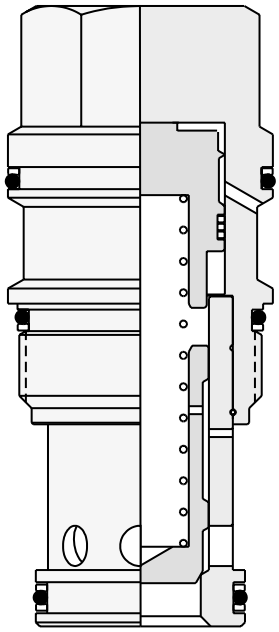
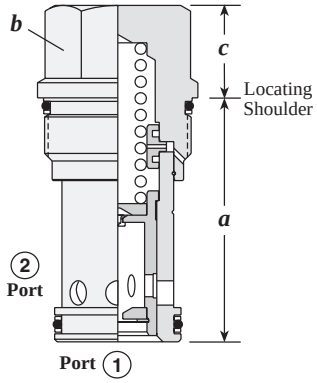
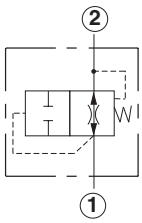
Circuit Savers



FIXED ORIFICE, FLOW FUSE VALVE



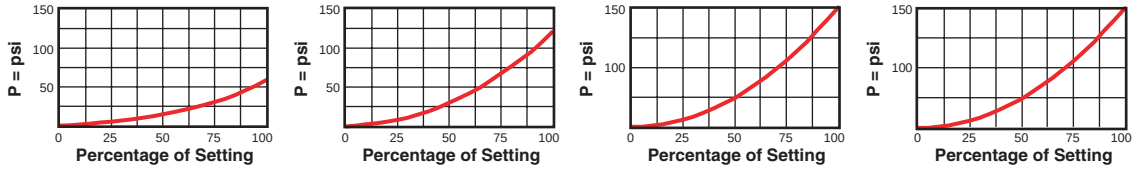


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
.5-6 GPM	**FQCA – XAN**	T - 13A	1.38	7/8”	.75	30/35
1-15 GPM	**FQEA – XAN**	T - 5A	1.62	1 1/8”	.69	45/50
1-25 GPM	**FQGA – XAN**	T - 16A	2.44	1 1/4”	.97	150/160
1-50 GPM	**FQIA – XAN**	T - 18A	3.13	1 5/8”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

Performance Curves

FQCA **FQEA** **FQGA** **FQIA**

Typical Pressure Drop



- Maximum operating pressure = 5000 psi
- Maximum valve leakage = FQCA: 2 in³/min. at 1000 psi, FQEA: 3 in³/min. at 1000 psi, FQGA: 4 in³/min. at 1000 psi, FQIA: 5 in³/min. at 1000 psi.
- Valve closes when flow from port 1 to port 2 exceeds the setting of the valve. Valve resets when pressures at port 1 and port 2 are equal.
- Flow setting should be at least 25% above maximum normal system flow.

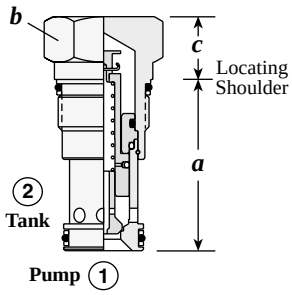
OPTION ORDERING INFORMATION

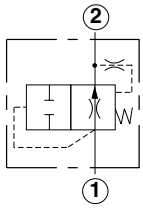
Model Codes printed in Red are Preferred Versions and most readily available

FQ ★ A – X A ★

Nominal Capacity	*Control***	*Flow Rate*	*Seal*
C .5-6 GPM	**X** Non-adjustable	**A**	**N** Buna-N
E 1-15 GPM			**V** Viton
G 1-25 GPM			
I 1-50 GPM		**Customer must specify flow.**	

