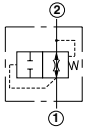
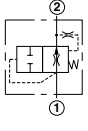
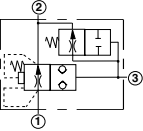
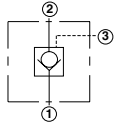
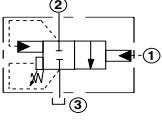
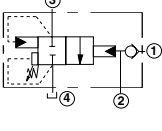
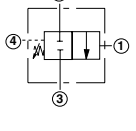
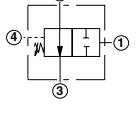
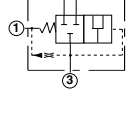
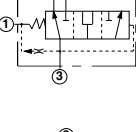
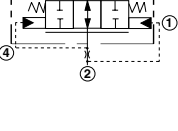
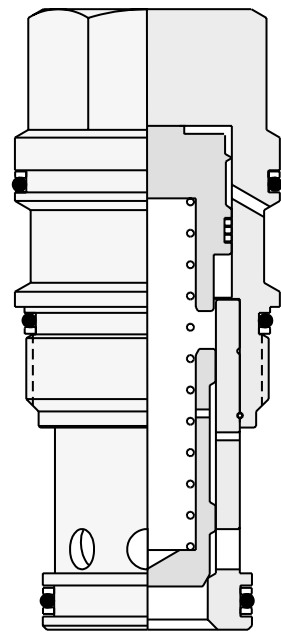
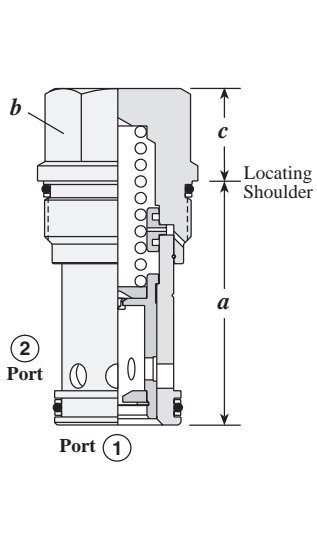


