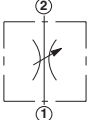
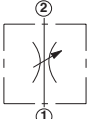
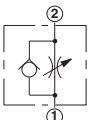
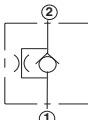
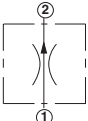
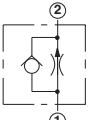
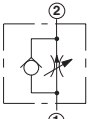
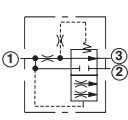
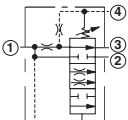
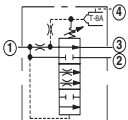
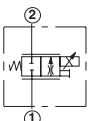
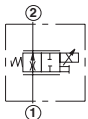
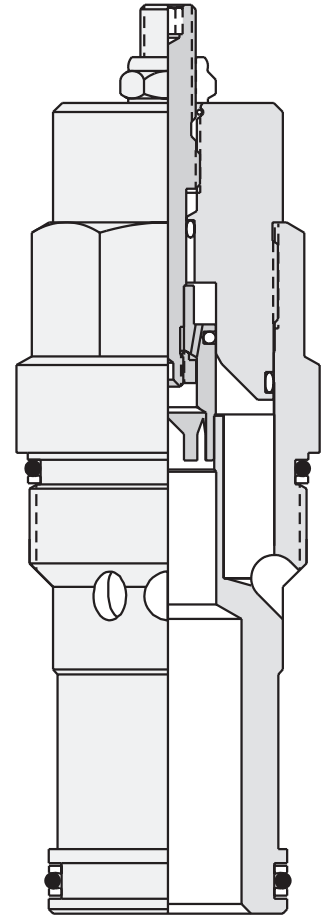
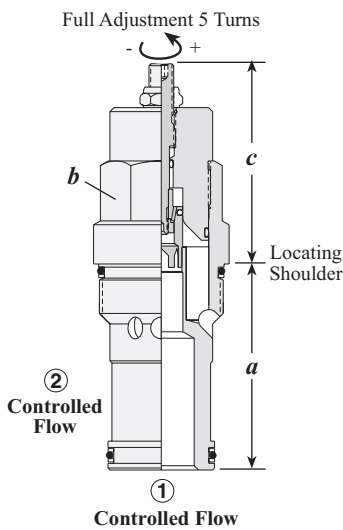


# Flow Control Valves

<i>Cartridge Type</i>	<i>Page</i>
	Fully Adjustable Needle 80
	Fully Adjustable Needle, High Capacity 81
	Fully Adjustable Needle with Reverse Flow Check, High Capacity 82
	Fixed Orifice, Non-pressure Compensated, with Reverse Flow Check 83
	Fixed Orifice, Pressure Compensated 84
	Fixed Orifice, Pressure Compensated, with Reverse Flow Check 85
	Fully Adjustable, Pressure Compensated, with Reverse Flow Check 86
	Fixed Orifice, Bypass/Restrictive, Priority Flow 87
	Ventable, Fixed Orifice, Bypass/Restrictive, Priority Flow 88
	Ventable, Fixed Orifice, Bypass/Restrictive, Priority Flow, with Integral T-8A Control Cavity 89
	Electro-Proportional, Normally Closed Throttle 90
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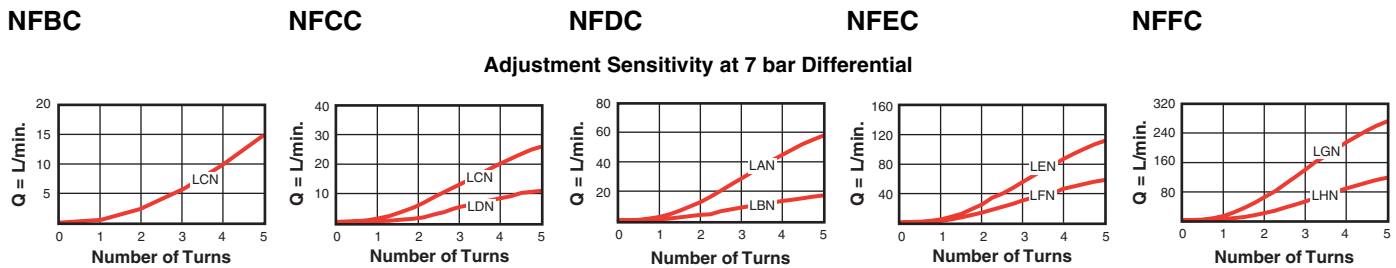


**FULLY ADJUSTABLE NEEDLE**



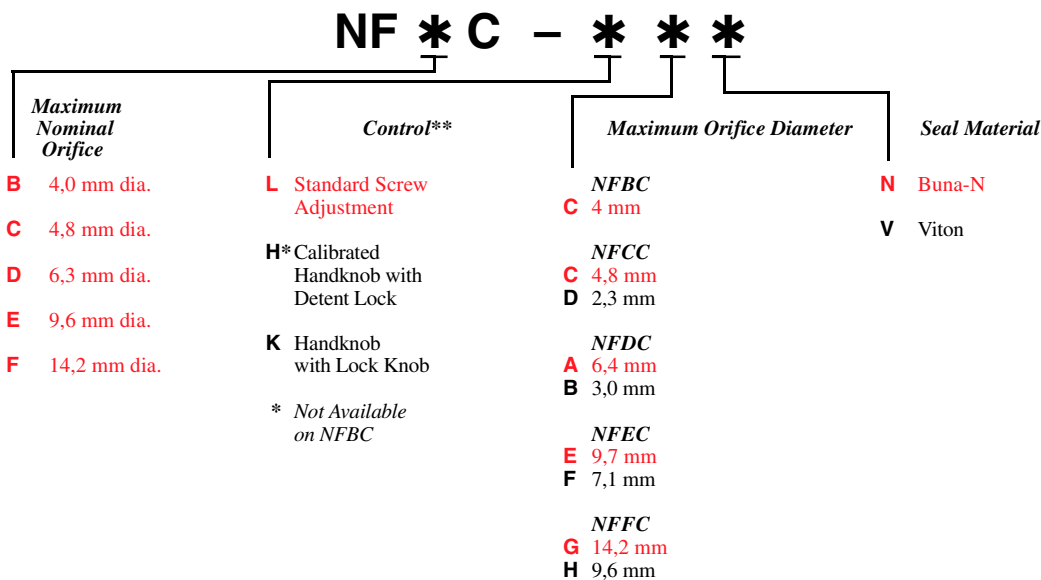
Maximum Nominal Orifice	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
4,0 mm dia.	NFBC – LCN	T - 162A	31,0	19,1	L 40,4 H - K 43,9	35 - 40
4,8 mm dia.	NFCC – LCN	T - 13A	35,0	22,2	L 57,7 H 63,2 K 63,5	45 - 50
6,4 mm dia.	NFDC – LAN	T - 5A	41,4	28,6	L 59,7 H 71,6 K 69,3	60 - 70
9,7 mm dia.	NFEC – LEN	T - 16A	62,0	31,8	L 67,6 H 77,7 K 74,7	200 - 215
14,2 mm dia.	NFFC – LGN	T - 18A	79,5	41,3	L 84,1 H 88,9 K 88,1	465 - 500

Performance Curves



- Maximum operating pressure = 350 bar.
- Because needle valves are non-compensating devices, the fixed orifice size will regulate flow through the valve in proportion to the square root of the pressure differential across ports 1 and 2.
- The sharp edged orifice design minimizes flow variations due to viscosity changes.
- There is no leakage when the adjustment mechanism is turned to the shut-off position.

