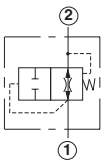
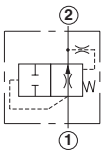
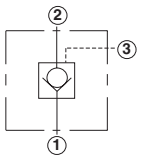
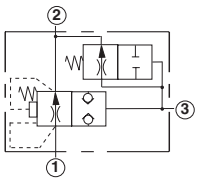
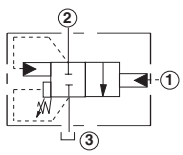
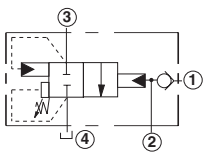
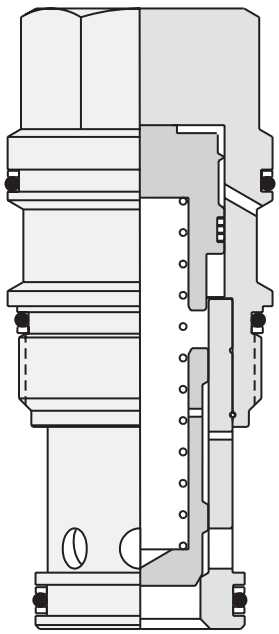
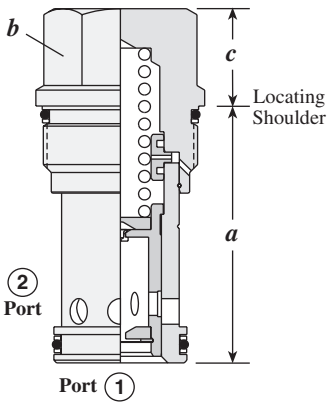
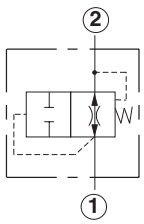
Circuit Savers

	Cartridge Type	*Page*
	Fixed Orifice, Flow Fuse	164
	Air Bleed and Start-up	165
	Check, Pilot-to-Close, 1.8:1 Pilot Ratio	166
	Check, Pilot-to-Close, 120:1 Pilot Ratio	167
	Accumulator Sense, Pump Unload, Pilot Capacity	168
	Accumulator Sense, Pump Unload with Check, Pilot Capacity	169



FIXED ORIFICE, FLOW FUSE



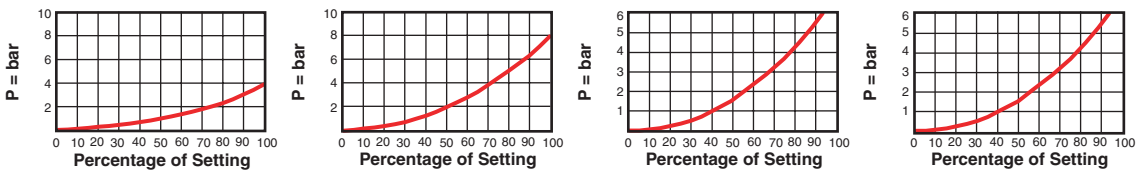


Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* a	b	c	*Installation Torque (Nm)*
23 L/min.	**FQCA – XAN**	T - 13A	35,1	22,2	19,1	45 - 50
60 L/min.	**FQEA – XAN**	T - 5A	41,1	28,6	17,5	60 - 70
95 L/min.	**FQGA – XAN**	T - 16A	62,0	31,8	24,6	200 - 215
200 L/min.	**FQIA – XAN**	T - 18A	79,5	41,3	30,2	465 - 500

Performance Curves

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

Typical Pressure Drop



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = FQCA: 30 cc/min. at 70 bar, FQEA: 50 cc/min. at 70 bar, FQGA: 65 cc/min. at 70 bar, FQIA: 80 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.
- Customer must specify a flow rating. Factory set flow ratings are within +/- 10% of the requested flow ratings.

OPTION ORDERING INFORMATION

FQ ✱ A – X A ✱

Nominal Capacity	*Control*	*Setting Range*	*Seal Material*
C 23 L/min.	**X** Not Adjustable	**A*** Replaceable Orifice FQCA: 2 - 23 L/min. FQEA: 4 - 60 L/min. FQGA: 4 - 95 L/min. FQIA: 4 - 200 L/min.	**N** Buna-N
E 60 L/min.			**V** Viton
G 95 L/min.			
I 200 L/min.		**B*** Permanent Orifice FQCA: 2 - 23 L/min. FQEA: 4 - 60 L/min. FQGA: 4 - 95 L/min. FQIA: 4 - 200 L/min.	