# Circuit Savers

Cartridge Type	Page
	144
	145
	146
	147
	148
	149
	150
	151
	152
	153
	154

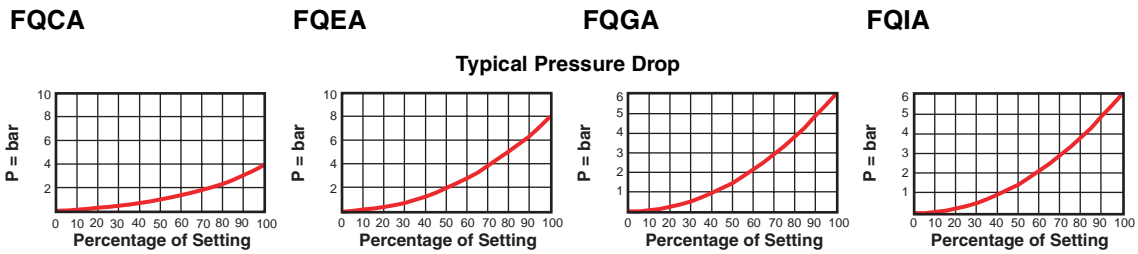


**FIXED ORIFICE, FLOW FUSE VALVE**

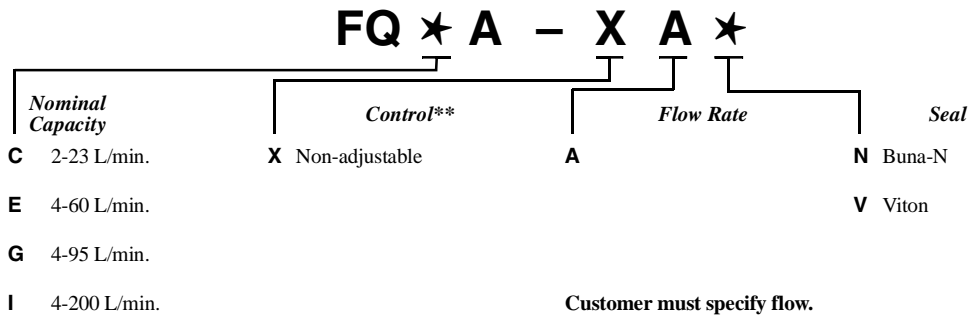


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			<i>a</i>	<i>b</i>	<i>c</i>	
2 - 23 L/min.	<b>FQCA - XAN</b>	T - 13A	34,9	22,2	19	40/50
4 - 60 L/min.	<b>FQEA - XAN</b>	T - 5A	41,1	28,6	18	60/70
4 - 95 L/min.	<b>FQGA - XAN</b>	T - 16A	61,9	31,8	25	200/215
4 - 200 L/min.	<b>FQIA - XAN</b>	T - 18A	79,4	41,3	31	465/500

**Performance Curves**

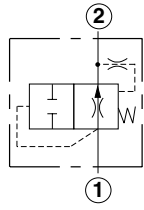
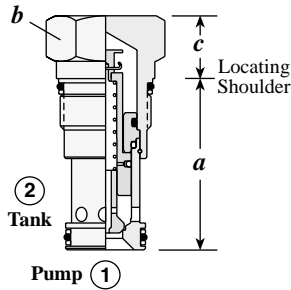


- Maximum operating pressure = 350 bar
- Maximum valve leakage = FQCA: 32,8 cc/min. at 70 bar, FQEA: 49,2 cc/min. at 70 bar, FQGA: 65,5 cc/min. at 70 bar, FQIA: 81,9 cc/min. at 70 bar.
- Valve closes when flow from port 1 to port 2 exceeds the setting of the valve. Valve resets when pressures at port 1 and port 2 are equal.
- Flow setting should be at least 25% above maximum normal system flow.



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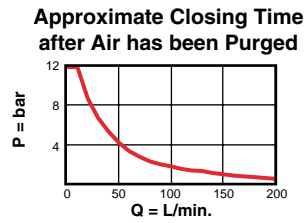
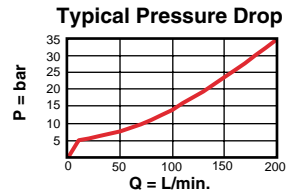
**AIR BLEED AND START-UP VALVE**



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
15 - 200 L/min.	<b>NQEB - XAN</b>	T - 3A	47,8	28,6	18	60/70

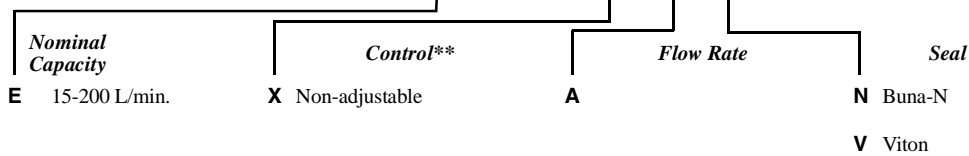
Performance Curves

**NQEB**



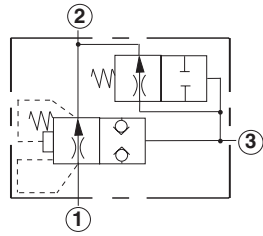
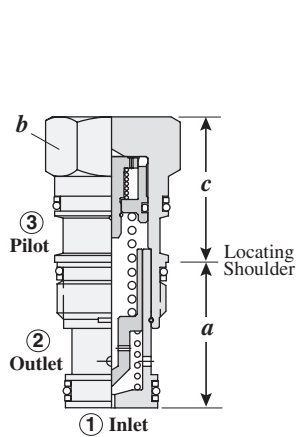
- Maximum operating pressure = 350 bar
- Air-bleed and start-up valves require a minimum of 15 L/min. flow rate and 5,5 bar system pressure.
- The valve will re-open when system pressure falls below 1,7 bar.
- After air has been purged, closing times vary from approximately 12 seconds at 15 L/min. to 0.5 seconds at 200 L/min.