OPTION ORDERING INFORMATION

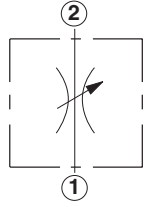
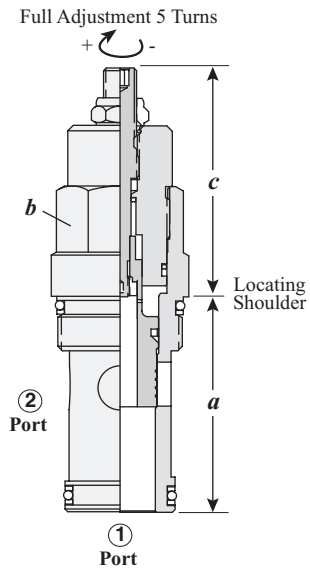


\*\* See page 178 for information on Control Options

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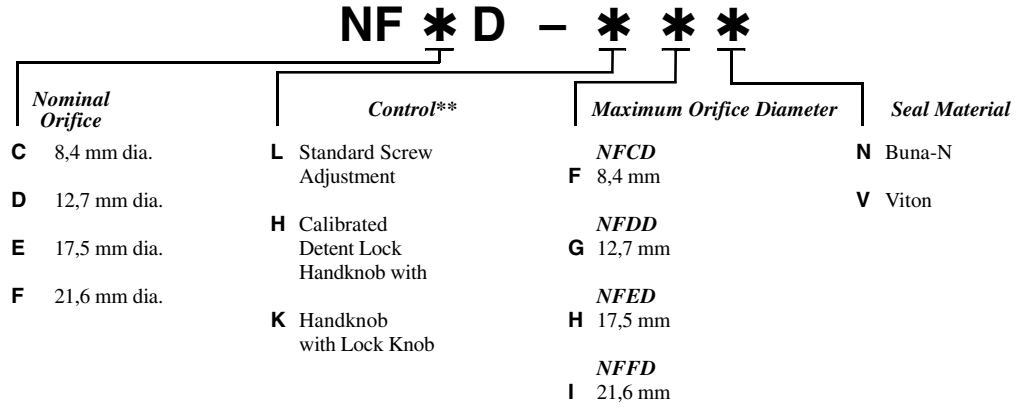
**FULLY ADJUSTABLE NEEDLE, HIGH CAPACITY**



Nominal Orifice	Typical Cartridge Model Code	Cavity	Cartridge Dimensions					Installation Torque (Nm)
			a	b	c			
					L	H	K	
8,4 mm dia.	NFCD – LFN	T - 13A	35,0	22,2	57,4	62,5	63,2	45 - 50
12,7 mm dia.	NFDD – LGN	T - 5A	41,4	28,6	59,7	71,4	69,1	60 - 70
17,5 mm dia.	NFED – LHN	T - 16A	62,0	31,8	67,6	77,7	74,7	200 - 215
21,6 mm dia.	NFFD – LIN	T - 18A	79,5	41,3	84,1	88,9	88,1	465 - 500

- Maximum operating pressure = 350 bar.
- Because needle valves are non-compensating devices, the fixed orifice size will regulate flow through the valve in proportion to the square root of the pressure differential across ports 1 and 2.
- A balanced adjustment mechanism allows for easy adjustment even at high pressures.
- The sharp edged orifice design minimizes flow variations due to viscosity changes.
- The flow path through this valve is bi-directional. The preferred path is port 1 to 2, to allow interchangeability with other flow controls.
- There is no leakage when the adjustment mechanism is turned to the shut-off position.

**OPTION ORDERING INFORMATION**



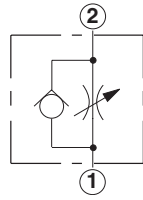
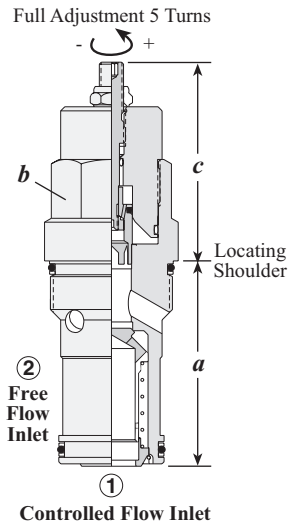
\*\* See page 178 for information on Control Options

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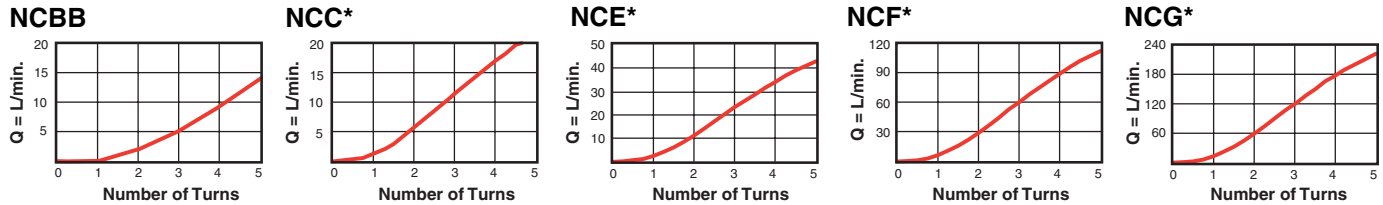
FULLY ADJUSTABLE NEEDLE WITH REVERSE FLOW CHECK, HIGH CAPACITY



Maximum Nominal Orifice	Typical Cartridge Model Code	Cavity	Cartridge Dimensions					Installation Torque (Nm)
			a	b	c			
					L	H	K	
4,0 mm dia.	NCBB – LCN	T - 162A	31,0	19,1	40,4	-	43,9	35 - 40
1,5 mm dia.	NCCD – LCN	T - 13A	35,0	22,2	57,7	63,2	63,5	45 - 50
4,8 mm dia.	NCCB – LCN	T - 13A	35,0	22,2	57,7	63,2	63,5	45 - 50
6,3 mm dia.	NCEB – LCN	T - 5A	41,4	28,6	59,7	71,6	69,3	60 - 70
9,7 mm dia.	NCFB – LCN	T - 16A	62,0	31,8	67,6	77,7	74,7	200 - 215
14,2 mm dia.	NCGB – LCN	T - 18A	79,5	41,3	84,1	88,9	88,1	465 - 500

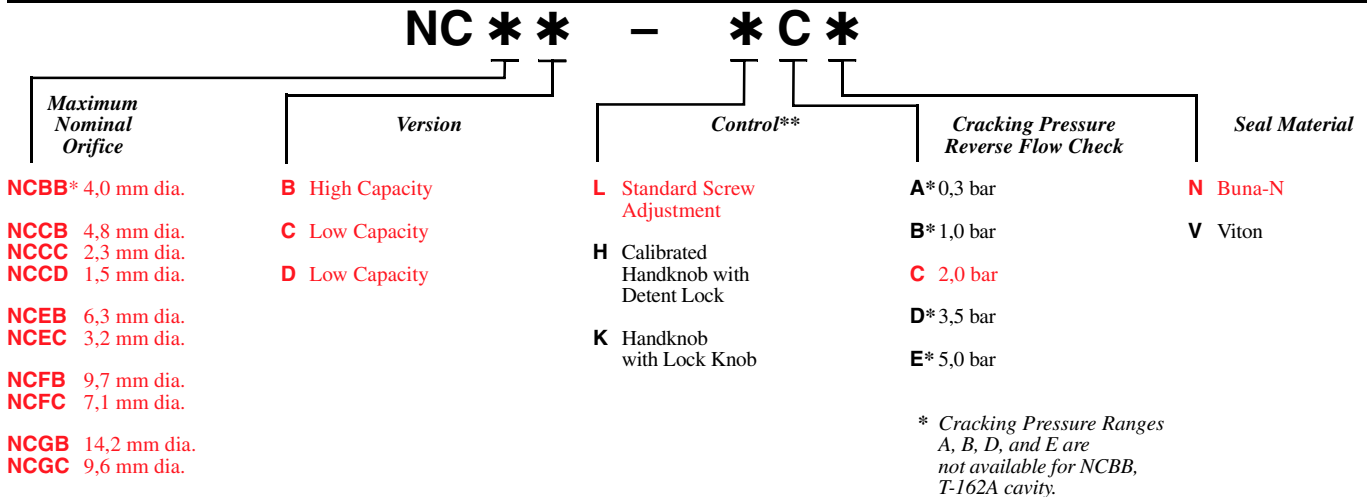
Performance Curves

Adjustment Sensitivity at 7 bar Differential



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,4 cc/min.
- Because needle valves are non-compensating devices, the fixed orifice size will regulate flow through the valve in proportion to the square root of the pressure differential across ports 1 and 2.
- The sharp edged orifice design minimizes flow variations due to viscosity changes.