AIR BLEED AND START-UP VALVE



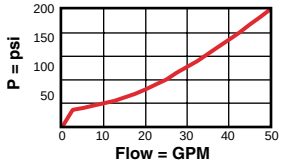


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
4-50 GPM	**NQEB– XAN**	T - 3A	1.88	1 1/8”	.69	45/50

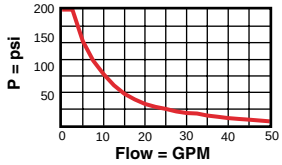
Performance Curves

NQEB

Typical Pressure Drop



Approximate Closing Time after Air has been Purged



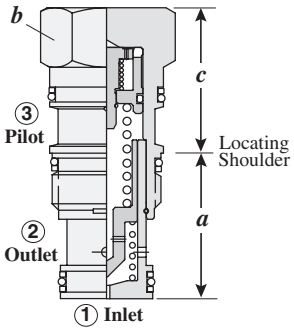
- Maximum operating pressure = 5000 psi
- Air-bleed and start-up valves require a minimum of 4 GPM flow rate and 80 psi system pressure.
- The valve will re-open when system pressure falls below 25 psi.
- After air has been purged, closing times vary from approximately 12 seconds at 4 GPM to 0.5 seconds at 50 GPM.

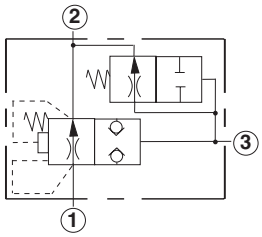
OPTION ORDERING INFORMATION **Model Codes printed in Red are Preferred Versions and most readily available**

NQ E B – X A ★

Nominal Capacity	*Control***	*Flow Rate*	*Seal*
E 4-50 GPM	**X** Non-adjustable	**A**	**N** Buna-N
			V Viton

CHECK, PILOT-TO-CLOSE



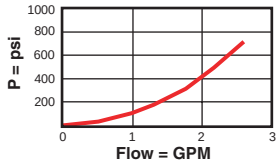


Orifice Diameter	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
.05 in.	**COFO – XDN**	T - 2A	1.38	1 1/8	1.38	45/50

Performance Curves

COFO

Pressure vs. Flow



- Maximum operating pressure = 5000 psi
- Pilot ratio = 120:1
- Leakage rate when closed = 5 drops/min.

OPTION ORDERING INFORMATION

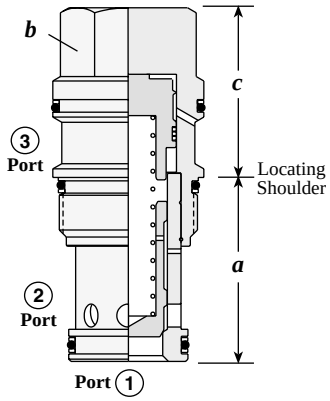
Model Codes printed in Red are Preferred Versions and most readily available

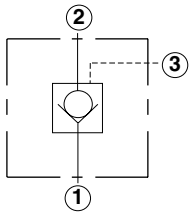
CO F O – X D N

Orifice Diameter	*Control***	*Minimum Pressure*	*Seal*
F .05 in.	**X** Standard Pilot	**D** 50 psi	**N** Buna-N
			V Viton

** *See page 162 for information on Control Options.*

CHECK, PILOT-TO-CLOSE



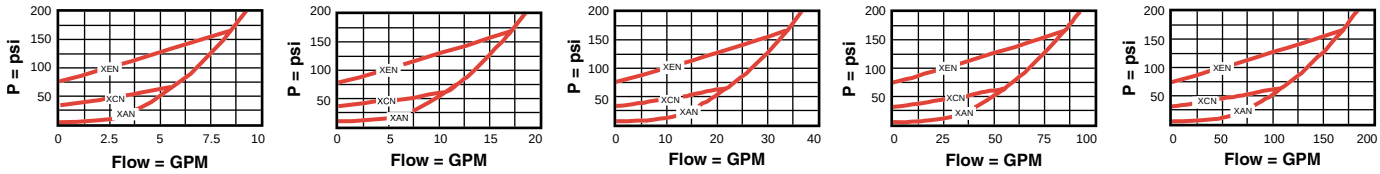


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
10 GPM	**COBA – XCN**	T - 163A	1.22	3/4”	1.22	25/30
20 GPM	**CODA – XCN**	T - 11A	1.38	7/8”	1.19	30/35
40 GPM	**COFA – XCN**	T - 2A	1.38	1 1/8”	1.38	45/50
80 GPM	**COHA – XCN**	T - 17A	1.81	1 1/4”	1.81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