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

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

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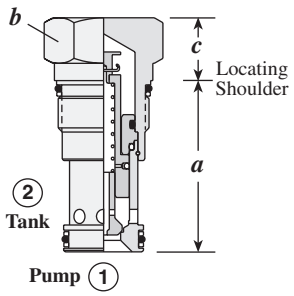
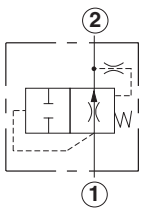
AIR BLEED AND START-UP

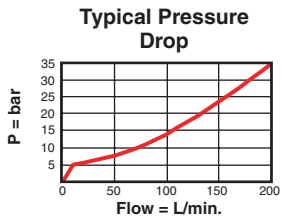


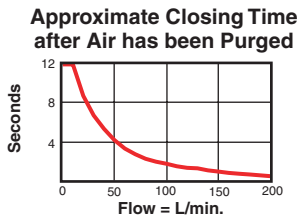


Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions*			*Installation Torque (Nm)*
			a	*b*	*c*	
15 - 200 L/min.	**NQEB – XAN**	T - 3A	47,8	28,6	17,5	60 - 70

Performance Curves

NQEB





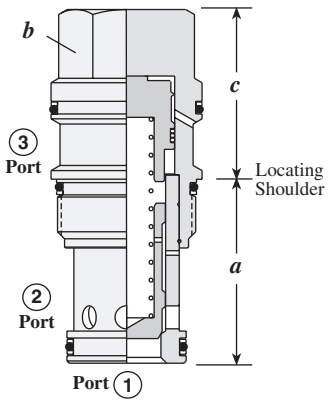
- Maximum operating pressure = 350 bar.
- Air-bleed and start-up valves require a minimum of 15 L/min. flow rate and 5,5 bar system pressure.
- The valve will re-open when system pressure falls below 1,7 bar.
- After air has been purged, closing times vary from approximately 12 seconds at 15 L/min. to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

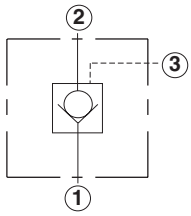
OPTION ORDERING INFORMATION

N Q E B – X A ✱

Nominal Capacity	*Control*	*Adjustment Range*	*Seal Material*
E 15-200 L/min.	**X** Not Adjustable	**A** Not Adjustable	**N** Buna-N
			V Viton

CHECK, PILOT-TO-CLOSE, 1.8:1 PILOT RATIO



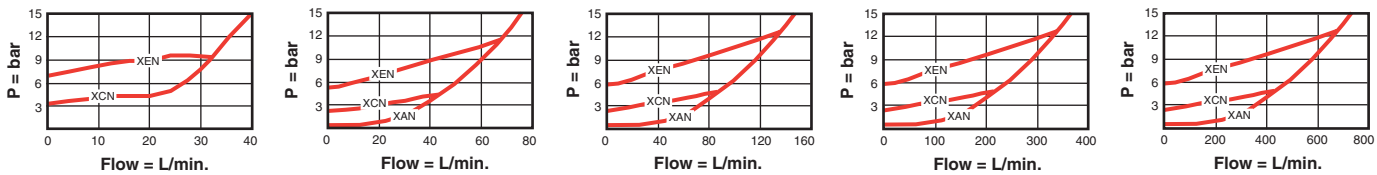


Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions*			*Installation Torque (Nm)*
			a	*b*	*c*	
40 L/min.	**COBA – XCN**	T - 163A	31,0	19,1	31,0	35 - 40
80 L/min.	**CODA – XCN**	T - 11A	35,1	22,2	30,2	45 - 50
160 L/min.	**COFA – XCN**	T - 2A	35,1	28,6	35,1	60 - 70
320 L/min.	**COHA – XCN**	T - 17A	46,0	31,8	46,0	200 - 245
640 L/min.	**COJA – XCN**	T - 19A	63,5	41,3	58,7	465 - 500

Performance Curves

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

Typical Pressure Drop



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,07 cc/min.
- Nominal Pilot Ratio = 1.8:1. This means that a pressure of 70 bar at the pilot port will close a valve against a pressure of 125 bar at port 1. Any decay or loss of pilot pressure could allow the valve to open, even if it is a momentary decay or loss.
- Reverse flow through the valve from port 2 to port 1 is not possible under any condition.
- Pressure at the port 2 area directly opposes pilot pressure.
- With equal pressures at all ports the valve is closed.