**NQEB - XA★**



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**CHECK, PILOT-TO-CLOSE**

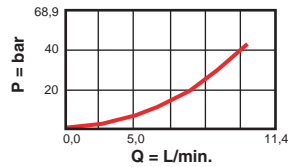


Orifice Diameter	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
1,27 mm	COFO – XDN	T - 2A	35,1	28,6	35,1	60/70

Performance Curves

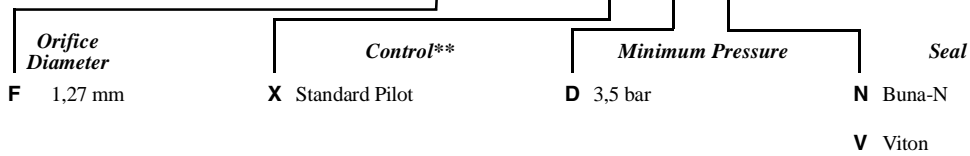
COFO

Pressure vs. Flow



- Maximum operating pressure = 350 bar
- Pilot ratio = 120:1
- Leakage rate when closed = 0,3 cc/min.

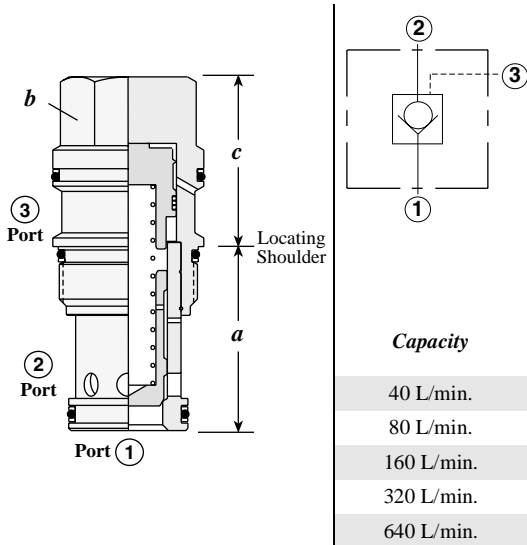
**COFO – XDN**



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

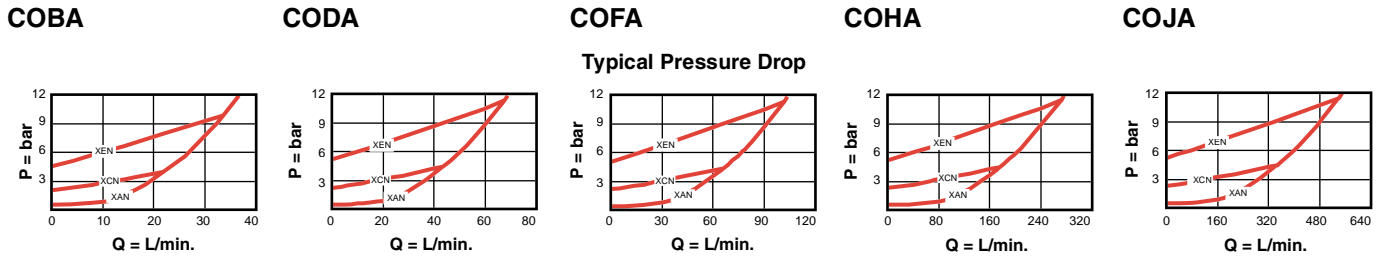
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**CHECK, PILOT-TO-CLOSE**



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
40 L/min.	<b>COBA – XCN</b>	T - 163A	31	19,1	32	35/40
80 L/min.	<b>CODA – XCN</b>	T - 11A	34,9	22,2	31	40/50
160 L/min.	<b>COFA – XCN</b>	T - 2A	34,9	28,6	35	60/70
320 L/min.	<b>COHA – XCN</b>	T - 17A	46	31,8	46	200/245
640 L/min.	<b>COJA – XCN</b>	T - 19A	63,5	41,3	59	465/500

Performance Curves



- Maximum operating pressure = 350 bar
- Pilot ratio = 1.8:1
- Leakage rate when closed = 0,07 cc/min.