OPTION ORDERING INFORMATION

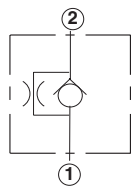
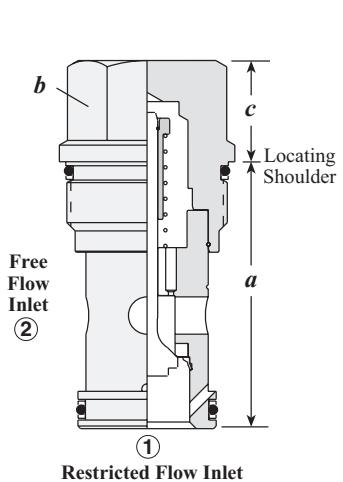


\*\* See page 178 for information on Control Options

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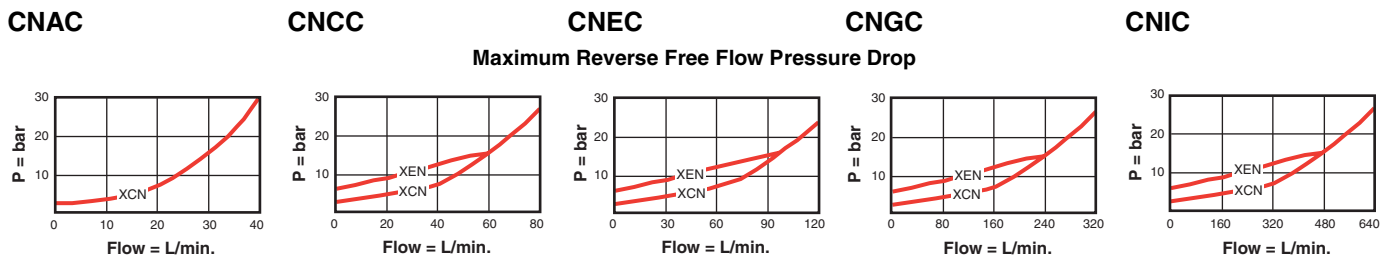
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**FIXED ORIFICE, NON-PRESSURE COMPENSATED, WITH REVERSE FLOW CHECK**



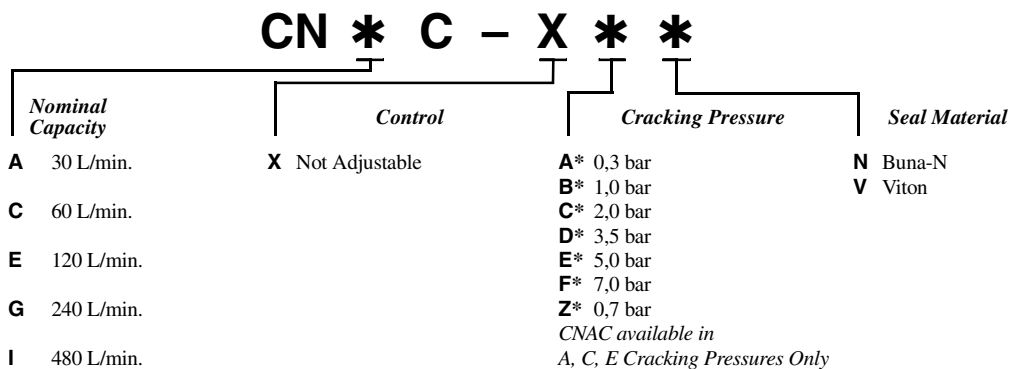
Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
30 L/min.	CNAC – XCN	T - 162A	31,0	19,1	20,8	35 - 40
60 L/min.	CNCC – XCN	T - 13A	35,1	22,2	19,1	45 - 50
120 L/min.	CNEC – XCN	T - 5A	41,1	28,6	17,5	60 - 70
240 L/min.	CNGC – XCN	T - 16A	62,0	31,8	24,6	200 - 215
480 L/min.	CNIC – XCN	T - 18A	79,5	41,3	30,2	465 - 500

Performance Curves



- Maximum operating pressure = 350 bar.
- There are essentially check valves with bypass orifices. The flow path matches Sun's flow controls and can be used in any flow control manifolds. Valves with the opposite direction of flow can be found under check valves with bypass orifice.
- Because needle valves are non-compensating devices, the fixed orifice size will regulate flow through the valve in proportion to the square root of the pressure differential across ports 1 and 2.

OPTION ORDERING INFORMATION



\* Customer specified effective orifice diameter stamped on hex.

Orifice Ranges:

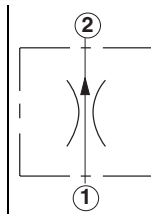
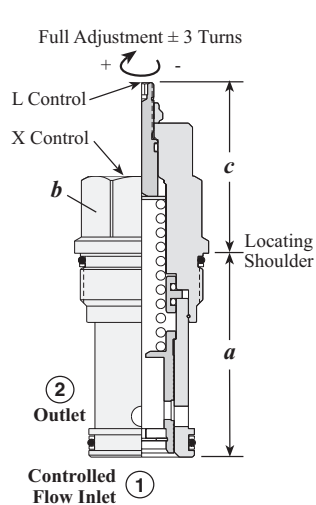
- CNAC: 0,4 - 1,6 mm.
- CNCC: 0,4 - 3,89 mm.
- CNEC: 0,4 - 3,42 mm.
- CNGC: 0,4 - 5,54 mm.
- CNIC: 0,4 - 5,54 mm.