Performance Curves

COBA **CODA** **COFA** **COHA** **COJA**

Typical Pressure Drop



- Maximum operating pressure = 5000 psi
- Pilot ratio = 1.8:1
- Leakage rate when closed = 1 drop/min.

OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

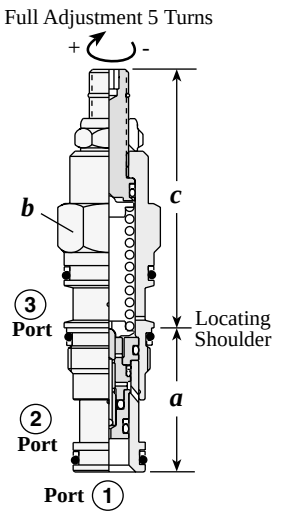
CO ✶ A – ✶ ✶ ✶

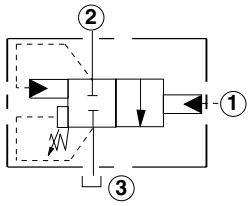
Nominal Capacity	*Control***	*Cracking Pressure*	*Seal*
B 10 GPM	**X** Standard Pilot	**A*** 4 psi	**N** Buna-N
D 20 GPM		**B*** 15 psi	**V** Viton
F 40 GPM		**C** 30 psi	
H 80 GPM		**D** 50 psi	
J 160 GPM		**E** 75 psi	
		F 100 psi	

** *See page 162 for information on Control Options*

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

ACCUMULATOR SENSE, PUMP UNLOAD VALVE - PILOT CAPACITY





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

- Maximum operating pressure = 5000 psi
- When applying this cartridge, a separate drain line is required to prevent erratic operation caused by tank line pressure fluctuations.
- Note: Careful consideration should be given when selecting an adjustment range. System pressure drops and flows tend to affect the operation of unloading valves.

OPTION ORDERING INFORMATION **Model Codes printed in Red are Preferred Versions and most readily available**

QP A ★ – ★ ★ ★

Nominal Capacity
- **A** .2 GPM

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

*Control***
- **L** Standard Screw
- **C** Tamper Resistant

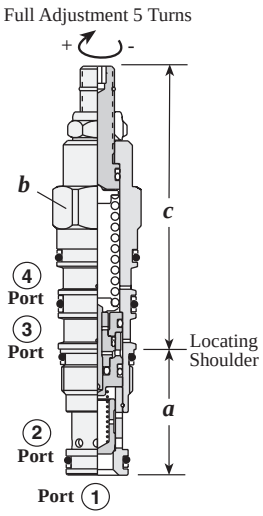
Adjustment Range
- **A** 1000 - 3000 psi
- **B** 400 - 1500 psi
- **C** 2000 - 5000 psi
- **D** 200 - 800 psi

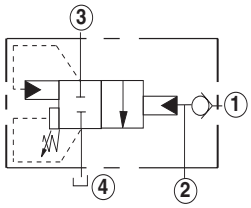
Seal
- **N** Buna-N
- **V** Viton

** *See page 162 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.

ACCUMULATOR SENSE, PUMP UNLOAD VALVE WITH CHECK - PILOT CAPACITY





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

- Maximum operating pressure = 5000 psi
- Check valve capacity = 12 GPM
- Free flow check cracking pressure = 4 psi
- Pressure drop, port 1 to port 2 = 70 psi at 12 GPM
- When applying this cartridge, a separate drain line is required to prevent erratic operation caused by tank line pressure fluctuations.
- Note: Careful consideration should be given when selecting an adjustment range. System pressure drops and flows tend to affect the operation of unloading valves.

OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

QC D ★ – ★ ★ ★

Nominal Capacity

D .2 GPM

Version

A 15% Nominal Differential

B 20% Nominal Differential

C 30% Nominal Differential

D 50% Nominal Differential

*Control***

L Standard Screw

C Tamper Resistant

Adjustment Range

A 1000 - 3000 psi

B 400 - 1500 psi

C 2000 - 5000 psi

D 200 - 800 psi

Seal

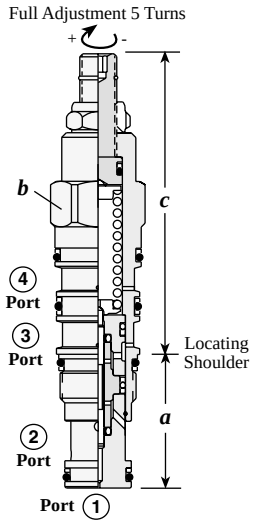
N Buna-N

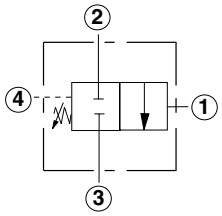
V Viton

** *See page 162 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.

DIRECT ACTING, 2-WAY DIRECTIONAL VALVE WITH DRAIN TO PORT 4 - NORMALLY CLOSED



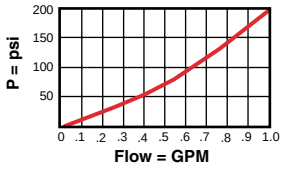


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
.5 GPM	**DRAX – LAN**	T - 21A	1.38	7/8"	3.09	30/35

Performance Curves

DRAX

Pressure Drop vs. Flow
Port 2 to Port 3



- Maximum operating pressure = 5000 psi
- The pilot area (port 1) and the spring chamber drain (port 4) are positively sealed.
- There is spool leakage between the work ports (ports 2 and 3), .03 in³/min. at 1000 psi.

OPTION ORDERING INFORMATION **Model Codes printed in Red are Preferred Versions and most readily available**

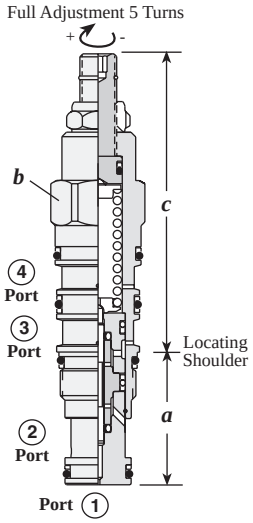
DR A X – L ✶ N

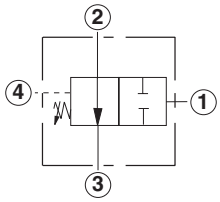
Nominal Capacity	*Control***	*Adjustment Range*	*Seal*
A .5 GPM	**L** Standard Screw	**A** 1000 - 3000 psi	**N** Buna-N
		C 2000 - 6000 psi	**V** Viton

** *See page 162 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.

DIRECT ACTING, 2-WAY DIRECTIONAL VALVE WITH DRAIN TO PORT 4 - NORMALLY OPEN

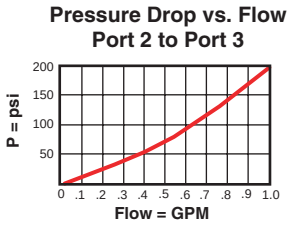




Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
.5 GPM	**DRAY – LAN**	T - 21A	1.38	7/8”	3.09	30/35

Performance Curves

DRAY



- Maximum operating pressure = 5000 psi
- The pilot area (port 1) and the spring chamber drain (port 4) are positively sealed.
- There is spool leakage between the work ports (ports 2 and 3), .03 in³/min. at 1000 psi.

OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

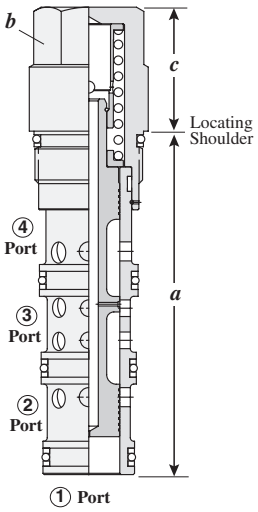
DR A Y – L ✶ N

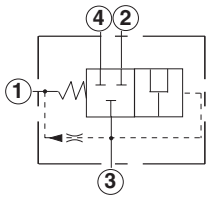
Nominal Capacity	*Control***	*Adjustment Range*	*Seal*
A .5 GPM	**L** Standard Screw	**A** 1000 - 3000 psi	**N** Buna-N
		C 2000 - 6000 psi	**V** Viton

** *See page 162 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.

VENT-TO-SHIFT 2-POSITION DIVERTER VALVE - NORMALLY CLOSED



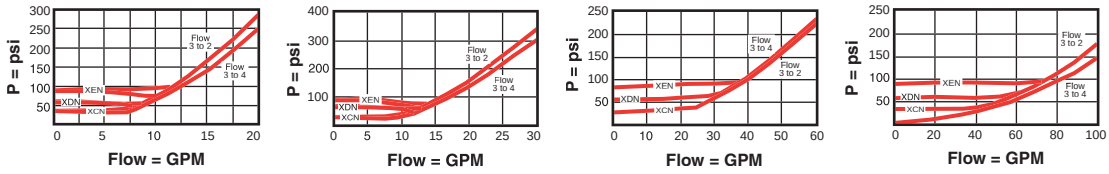


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
15 GPM	**DSCX – XEN**	T - 31A	3.34	7/8	1.19	30/35
30 GPM	**DSEX – XEN**	T - 32A	3.63	1 1/8	1.31	45/50
60 GPM	**DSGX – XEN**	T - 33A	4.51	1 1/4	1.63	150/160
120 GPM	**DSIX – XEN**	T - 34A	5.50	1 5/8	2.12	350/375

Performance Curves

DSCX **DSEX** **DSGX** **DSIX**

Typical Pressure Drop



- Maximum operating pressure = 5000 psi
- Nominal vent flow = DSCX. DSEX: 23 in³/min., DSGX, DSIX: 35 in³/min.
- There must be a pressure source at port 3, relative to port 1, to shift the valve.

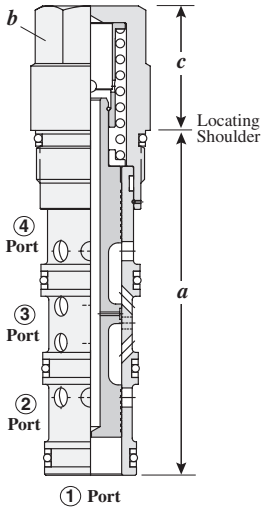
OPTION ORDERING INFORMATION **Model Codes printed in Red are Preferred Versions and most readily available**

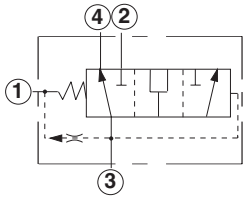
DS ✶ X – X E ✶

Nominal Capacity		*Control*		*Minimum Control Pressure*		*Seal*	
C	15 GPM	**X**	Non-adjustable	**C**	30 psi	**N**	Buna-N
E	30 GPM			**D**	50 psi	**V**	Viton
G	60 GPM			**E**	75 psi		
I	120 GPM						

Customer may specify pressure setting.