**CO \* A - \* \* \***

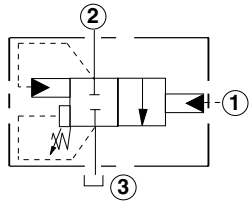
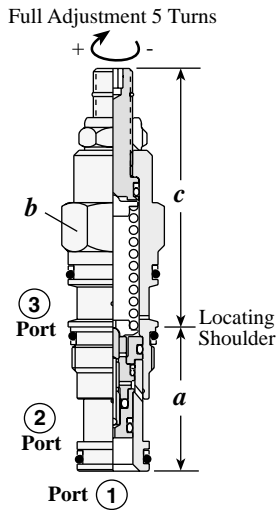
Nominal Capacity	Control**	Cracking Pressure	Seal
<b>B</b> 40 L/min.	<b>X</b> Standard Pilot	<b>A</b> *0,3 bar	<b>N</b> Buna-N
<b>D</b> 80 L/min.		<b>B</b> *1,0 bar	<b>V</b> Viton
<b>F</b> 160 L/min.		<b>C</b> 2,0 bar	
<b>H</b> 320 L/min.		<b>D</b> 3,5 bar	
<b>J</b> 640 L/min.		<b>E</b> 5,0 bar	
		<b>F</b> 7,0 bar	

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

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

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**ACCUMULATOR SENSE, PUMP UNLOAD VALVE - PILOT CAPACITY**



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	L	C	
0,8 L/min.	<b>QPAA – LAN</b>	T - 11A	34,9	22,2	64	66	40/50

- Maximum operating pressure = 350 bar
- 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.

**QP A ★ – ★ ★ ★**

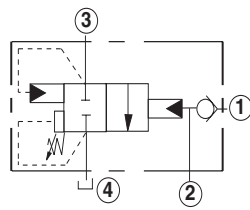
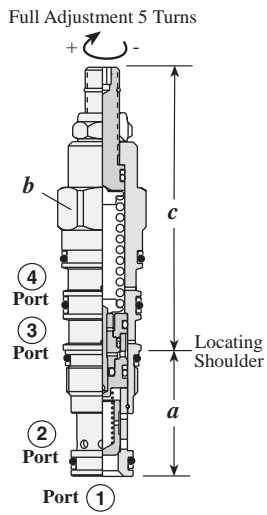
Nominal Capacity	Version	Control**	Adjustment Range	Seal
<b>A</b> 0,8 L/min.	<b>A</b> 15% Nominal Differential	<b>L</b> Standard Screw	<b>A</b> 70 - 210 bar	<b>N</b> Buna-N
	<b>B</b> 20% Nominal Differential	<b>C</b> Tamper Resistant	<b>B</b> 28 - 105 bar	<b>V</b> Viton
	<b>C</b> 30% Nominal Differential		<b>C</b> 140 - 350 bar	
	<b>D</b> 50% Nominal Differential		<b>D</b> 14 - 55 bar	

Adjustment Range Options:  
 A and B Options are standard set at 70 bar.  
 D Option is standard set at 25 bar.  
 C Option is standard set at 140 bar.  
**Customer may specify pressure setting.**

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

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# ACCUMULATOR SENSE, PUMP UNLOAD VALVE WITH CHECK - PILOT CAPACITY



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	L	C	
0,8 L/min.	<b>QCDA - LAN</b>	T - 21A	34,9	22,2	79	81	40/50

- Maximum operating pressure = 350 bar
- Check valve = 50 L/min.
- Free flow check cracking pressure = 0,3 bar
- Pressure drop, port 1 to port 2 = 5 bar at 50 L/min.
- 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.