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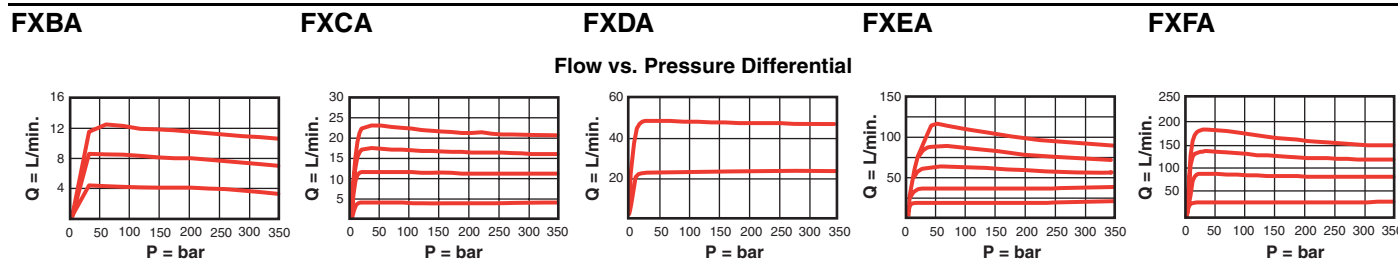


**FIXED ORIFICE, PRESSURE COMPENSATED**



Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c (X, L, K)	
11 L/min.	FXBA - XAN	T - 162A	31,0	19,1	20,8 (X), 53,6 (L), 64,8 (K)	35 - 40
23 L/min.	FXCA - XAN	T - 13A	35,1	22,2	19,1 (X), 50,8 (L), 57,2 (K)	45 - 50
45 L/min.	FXDA - XAN	T - 5A	41,1	28,6	17,5 (X), 53,8 (L), 60,5 (K)	60 - 70
95 L/min.	FXEA - XAN	T - 16A	62,0	31,8	24,6 (X), 62,0 (L), 68,3 (K)	200 - 215
200 L/min.	FXFA - XAN	T - 18A	79,5	41,3	30,2 (X), 71,4 (L), 77,7 (K)	465 - 500

Performance Curves



- Maximum operating pressure = 350 bar.
- Customer must specify a flow setting. The factory set flow ratings for FXCA, FXDA, FXEA, FXFA, are within +/- 10% of the required setting. The factory set flow rating for FXBA is within +/- 15% of the required setting.
- Accurate pressure compensated control requires that a 14 bar minimum pressure differential be maintained across the valve.
- The tuneable control option provides +/- 25% variation from the nominal factory pre-set flow. Turn the adjustment clockwise to increase.
- The sharp edged orifice design minimizes flow variations due to viscosity changes.

OPTION ORDERING INFORMATION

**FX \* A - X A \***

<p><b>Nominal Capacity</b></p> <p><b>B</b> 11 L/min.</p> <p><b>C</b> 23 L/min.</p> <p><b>D</b> 45 L/min.</p> <p><b>E</b> 95 L/min.</p> <p><b>F</b> 200 L/min.</p>	<p><b>Control**</b></p> <p><b>X</b> Not Adjustable</p> <p><b>L+</b> Tuning Adjustment ±25% of customer specified flow</p> <p><b>K</b> Handknob with Lock Knob</p> <p>+ Special setting is required. Specify at time of order.</p>	<p><b>Setting Range</b></p> <p><b>FXBA:</b> A* Orifice Not Replaceable</p> <p><b>FXCA, FXDA, FXEA, FXFA:</b> A* Replaceable Orifice</p>	<p><b>Seal Material</b></p> <p><b>N</b> Buna-N</p> <p><b>V</b> Viton</p>
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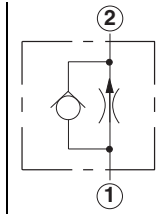
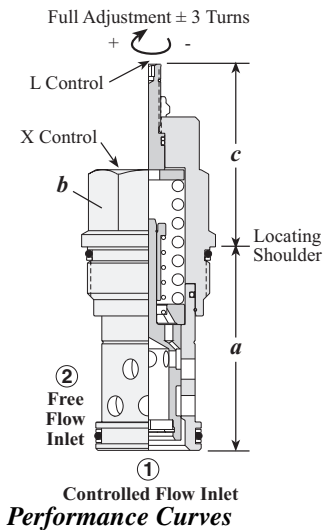
\* Customer specified flow setting stamped on hex.

**Flow Settings:**  
 FXBA: 0,4 - 11 L/min.  
 FXCA: 0,4 - 23 L/min.  
 FXDA: 0,4 - 45 L/min.  
 FXEA: 0,8 - 95 L/min.  
 FXFA: 0,8 - 200 L/min.

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**FIXED ORIFICE, PRESSURE COMPENSATED, WITH REVERSE FLOW CHECK**



Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions					Installation Torque (Nm)
			a	b	c			
11 L/min.	FCBB – XAN	T - 162A	31,0	19,1	20,8	53,6	58,0	35 - 40
23 L/min.	FCCB – XAN	T - 13A	35,1	22,2	19,1	50,8	57,2	45 - 50
45 L/min.	FCDB – XAN	T - 5A	41,1	28,6	17,5	53,8	60,5	60 - 70
95 L/min.	FCEB – XAN	T - 16A	62,0	31,8	24,6	62,0	68,3	200 - 215
200 L/min.	FCFB – XAN	T - 18A	79,5	41,3	30,2	71,4	77,7	465 - 500

**FCBB**

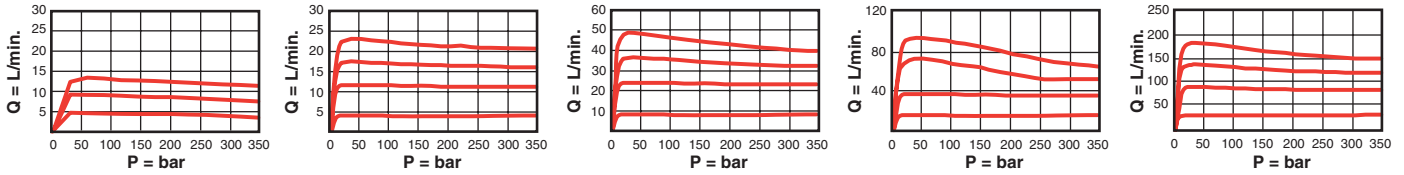
**FCCB**

**FCDB**

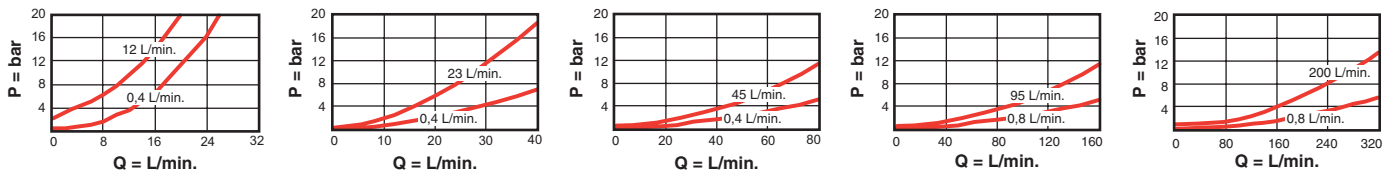
**FCEB**

**FCFB**

Flow vs. Pressure Differential



Reverse Free Flow Pressure Drop Based on Specified Flow Extremes



- Maximum operating pressure = 350 bar.
- Customer must specify a flow setting. The factory set flow ratings for FCCB, FCDB, FCEB, FCFB, are within +/- 10% of the required setting. The factory set flow rating for FCBB is within +/- 15% of the required setting.
- Accurate pressure compensated control requires that a 14 bar minimum pressure differential be maintained across the valve.
- The tuneable control option provides +/- 25% variation from the nominal factory pre-set flow. Turn the adjustment clockwise to increase.
- The sharp edged orifice design minimizes flow variations due to viscosity changes.

