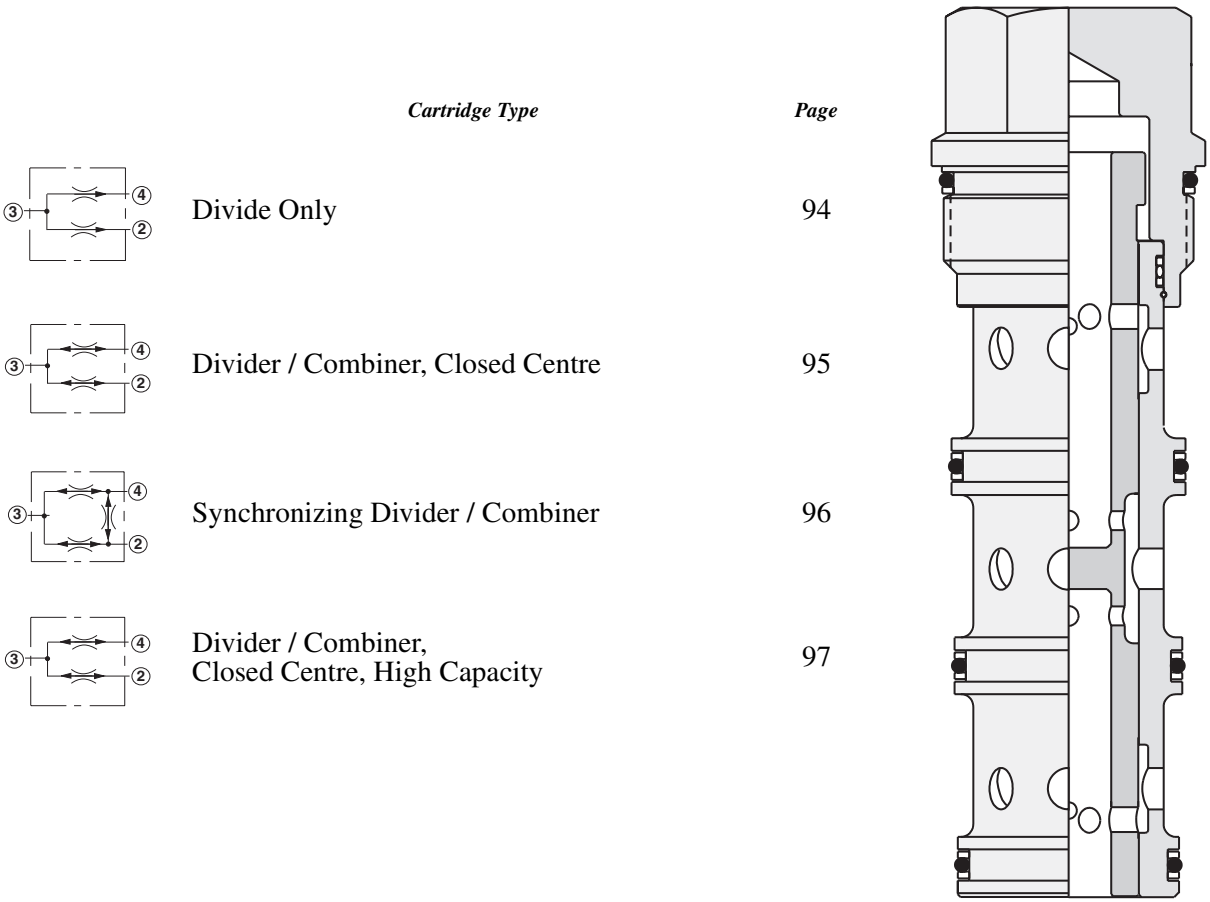
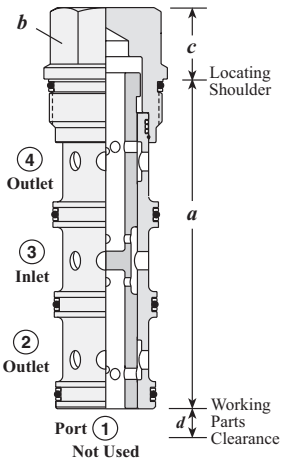
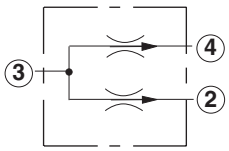
Flow Divider / Combiner Cartridge Valves