VENT-TO-SHIFT, 2-POSITION, 3-WAY DIVERTER VALVE



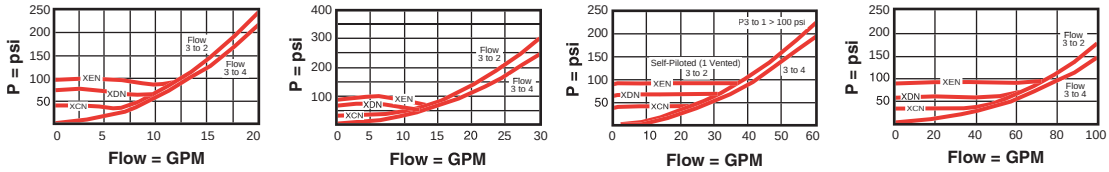


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c	Installation Torque lb. ft.
15 GPM	**DSCY – XEN**	T - 31A	3.34	7/8	1.19	30/35
30 GPM	**DSEY – XEN**	T - 32A	3.63	1 1/8	1.31	45/50
60 GPM	**DSGY – XEN**	T - 33A	4.51	1 1/4	1.63	150/160
120 GPM	**DSIY – XEN**	T - 34A	5.50	1 5/8	2.12	350/375

Performance Curves

DSCY **DSEY** **DSGY** **DSIY**

Typical Pressure Drop



- Maximum operating pressure = 5000 psi
- Nominal vent flow = DSCY. DSEY: 23 in³/min., DSGY, DSIY: 35 in³/min.
- There must be a pressure source at port 3, relative to port 1, to shift the valve.

OPTION ORDERING INFORMATION

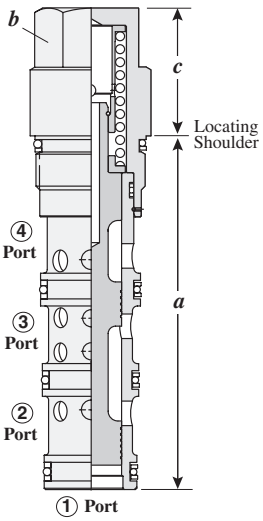
Model Codes printed in Red are Preferred Versions and most readily available

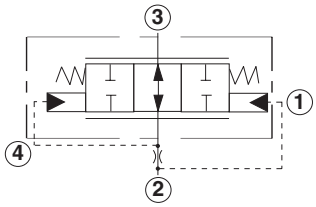
DS ✶ Y – X E ✶

Nominal Capacity		*Control*		*Minimum Control Pressure*		*Seal*	
C	15 GPM	**X**	Non-adjustable	**C**	30 psi	**N**	Buna-N
E	30 GPM			**D**	50 psi	**V**	Viton
G	60 GPM			**E**	75 psi		
I	120 GPM						

Customer may specify pressure setting.

NORMALLY OPEN, BI-DIRECTIONAL, MODULATING LOGIC ELEMENT



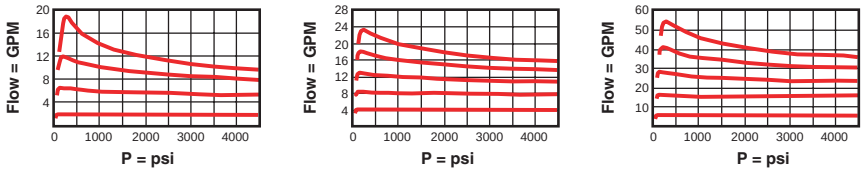


Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* a	b	c	*Installation Torque lb. ft.*
15 GPM	**LHDT – XFN**	T - 31A	3.34	7/8	1.19	30/35
30 GPM	**LHFT – XFN**	T - 32A	3.63	1 1/8	1.31	45/50
60 GPM	**LHHT – XFN**	T - 33A	4.50	1 1/4	1.63	150/160

Performance Curves

LHDT **LHFT** **LHHT**

Typical Performance Pressure Differential vs. Flow



- Maximum operating pressure = 5000 psi

OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

LH ★ T – X F ★

Nominal Capacity	*Control*	*Nominal Control Pressure*	*Seal*
D 15 GPM	**X** Non-adjustable	**D** 50 psi	**N** Buna-N
F 30 GPM		**E** 75 psi	**V** Viton
H 60 GPM		**F** 100 psi	

Customer may specify pressure setting.