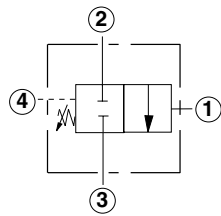
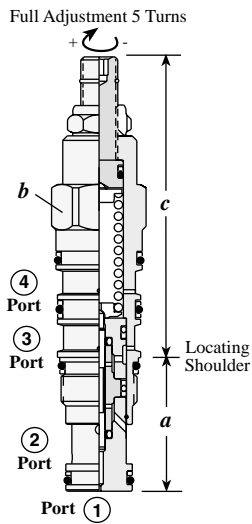
Nominal Capacity	Version	Control**	Adjustment Range	Seal
<b>D</b> 0,8 L/min.	<b>A</b> 15% Nominal Differential	<b>L</b> Standard Screw	<b>A</b> 70 - 210 bar	<b>N</b> Buna-N
	<b>B</b> 20% Nominal Differential	<b>C</b> Tamper Resistant	<b>B</b> 28 - 105 bar	<b>V</b> Viton
	<b>C</b> 30% Nominal Differential		<b>C</b> 140 - 350 bar	
	<b>D</b> 50% Nominal Differential		<b>D</b> 14 - 55 bar	

Adjustment Range Options:  
 A and B Options are standard set at 70 bar.  
 D Option is standard set at 25 bar.  
 C Option is standard set at 140 bar.  
**Customer may specify pressure setting.**

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

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

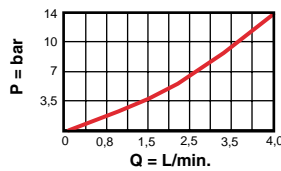


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
2 L/min.	<b>DRAX - LAN</b>	T - 21A	34,9	22,2	79	40/50

**Performance Curves**

**DRAX**

**Pressure Drop vs. Flow  
Port 2 to Port 3**



- Maximum operating pressure = 350 bar
- 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), 0,8 cc/min. at 70 bar.

**DRAX - L \* N**

Nominal Capacity	Control**	Adjustment Range	Seal
<b>A</b> 2 L/min.	<b>L</b> Standard Screw	<b>A</b> 70 - 210 bar	<b>N</b> Buna-N
		<b>C</b> 140 - 420 bar	<b>V</b> Viton

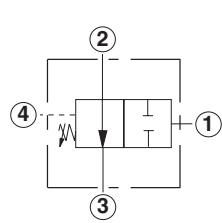
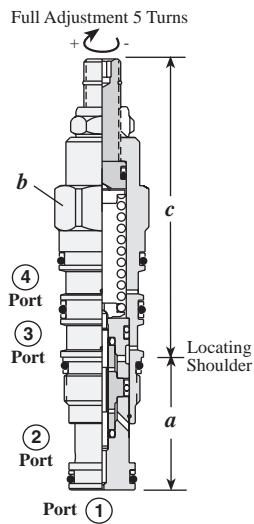
\*\* See page 162 for information on Control Options

Adjustment Range Options:  
A Option is standard set at 70 bar.  
C Option is standard set at 140 bar.  
Customer may specify pressure setting.

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

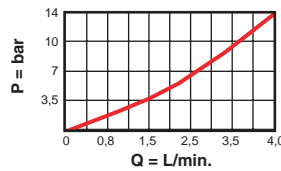


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
2 L/min.	<b>DRAY - LAN</b>	T - 21A	34,9	22,2	81	40/50

**Performance Curves**

**DRAY**

Pressure Drop vs. Flow  
Port 2 to Port 3



- Maximum operating pressure = 350 bar
- 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), 0,8 cc/min. at 70 bar.

**DRAY - L \* N**

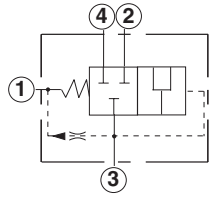
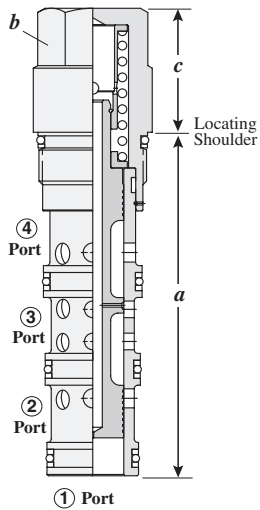
Nominal Capacity	Control**	Adjustment Range	Seal
<b>A</b> 2 L/min.	<b>L</b> Standard Screw	<b>A</b> 70 - 210 bar	<b>N</b> Buna-N
		<b>C</b> 140 - 420 bar	<b>V</b> Viton

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

Adjustment Range Options:  
A Option is standard set at 70 bar.  
C Option is standard set at 140 bar.  
Customer may specify pressure setting.