**OPTION ORDERING INFORMATION**

**FC \* B - \* A \***

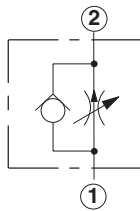
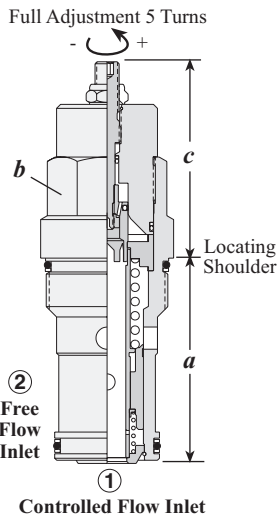
<p><i>Nominal Capacity</i></p> <p><b>B</b> 11 L/min.</p> <p><b>C</b> 23 L/min.</p> <p><b>D</b> 45 L/min.</p> <p><b>E</b> 95 L/min.</p> <p><b>F</b> 200 L/min.</p>	<p><i>Control**</i></p> <p><b>X</b> Not Adjustable</p> <p><b>L+</b> Tuning Adjustment ±25% of customer specified flow</p> <p><b>K</b> Handknob with Lock Knob</p> <p>+ Special setting is required. Specify at time of order.</p>	<p><i>Setting Range</i></p> <p><b>FCBB:</b> <b>A*</b> Orifice Not Replaceable</p> <p><b>FCCB, FCDB, FCEB, FCFB:</b> <b>A*</b> Replaceable Orifice</p> <p>* Customer specified flow setting stamped on hex.</p> <p><b>Flow Settings:</b> FCBB: 0,4 - 11 L/min. FCCB: 0,4 - 23 L/min. FCDB: 0,4 - 45 L/min. FCEB: 0,8 - 95 L/min. FCFB: 0,8 - 200 L/min.</p>	<p><i>Seal Material</i></p> <p><b>N</b> Buna-N</p> <p><b>V</b> Viton</p>
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\*\* See page 178 for information on Control Options

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**FULLY ADJUSTABLE, PRESSURE COMPENSATED, WITH REVERSE FLOW CHECK**



Nominal Flow Range	Typical Cartridge Model Code	Cavity	Cartridge Dimensions					Installation Torque (Nm)
			a	b	L	H	K	
23 L/min.	<b>FDBA – LAN</b>	T - 13A	35,1	22,2	57,7	62,0	58,7	45 - 50
45 L/min.	<b>FDCB – LAN</b>	T - 5A	41,1	28,6	59,7	71,6	69,3	60 - 70
95 L/min.	<b>FDEA – LAN</b>	T - 16A	62,0	31,8	67,6	77,7	73,9	200 - 215
200 L/min.	<b>FDFA – LAN</b>	T - 18A	79,5	41,3	84,1	88,9	88,1	465 - 500

Performance Curves

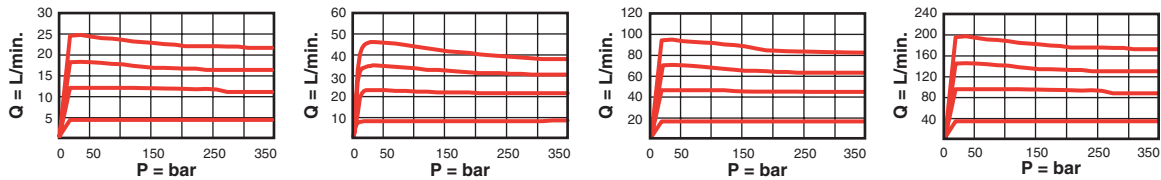
**FDBA**

**FDCB**

**FDEA**

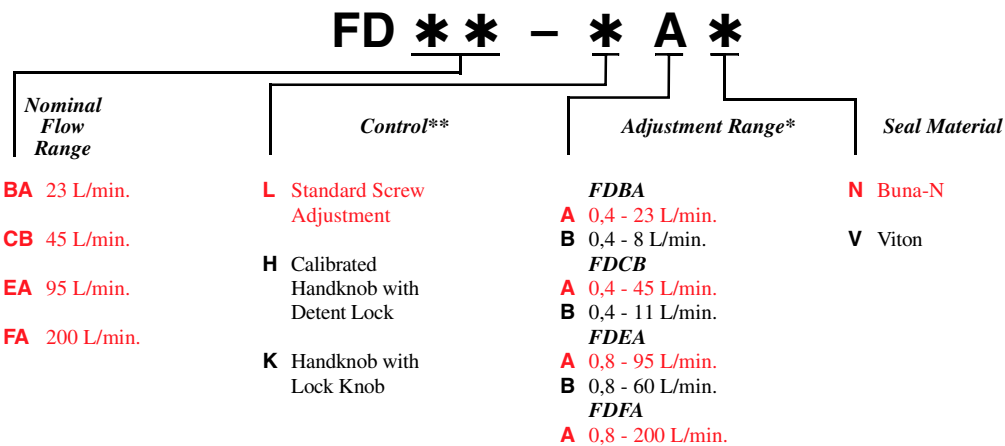
**FDFA**

Flow vs. Pressure Differential



- Maximum operating pressure = 350 bar.
- Accurate pressure compensated control requires that a 14 bar minimum pressure differential be maintained across the valve.
- A balanced adjustment mechanism allows for easy adjustment even at high pressures.
- The sharp edged orifice design minimizes flow variations due to viscosity changes.

OPTION ORDERING INFORMATION



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

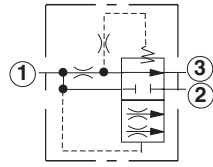
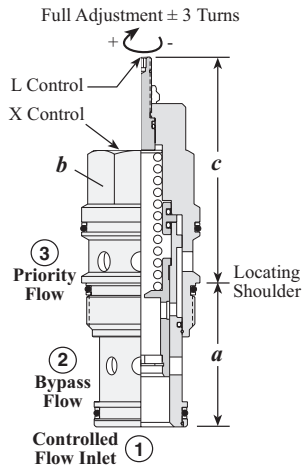
\* Customer specified special setting stamped on hex.

U.S. Patent #4,630,640

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**FIXED ORIFICE, BYPASS / RESTRICTIVE, PRIORITY FLOW**

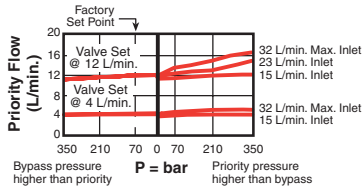


Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)	
			a	b	X	L		K
11 L/min.	FRBA - XAN	T - 163A	31,0	19,1	32,0	64,8	70,4	35 - 40
23 L/min.	FRCA - XAN	T - 11A	35,1	22,2	30,2	63,5	69,9	45 - 50
45 L/min.	FRDA - XAN	T - 2A	35,1	28,6	35,1	71,4	77,7	60 - 70
95 L/min.	FREA - XAN	T - 17A	46,0	31,8	46,0	83,3	89,7	200 - 215
200 L/min.	FRFA - XAN	T - 19A	63,5	41,3	69,9	100,1	106,4	465 - 500

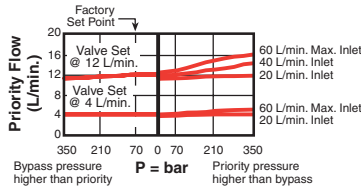
Performance Curves

Typical Performance

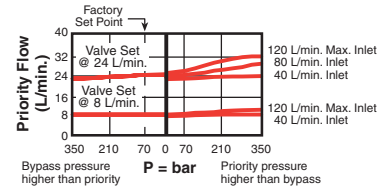
FRBA



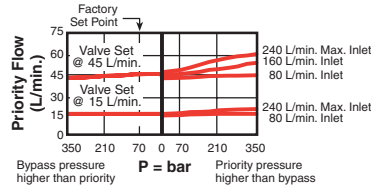
FRCA



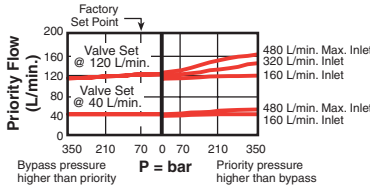
FRDA



FREA



FRFA



- Maximum operating pressure = 350 bar.
- Maximum input flow: FRBA: 30 L/min., FRCA: 60 L/min., FRDA: 120 L/min., FREA: 240 L/min., FRFA: 480 L/min.
- Customer must specify a flow rating. The factory set flow ratings for FRCA, FRDA, FREA, FRFA, are within +/- 10% of the requested setting. The factory set flow rating for FRBA is within +/- 15% of the requested setting.
- Priority remains relatively constant regardless of variation in input flow.