DIVIDE ONLY





Capacity Min/Max	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions* a	b	c	d	*Installation Torque (Nm)*
6-30 L/min.	**FSCD – XAN**	T - 31A	85,1	22,2	19,1	3,6	45 - 50
12-60 L/min.	**FSDD – XAN**	T - 32A	92,2	28,6	17,1	3,8	60 - 70
23-115 L/min.	**FSED – XAN**	T - 33A	114,3	31,8	24,6	5,3	200 - 215
45-230 L/min.	**FSFD – XAN**	T - 34A	139,7	41,3	30,2	6,9	465 - 500

Operating Characteristics

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation* High Flow Leg L/min.	Low Flow Leg L/min.
FSCD					
50:50	Max. Rated	30	+/-3.5%	14,0-16,0	—
	Min. Rated	6	+/-6.5%	2,6-3,4	—
40:60	Max. Rated	26,5	+/-3.5%	15,0-16,8	9,7-11,6
	Min. Rated	5,3	+/-6.5%	2,8-3,5	1,8-2,5
33:67	Max. Rated	22,7	+/-3.5%	14,4-16	6,7-8,3
	Min. Rated	4,5	+/-6.5%	2,7-3,3	1,2-1,8
FSDD					
50:50	Max. Rated	60	+/-3.5%	28-32	—
	Min. Rated	12	+/-6.5%	5,2-6,7	—
40:60	Max. Rated	47	+/-3.5%	26,6-29,8	17,2-20-4
	Min. Rated	9,4	+/-6.5%	5,0-6,2	3,2-4,4
33:67	Max. Rated	42	+/-3.5%	26,5-29,5	12,5-15,5
	Min. Rated	8,4	+/-6.5%	5,1-6,2	2,2-3,3

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation* High Flow Leg L/min.	Low Flow Leg L/min.
FSED					
50:50	Max. Rated	115	+/-3.5%	53,5-61,5	—
	Min. Rated	23	+/-6.5%	10-13	—
40:60	Max. Rated	95	+/-3.5%	54-60	35-41
	Min. Rated	19	+/-6.5%	10,2-12,6	6,4-8,8
33:67	Max. Rated	85	+/-3.5%	54-60	25-31
	Min. Rated	17	+/-6.5%	10,3-12,5	4,5-6,7
FSFD					
50:50	Max. Rated	230	+/-3.5%	10-123	—
	Min. Rated	45	+/-6.5%	19,6-25,4	—
40:60	Max. Rated	200	+/-3.5%	113-127	73-87
	Min. Rated	38	+/-6.5%	20,3-25,3	12,7-17,7
33:67	Max. Rated	180	+/-3.5%	114-126	54-66
	Min. Rated	36	+/-6.5%	22-26	10-14

The maximum variation is at 350 bar differential between legs with the high pressure leg being the higher flow.

- Maximum operating pressure = 350 bar.
- Pressure drop at maximum input flow = 18 bar; at minimum input flow = 0,7 bar.
- This valve is a divider; any attempt to flow backwards through the valve is not advised.

OPTION ORDERING INFORMATION

FS ✱ D – X ✱ ✱

Nominal Capacity

C 6-30 L/min.
D 12-60 L/min.
E 23-115 L/min.
F 45-230 L/min.

Control

X Not Adjustable

Flow Split

A 50/50
B*40/60
C*33/67

* *Port 4 is always high percentage flow.*

Seal Material

N Buna-N
V Viton

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

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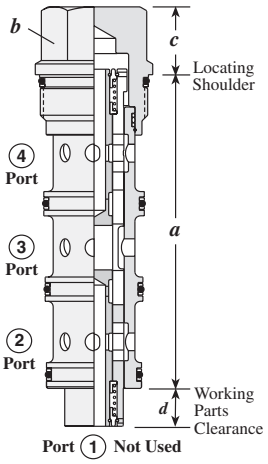
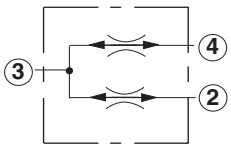
DIVIDER / COMBINER, CLOSED CENTRE





Note: Closed centre valves have spring centred internal spools that provide blocked flow paths when centred. Centring occurs when the Port 3 flow is also blocked. This internal blocking isolates Port 2 and 4 from cross flow.