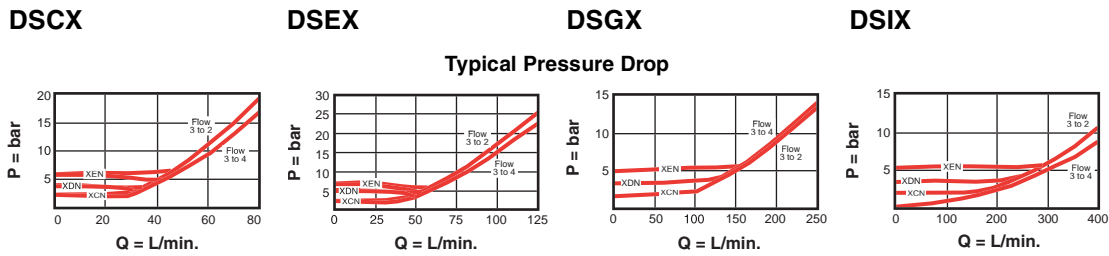
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**VENT-TO-SHIFT 2-POSITION DIVERTER VALVE - NORMALLY CLOSED**



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
60 L/min.	<b>DSCX – XEN</b>	T - 31A	84,8	22,2	30,2	40/50
120 L/min.	<b>DSEX – XEN</b>	T - 32A	92,2	28,6	33,3	60/70
240 L/min.	<b>DSGX – XEN</b>	T - 33A	114,6	31,8	41,4	200/215
480 L/min.	<b>DSIX – XEN</b>	T - 34A	139,7	41,3	53,8	465/500

**Performance Curves**



- Maximum operating pressure = 350 bar
- Nominal vent flow = DSCX, DSEX: 0,38 L/min., DSGX, DSIX: 0,60 L/min.
- There must be a pressure source at port 3, relative to port 1, to shift the valve.

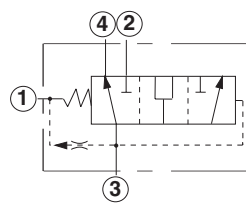
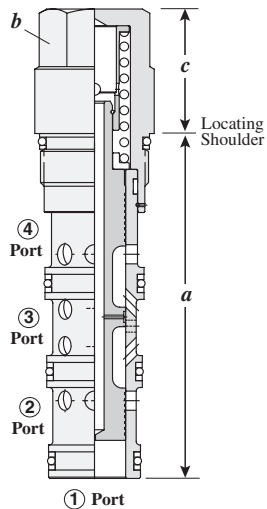
**DS ★ X – X E ★**

Nominal Capacity	Control	Minimum Control Pressure	Seal
<b>C</b> 60 L/min.	<b>X</b> Non-adjustable	<b>C</b> 2 bar	<b>N</b> Buna-N
<b>E</b> 120 L/min.		<b>D</b> 3,5 bar	<b>V</b> Viton
<b>G</b> 240 L/min.		<b>E</b> 5 bar	
<b>I</b> 480 L/min.			

Customer may specify pressure setting.

