★ – X B ★

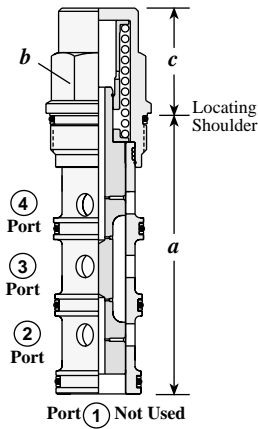
<i>Nominal Capacity</i>		<i>Version</i>		<i>Control**</i>		<i>Seal</i>
A	2.5 GPM	B	Signal at Port 3	X	Non-adjustable	N Buna-N
		D	Signal at Port 2			V Viton

SHUTTLE, LOW SIDE (HOT OIL) 3 POSITION, BLOCKED CENTER



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
15 GPM	DSCH - XHN	T - 31A	3.35	7/8"	1.19	30/35
30 GPM	DSEH - XHN	T - 32A	3.63	1 1/8"	1.31	45/50
60 GPM	DSGH - XHN	T - 33A	4.50	1 1/4"	1.63	150/160
120 GPM	DSIH - XHN	T - 34A	5.50	1 5/8"	2.00	350/375

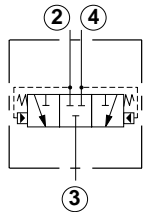
OPTION ORDERING INFORMATION



DS * H - X * *

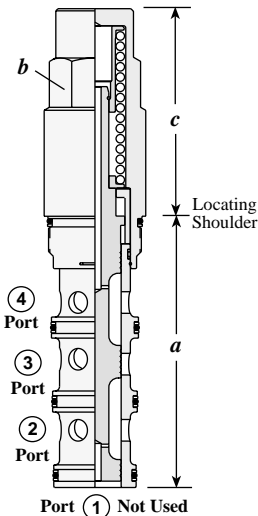
Nominal Capacity	Control	Shifting Pressure	Seal
C 15 GPM	X Non-adjustable	G 150 psi	N Buna-N
E 30 GPM		H 200 psi	V Viton
G 60 GPM			
I 120 GPM			

SHUTTLE, HIGH SIDE, BLOCKED CENTER



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
15 GPM	DSCS - XCN	T - 31A	3.35	7/8"	1.44	30/35
30 GPM	DSES - XCN	T - 32A	3.63	1 1/8"	1.63	45/50
60 GPM	DSGS - XCN	T - 33A	4.50	1 1/4"	2.83	150/160
120 GPM	DSIS - XCN	T - 34A	5.50	1 5/8"	4.21	350/375

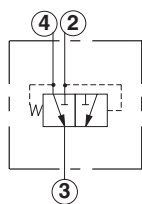
OPTION ORDERING INFORMATION



DS * S - X * *

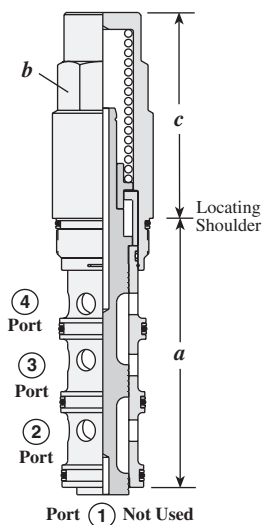
Nominal Capacity	Control	Shifting Pressure	Seal
C 15 GPM	X Non-adjustable	C 30 psi	N Buna-N
E 30 GPM		E 75 psi	V Viton
G 60 GPM		F 100 psi	
I 120 GPM		G 150 psi	

SHUTTLE, HIGH SIDE, 2 POSITION 2-WAY, SPRING OFFSET



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
15 GPM	DSCO - XCN	T - 31A	3.35	7/8"	1.44	30/35
30 GPM	DSEO - XCN	T - 32A	3.63	1 1/8"	1.63	45/50
60 GPM	DSGO - XCN	T - 33A	4.50	1 1/4"	2.83	150/160
120 GPM	DSIO - XCN	T - 34A	5.50	1 5/8"	4.21	350/375

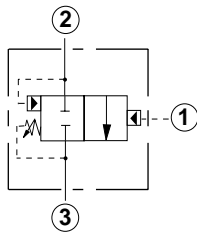
OPTION ORDERING INFORMATION



DS * O - X * *

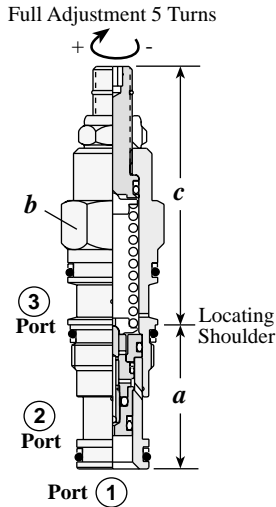
Nominal Capacity	Base Price	Control		Shifting Pressure		Seal	
C 15 GPM	\$ 71.70	X Non-adjustable	+\$ 0.00	C 30 psi	+\$ 3.00	N Buna-N	+\$ 0.00
E 30 GPM	\$ 97.10			E 75 psi	+\$ 0.00	V Viton	+\$ 2.50
G 60 GPM	\$ 161.30						
I 120 GPM	\$ 288.20						