OPTION ORDERING INFORMATION

CO ✱ A – X ✱ ✱

Nominal Capacity		*Control**	*Cracking Pressure*	*Seal Material*
B	40 L/min.	**X** Standard Pilot	**A***0,3 bar	**N** Buna-N
D	80 L/min.	* *See page 178 for information on Control Options*	**B***1,0 bar	**V** Viton
F	160 L/min.		**C** 2,0 bar	
H	320 L/min.		**D** 3,5 bar	
J	640 L/min.		**E** 5,0 bar	
			F 7,0 bar	

* *COBA is not available in A and B Cracking Pressures.*

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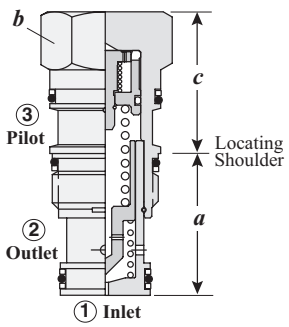
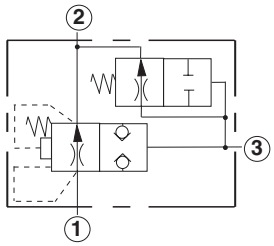
CHECK, PILOT-TO-CLOSE, 120:1 PILOT RATIO



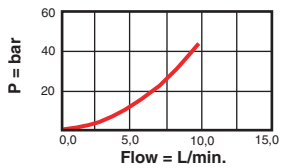


Orifice Diameter	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions*			*Installation Torque (Nm)*
			a	*b*	*c*	
1,27 mm	**COFO – XDN**	T - 2A	35,1	28,6	35,1	60 - 70

Performance Curves

COFO

Pressure Differential vs. Flow



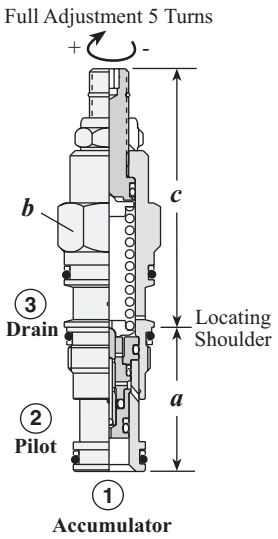
- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,3 cc/min.
- Pilot ratio = 120:1.
- Features hardened steel seats for excellent wear characteristics and contamination tolerance.
- The valve is a poppet design that results in very low leakage of stored fluid from the accumulator.
- When pump pressure is below 20 bar there is a leak path from port 3 to tank (port 2).
- The discharge of the accumulator is across a 1,27 mm diameter orifice. The discharge time for large accumulators with low pre-charge pressures may be too long.

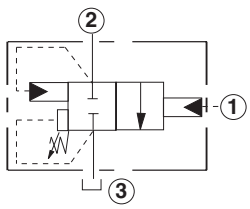
OPTION ORDERING INFORMATION

C O F O – X D N

Orifice Diameter	*Control*	*Minimum Pilot Pressure*	*Seal Material*
F 1,27 mm	**X** Standard Pilot	**D** 3,5 bar	**N** Buna-N
			V Viton

ACCUMULATOR SENSE, PUMP UNLOAD, PILOT CAPACITY





Pilot Flow Capacity	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* *a*	*b*	*c* L	*c* C	*c* K	*Installation Torque (Nm)*
0,75 L/min.	**QPAA – LAN**	T - 11A	35,0	22,2	63,5	67,8	69,3	45 - 50

- Maximum operating pressure = 350 bar.
- The pressure differential between unload and reset will be within +/- 1% of the stated ratio of the valve with up to an additional 1,7 bar due to dynamic seal friction.
- The accumulator sensing area is positively sealed.
- The spool design of this valve allows it to maintain a fixed differential ratio because the areas are created by diameters on the spool that will not wear or change with use.
- Minimum clearance between the spool and sleeve, and seal on the pilot piston diameter significantly reduce the potential for silting.
- When applying this cartridge, a separate drain line is required to prevent erratic operation caused by tank line pressure fluctuations.
- Careful consideration should be given when selecting an adjustment range. System pressure drops and flows tend to affect the operation of unloading valves. Low operating pressures combined with low differential pressures result in a very narrow band between unload and reset, requiring precise system design. High flow rates typically mean high pressure drops, which subtract from the differential with which the valve has to work.