- Both priority and bypass flow are usable up to the system operating pressure.
- Bypass flow is not available until priority flow requirements are satisfied.
- Pressure at the bypass port (port 2) may exceed pressure at the priority port (port 3).

OPTION ORDERING INFORMATION

**FR \* A - \* A \***

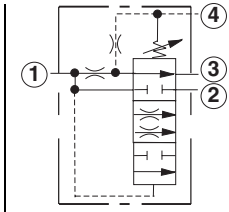
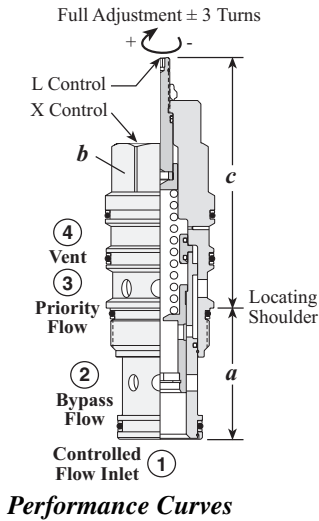
Nominal Capacity	Control**	Adjustment Range	Seal Material
<b>B</b> 11 L/min.	<b>X</b> Not adjustable	<b>FRBA:</b> <b>A* Orifice</b> Not Replaceable	<b>N</b> Buna-N
<b>C</b> 23 L/min.	<b>L+</b> Tuning Adjustment ±25% of customer specified flow	<b>FRCA, FRDA, FREA, FRFA:</b> <b>A* Replaceable Orifice</b>	<b>V</b> Viton
<b>D</b> 45 L/min.	<b>K</b> Handknob with Lock Knob		
<b>E</b> 95 L/min.	<b>+ Special setting is required. Specify at time of order.</b>	<b>* Customer specified flow setting stamped on hex.</b>	
<b>F</b> 200 L/min.		<b>Flow Settings:</b> FRBA: 0,4 - 11 L/min. FRCA: 0,4 - 23 L/min. FRDA: 0,4 - 45 L/min. FREA: 1 - 95 L/min. FRFA: 1 - 200 L/min.	

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

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

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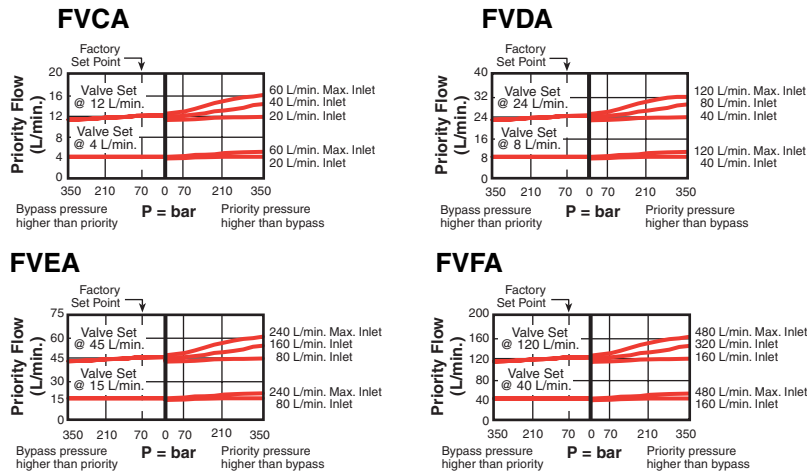
**VENTABLE, FIXED ORIFICE, BYPASS / RESTRICTIVE, PRIORITY FLOW**



Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions					Installation Torque (Nm)
			a	b	X	L	K	
23 L/min.	<b>FVCA – XAN</b>	T - 21A	35,1	22,2	45,2	78,5	84,8	45 - 50
45 L/min.	<b>FVDA – XAN</b>	T - 22A	35,1	28,6	50,8	87,4	93,7	60 - 70
95 L/min.	<b>FVEA – XAN</b>	T - 23A	46,0	31,8	63,5	100,1	106,4	200 - 215
200 L/min.	<b>FVFA – XAN</b>	T - 24A	63,5	41,3	81,0	120,9	127,3	465 - 500

Performance Curves

Typical Performance



- Maximum operating pressure = 350 bar.
- Maximum input flow: FVCA: 60 L/min., FVDA: 120 L/min., FVEA: 240 L/min., FVFA: 480 L/min.
- Nominal vent flow = 0,75 L/min.
- Customer must specify a flow rating. Factory set flow ratings are within +/-10% of the requested setting.
- Pressure at the bypass port (port 2) may exceed pressure at the priority port (port 3).
- Priority remains relatively constant regardless of variation in input flow.
- A tuneable adjustment control option provides +/- 25% variation from the nominal factory pre-set flow. Adjustment is done with +/- 3 turns of the adjustment screw.

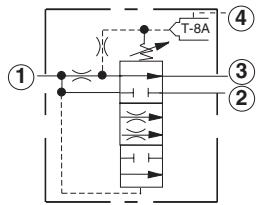
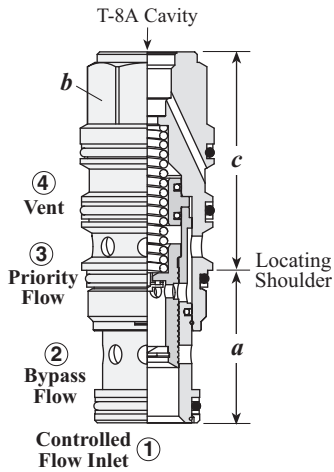
OPTION ORDERING INFORMATION

**FV \* A – X A \***

<p><b>Nominal Capacity</b></p> <p><b>C</b> 23 L/min.</p> <p><b>D</b> 45 L/min.</p> <p><b>E</b> 95 L/min.</p> <p><b>F</b> 200 L/min.</p>	<p><b>Control**</b></p> <p><b>X</b> Not Adjustable</p> <p><b>L+</b> Tuning Adjustment ±25% of customer specified flow</p> <p><b>K</b> Handknob with Lock Knob</p> <p><b>+</b> Special setting is required. Specify at time of order.</p> <p>** See page 178 for information on Control Options</p> <p>Customer specified special setting stamped on hex.</p>	<p><b>Adjustment Range</b></p> <p><b>A*</b> Replaceable Orifice</p> <p>* Customer specified flow setting stamped on hex.</p> <p><b>Flow Settings:</b>                      FVCA: 0,4 - 23 L/min.                      FVDA: 0,4 - 45 L/min.                      FVEA: 0,8 - 95 L/min.                      FVFA: 0,8 - 200 L/min.</p>	<p><b>Seal Material</b></p> <p><b>N</b> Buna-N</p> <p><b>V</b> Viton</p>
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Visit [www.sunhydraulics.com](http://www.sunhydraulics.com) for current list pricing and complete technical information on all Sun products.

**VENTABLE, FIXED ORIFICE, BYPASS / RESTRICTIVE, PRIORITY FLOW, WITH INTEGRAL T-8A CONTROL CAVITY**



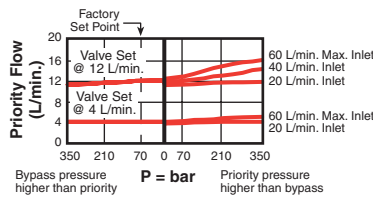
The -8 control option allows the pilot control valve to be incorporated directly into the end of the priority flow control cartridge via the T-8A cavity. These pilot control cartridges are sold separately and include electro-proportional, solenoid, air pilot, and hydraulic pilot operation. See Pilot Control Cartridges on page 141.

Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions			Installation Torque (Nm)
			a	b	c	
23 L/min.	<b>FVCA - 8AN</b>	T - 21A	34,8	22,2	45,2	45 - 50
45 L/min.	<b>FVDA - 8AN</b>	T - 22A	34,8	28,6	50,8	60 - 70
95 L/min.	<b>FVEA - 8AN</b>	T - 23A	45,9	31,8	65,7	200 - 215
200 L/min.	<b>FVFA - 8AN</b>	T - 24A	63,5	41,3	80,0	465 - 500

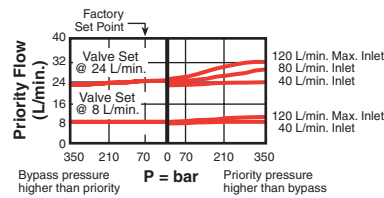
Performance Curves

Typical Performance

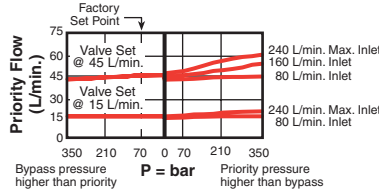
**FVCA-8**



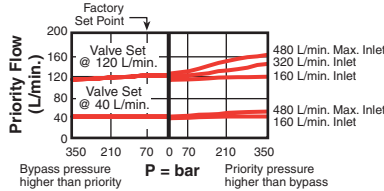
**FVDA-8**



**FVEA-8**

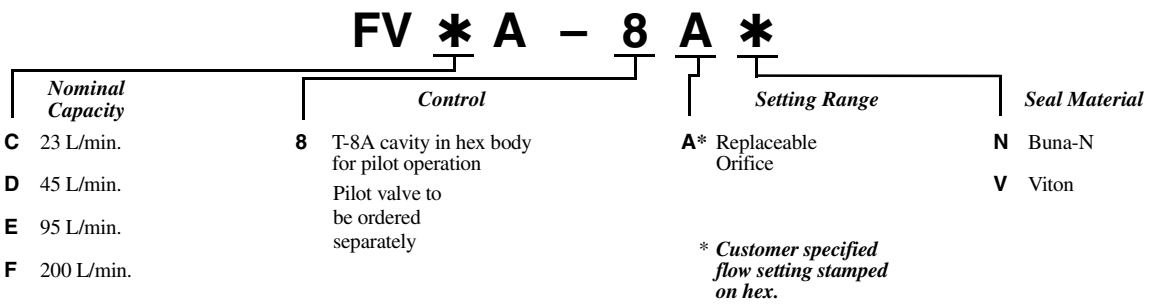


**FVFA-8**



- Maximum operating pressure = 350 bar.
- Maximum input flow: FVCA: 60 L/min., FVDA: 120 L/min., FVEA: 240 L/min., FVFA: 480 L/min.
- Nominal vent flow = 0,75 L/min.
- Customer must specify a flow rating. Factory set flow ratings are within +/-10% of the requested setting.
- Both priority and bypass flow are usable up to the system operating pressure.
- Priority remains relatively constant regardless of variation in input flow.
- Pressure at the bypass port (port 2) may exceed pressure at the priority port (port 3).

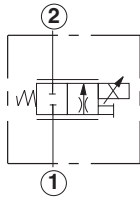
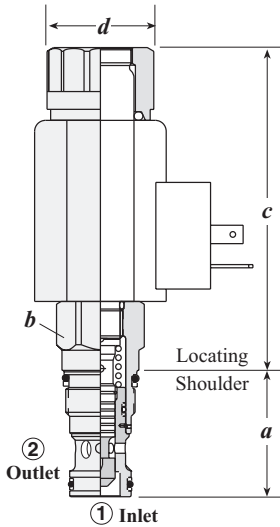
OPTION ORDERING INFORMATION



**Flow Settings:**  
 FVCA-8: 0,4 - 23 L/min.  
 FVDA-8: 0,4 - 45 L/min.  
 FVEA-8: 0,8 - 95 L/min.  
 FVFA-8: 1 - 200 L/min.

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**NORMALLY CLOSED THROTTLE**

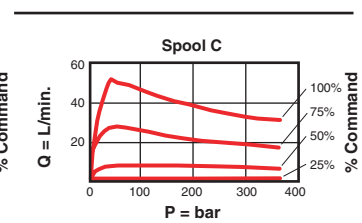
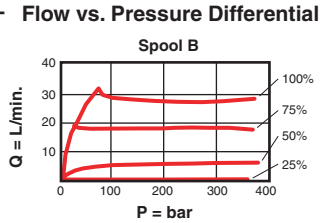
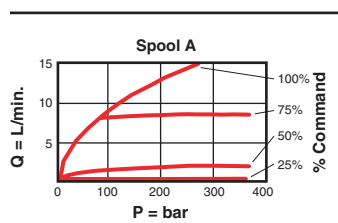
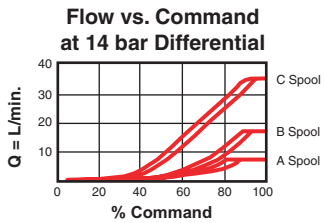


Maximum Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)	
			a	b	c***	d		
40 L/min.	FPCC - XCN	T - 13A	35,1	22,2	X,M 89,2	D,L,T 114,0	38,1	45 - 50

\*\*\*An additional 50,8 mm clearance is needed for coil installation and removal.

Performance Curves

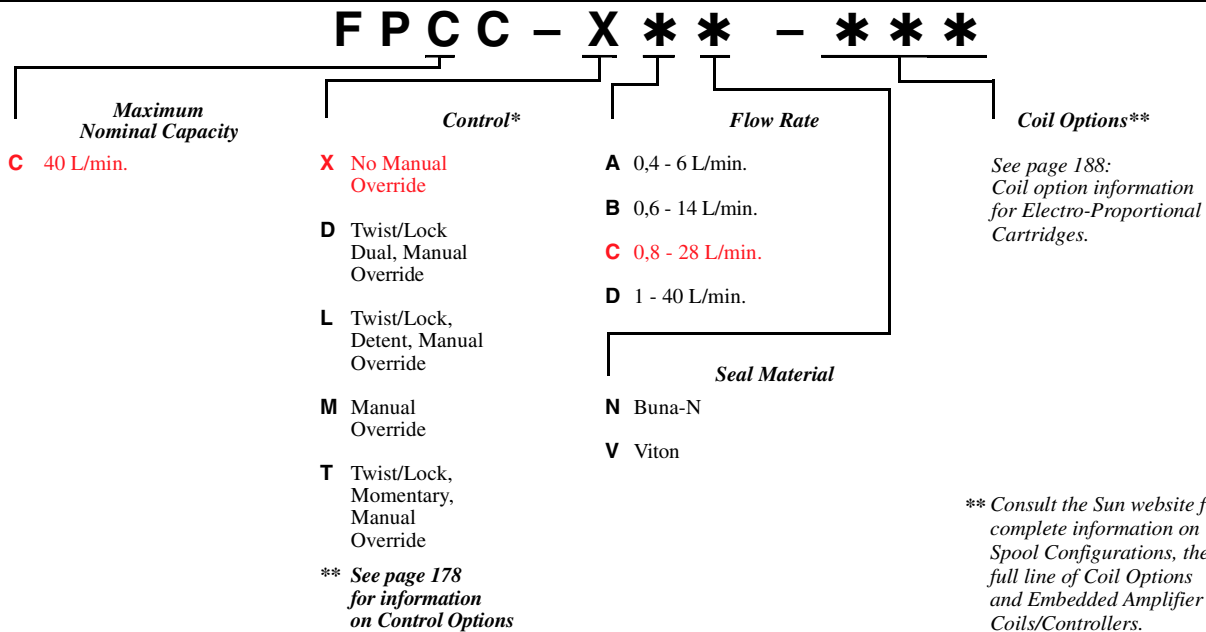
**FPCC**



- Capable of operating with pressures up to 350 bar.
- Maximum valve leakage at 24 cSt = 100 cc/min. at 210 bar.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.
- Hysteresis with dither = <4% and with DC input = <8%.
- Linearity with dither = <2% and repeatability with dither = <2%.
- Recommended dither frequency = 140 Hz.
- Deadband nominal (as percentage of input) = 25%.