UNLOADING, 3 PORT PILOT STAGE



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (lb. ft.)
			a	b	L	C	
.2 GPM	QPAA – LAN	T - 11A	1.38	7/8"	2.50	2.56	30/35

OPTION ORDERING INFORMATION



QP A * - * * *

Nominal Capacity	Control**	Adjustment Range	Seal
A .2 GPM	L Standard Screw C Tamper Resistant	A 1000 - 3000 psi B 400 - 1500 psi C 2000 - 5000 psi D 200 - 800 psi	N Buna-N V Viton

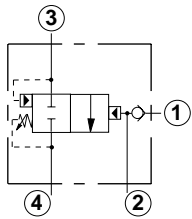
Version

- A 15% Nominal Differential
- B 20% Nominal Differential
- C 30% Nominal Differential
- D 50% Nominal Differential

*** See page 92 for information on Control Options*

*Adjustment Range Options:
A and B Options are standard set at 1000 psi.
D Option is standard set at 400 psi.
C Option is standard set at 2000 psi.
Customer may specify pressure setting.*

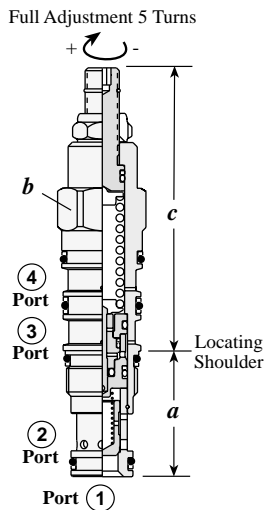
UNLOADING, 4 PORT PILOT STAGE WITH CHECK



Capacity*	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (lb. ft.)
			a	b	L	C	
.2 GPM	QCDA – LAN	T - 21A	1.38	7/8"	3.09	3.15	30/35

* Flow Capacity: Port 3-4 = .2 GPM, Port 1-2 = 15 GPM

OPTION ORDERING INFORMATION



QC D * - * * *

Nominal Capacity*	Control**	Adjustment Range	Seal
D .2 GPM	L Standard Screw C Tamper Resistant	A 1000 - 3000 psi B 400 - 1500 psi C 2000 - 5000 psi D 200 - 800 psi	N Buna-N V Viton

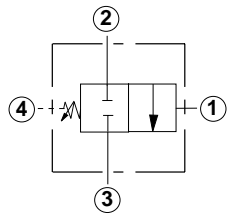
Version

- A 15% Nominal Differential
- B 20% Nominal Differential
- C 30% Nominal Differential
- D 50% Nominal Differential

*** See page 92 for information on Control Options*

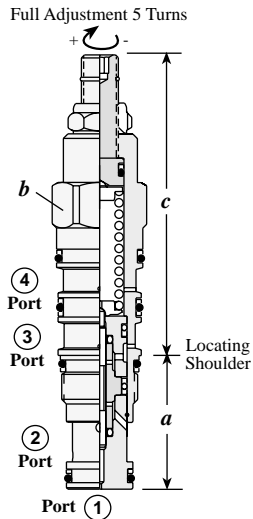
*Adjustment Range Options:
A and B Options are standard set at 1000 psi.
D Option is standard set at 400 psi.
C Option is standard set at 2000 psi.
Customer may specify pressure setting.*

SEQUENCE, DIRECT ACTING, REMOTE PILOT, NORMALLY CLOSED, 2-WAY



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
.5 GPM	DRAX – LAN	T - 21A	1.38	7/8"	3.09	30/35

OPTION ORDERING INFORMATION



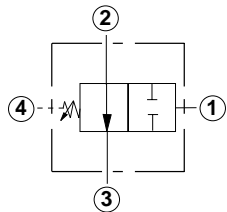
DR A X – L ★ N

Nominal Capacity	Control**	Adjustment Range	Seal
A .5 GPM	L Standard Screw	A 1000 - 3000 psi	N Buna-N
		C 2000 - 6000 psi	V Viton

** See page 92 for information on Control Options

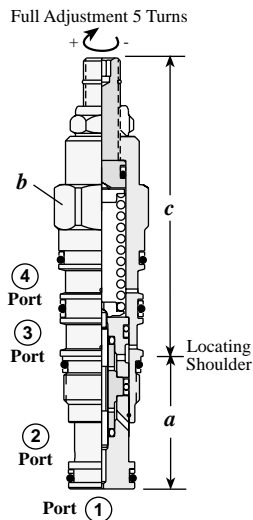
Adjustment Range Options:
 A Option is standard set at 1000 psi.
 C Option is standard set at 2000 psi.
 Customer may specify pressure setting.

SEQUENCE, DIRECT ACTING, REMOTE PILOT, NORMALLY OPEN, 2-WAY



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (lb. ft.)
			a	b	c	
.5 GPM	DRAY – LAN	T - 21A	1.38	7/8"	3.09	30/35

OPTION ORDERING INFORMATION



DR A Y – L ★ N

Nominal Capacity	Control**	Adjustment Range	Seal
A .5 GPM	L Standard Screw	A 1000 - 3000 psi	N Buna-N
		C 2000 - 6000 psi	V Viton

** See page 92 for information on Control Options

Adjustment Range Options:
 A Option is standard set at 1000 psi.
 C Option is standard set at 2000 psi.
 Customer may specify pressure setting.