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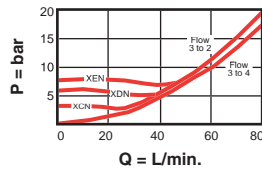
**VENT-TO-SHIFT, 2-POSITION, 3-WAY DIVERTER VALVE**



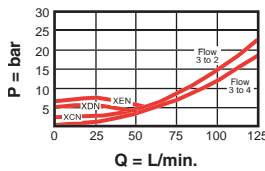
Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
60 L/min.	<b>DSCY – XEN</b>	T - 31A	84,8	22,2	30,2	40/50
120 L/min.	<b>DSEY – XEN</b>	T - 32A	92,2	28,6	33,3	60/70
240 L/min.	<b>DSGY – XEN</b>	T - 33A	114,6	31,8	41,4	200/215
480 L/min.	<b>DSIY – XEN</b>	T - 34A	139,7	41,3	53,8	465/500

**Performance Curves**

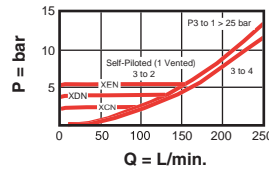
**DSCY**



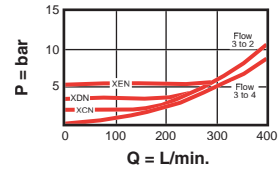
**DSEY**



**DSGY**



**DSIY**



**Typical Pressure Drop**

- Maximum operating pressure = 350 bar
- Nominal vent flow = DSCY, DSEY: 0,38 L/min., DSGY, DSIY: 0,60 L/min.
- There must be a pressure source at port 3, relative to port 1, to shift the valve.

**DS ★ Y – X E ★**

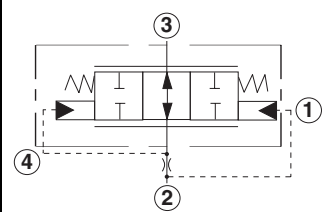
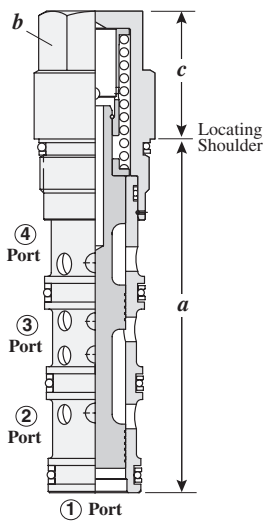
Nominal Capacity	Control	Minimum Control Pressure	Seal
<b>C</b> 60 L/min.	<b>X</b> Non-adjustable	<b>C</b> 2 bar	<b>N</b> Buna-N
<b>E</b> 120 L/min.		<b>D</b> 3,5 bar	<b>V</b> Viton
<b>G</b> 240 L/min.		<b>E</b> 5 bar	
<b>I</b> 480 L/min.			

Customer may specify pressure setting.

Visit [www.sunhydraulics.com](http://www.sunhydraulics.com) for detailed and complete technical information on our full line of products.

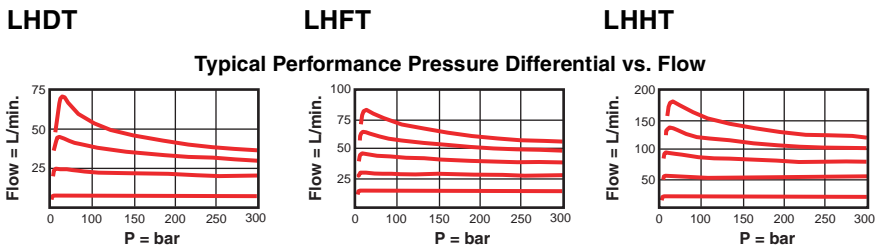


**NORMALLY OPEN, BI-DIRECTIONAL, MODULATING LOGIC ELEMENT**



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
60 L/min.	LHDT - XFN	T - 31A	84,8	22,2	30,2	40/50
120 L/min.	LHFT - XFN	T - 32A	92,2	28,6	33,3	60/70
240 L/min.	LHHT - XFN	T - 33A	114,3	31,8	41,3	200/215

Performance Curves



- Maximum operating pressure = 350 bar

**LH \* T - X F \***

Nominal Capacity	Control	Nominal Control Pressure	Seal
D 60 L/min.	X Non-adjustable	D 3,5 bar	N Buna-N
F 120 L/min.		E 5 bar	V Viton
H 240 L/min.		F 7 bar	

Customer may specify pressure setting.

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