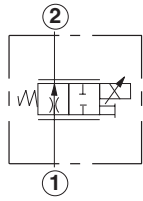
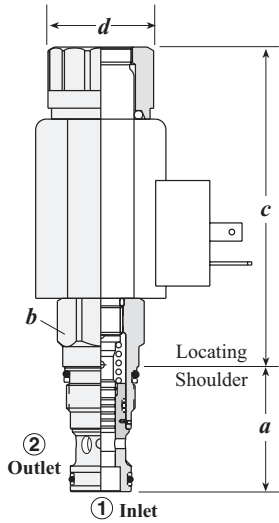
- For optimum performance, an amplifier with current sensing and adjustable dither should be used. Dither should be adjustable between 100-250 Hz.
- Available in either a normally open or normally closed configuration with three different capacity ranges.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

**OPTION ORDERING INFORMATION**



Visit [www.sunhydraulics.com](http://www.sunhydraulics.com) for current list pricing and complete technical information on all Sun products.

**NORMALLY OPEN THROTTLE**

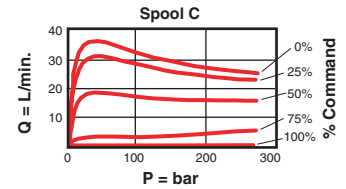
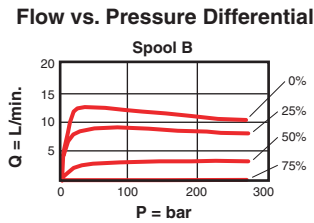
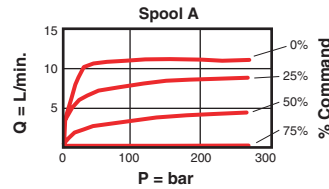
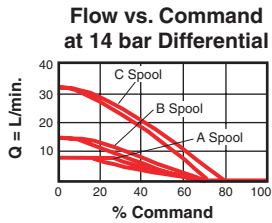


Maximum Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions					Installation Torque (Nm)
			a	b	c***		d	
28 L/min.	<b>FPCH - XCN</b>	T - 13A	35,1	22,2	X,M	D,L,T	38,1	45 - 50

\*\*\*An additional 50,8 mm clearance is needed for coil installation and removal.

**Performance Curves**

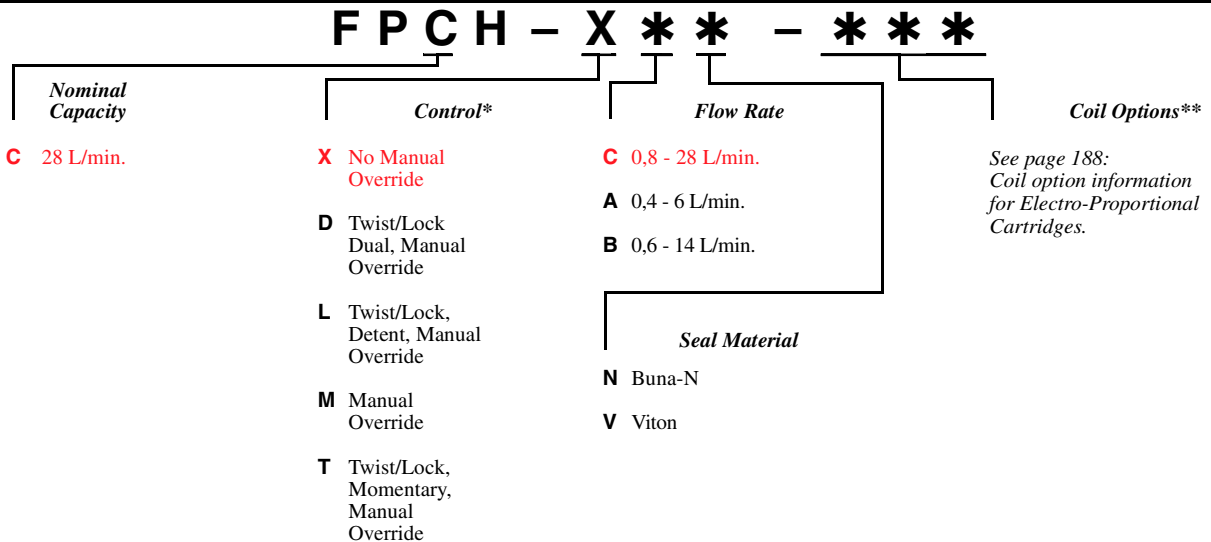
**FPCH**



- Capable of operating with pressures up to 350 bar.
- Maximum valve leakage at 24 cSt = 100 cc/min. at 210 bar.
- Hysteresis with dither = <4% and with DC input = <8%.
- Linearity with dither = <2% and repeatability with dither = <2%.
- Recommended dither frequency = 140 Hz.
- Deadband nominal (as percentage of input) = 25%.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.

- Available in either a normally open or normally closed configuration with three different capacity ranges.
- Low leakage levels in the closed position.
- For optimum performance, an amplifier with current sensing and adjustable dither should be used. Dither should be adjustable between 100-250 Hz.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

**OPTION ORDERING INFORMATION**



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

\*\* Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

Visit [www.sunhydraulics.com](http://www.sunhydraulics.com) for current list pricing and complete technical information on all Sun products.

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# A Sun Amplifier, Controlling a Sun Coil, Powering a Sun Valve:

## Sun Hydraulics' Optimized Solution

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### **Electro-Hydraulic Proportional Valves WITH ON-BOARD ELECTRONICS**

---

Sun's proportional hydraulic cartridge valves:

- Available in a wide array of pilot, single-stage and two-stage versions.
- Affordable for mobile and industrial applications.
- Systems become more efficient and versatile.
- Circuits become less complicated hydraulically.
- System plumbing and wiring are simplified.

Proportional pilot valves incorporated as the pilot control option can mount directly into any of Sun's ventable and pilot operated cartridges which are configured to accept the pilot. This versatility allows proportional control of high pressures and high flows with the power consumption of a much smaller valve.

And Sun's electro-proportional valves with embedded electronics can be mounted close to actuators for improved performance, while minimizing system wiring and plumbing.

All Sun Proportional, Ramping and Power Saver Amplifiers offer improved efficiency, precise control, and enhanced reliability. Performance is optimized with Sun proportional valves — valve, coil, and amplifier are matched (serialized) for easy "plug and play". And, assemblies are ultrasonically welded and polyurethane potted for excellent environmental protection.



See catalogue pages: 14 (RBAP), 15 (RBA), 16 (RP\*C-8), 17 (RP\*S-8), 23 (RV\*D-8), 31 (RS\*C-8), 36 (PB\*B-8), 43 (PRDL), 44 (PRDP), 45 (PP\*B-8), 46 (PV\*A-8), 90 (FPCC), and 91 (FPCH).

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**Products: Cartridges: Coils or Coil Search.**

**Standard and Embedded Coil Options are listed at the bottom of each cartridge web page.**