OPTION ORDERING INFORMATION

QPA* – *

Pilot Flow Capacity

A 0,75 L/min.

Version

A 15% Nominal Differential

B 20% Nominal Differential

C 30% Nominal Differential

D 50% Nominal Differential

Control*

L Standard Screw Adjustment

C* Tamper Resistant Factory Set

K Handknob with Lock Knob

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

Adjustment Range

A 70 - 210 bar Standard Set at 70 bar

B 35 - 105 bar Standard Set at 35 bar

C 140 - 350 bar Standard Set at 140 bar

D 18 - 55 bar Standard Set at 18 bar

Seal Material

N Buna-N

V Viton

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

Customer specified special setting stamped on hex.

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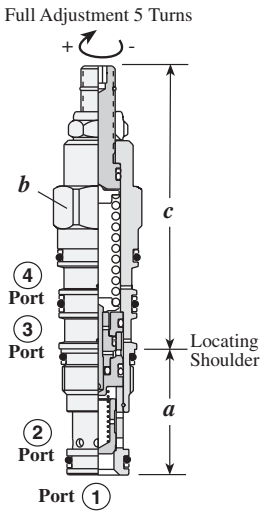
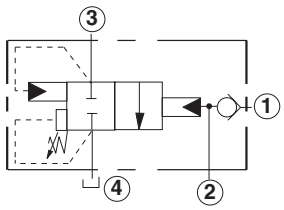
ACCUMULATOR SENSE, PUMP UNLOAD WITH CHECK, PILOT CAPACITY





Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions a	b	c L	c C	c K	Installation Torque (Nm)
45 L/min.	**QCDA – LAN**	T - 21A	35,0	22,2	78,5	82,6	84,8	45 - 50
60 L/min.	**QCDB – LAN**	T - 21A	35,0	22,2	78,5	82,6	84,8	45 - 50
60 L/min.	**QCDC – LAN**	T - 21A	35,0	22,2	78,5	82,6	84,8	45 - 50
60 L/min.	**QCDD – LAN**	T - 21A	35,0	22,2	78,5	82,6	84,8	45 - 50

- Maximum operating pressure = 350 bar.
- Pilot flow capacity = 0,75 L/min.
- Pressure drop, port 1 to port 2 = 7 bar at 60 L/min.
- Free flow check cracking pressure = 0,3 bar.
- The pressure differential between unload and reset will be within +/- 1% of the stated ratio of the valve with up to an additional 1,7 bar due to dynamic seal friction.
- The accumulator sensing area is positively sealed.
- The spool design of this valve allows it to maintain a fixed differential ratio because the areas are created by diameters on the spool that will not wear or change with use.
- Minimum clearance between the spool and sleeve, and seal on the pilot piston diameter significantly reduce the potential for silting.
- When applying this cartridge, a separate drain line is required to prevent erratic operation caused by tank line pressure fluctuations.
- Careful consideration should be given when selecting an adjustment range. System pressure drops and flows tend to affect the operation of unloading valves. Low operating pressures combined with low differential pressures result in a very narrow band between unload and reset, requiring precise system design. High flow rates typically mean high pressure drops, which subtract from the differential with which the valve has to work.

OPTION ORDERING INFORMATION

QCD✱ – ✱✱✱

Nominal Capacity

- **DA** 45 L/min.
- **DB** 60 L/min.
- **DC** 60 L/min.
- **DD** 60 L/min.

Version

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

Control**

- **L** Standard Screw Adjustment
- **C*** Tamper Resistant Factory Set
- **K** Handknob with Lock Knob
- * ***Special setting is required. Specify at time of order.***

Adjustment Range

- **A** 70 - 210 bar Standard Set at 70 bar
- **B** 35 - 105 bar Standard Set at 35 bar
- **C** 140 - 350 bar Standard Set at 140 bar
- **D** 18 - 55 bar Standard Set at 18 bar

Seal Material

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

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

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NOTES