Capacity Min/Max	*Typical Cartridge Model Code*	*Cartridge Dimensions* *Cavity*	*a*	*b*	*c*	*d*	*Installation Torque (Nm)*
6-30 L/min.	**FSCA – XAN**	T - 31A	85,1	22,2	19,1	16,5	45 - 50
12-60 L/min.	**FSDA – XAN**	T - 32A	92,2	28,6	17,5	19,6	60 - 70
23-115 L/min.	**FSEA – XAN**	T - 33A	114,3	31,8	24,6	25,1	200 - 215
45-230 L/min.	**FSFA – XAN**	T - 34A	139,7	41,3	30,2	23,1	465 - 500

Operating Characteristics

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation L/min.*
FSCA				
50:50	Max. Rated	30	+/-2.5%	14,3-15,8
	Min. Rated	6	+/-4.5%	2,73-3,27
FSDA				
50:50	Max. Rated	60	+/-2.5%	28,5-31,5
	Min. Rated	12	+/-4.5%	5,5-6,5

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation L/min.*
FSEA				
50:50	Max. Rated	115	+/-2.5%	54,6-60,4
	Min. Rated	23	+/-4.5%	10,5-12,5
FSFA				
50:50	Max. Rated	230	+/-2.5%	109-120
	Min. Rated	45	+/-4.5%	21-25

The maximum variation is at 350 bar differential between legs with the high pressure leg being the higher flow in dividing mode and the lower flow in combining mode.

- Maximum operating pressure = 350 bar.
- Pressure drop at maximum input flow = 24 bar; at minimum input flow = 1 bar.
- Operating characteristics cause the leg of the circuit with the greatest load to receive the higher percentage of the flow in dividing mode. If a rigid mechanism is used to tie actuators together, the lead actuator may pull the lagging actuator and cause it to cavitate.
- In combining mode, compensating characteristics will cause the leg of the circuit with the lowest load to receive the higher percentage of flow. If a synchronization feature is not included, an additive accuracy error will be experienced with each full stroke of the actuator.

OPTION ORDERING INFORMATION

FS ✱ A – X A ✱

Nominal Capacity

C 6-30 L/min.

D 12-60 L/min.

E 23-115 L/min.

F 45-230 L/min.

Control

X Not Adjustable

Flow Split

A 50/50

Seal Material

N Buna-N

V Viton

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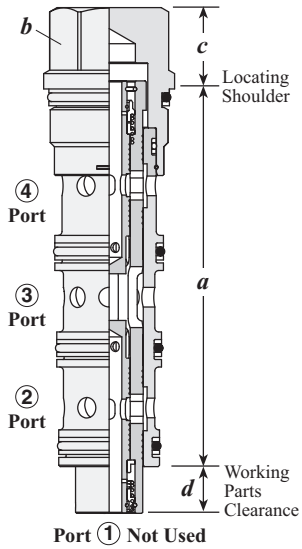
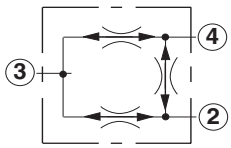
SYNCHRONIZING DIVIDER / COMBINER





Capacity Min/Max	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions*				*Installation Torque (Nm)*
			a	*b*	*c*	*d*	
6-30 L/min.	**FSCS – XAN**	T - 31A	85,1	22,2	19,0	16,5	45 - 50
12-60 L/min.	**FSDS – XAN**	T - 32A	92,2	28,6	17,5	19,6	60 - 70
23-115 L/min.	**FSES – XAN**	T - 33A	114,3	31,8	24,6	25,1	200 - 215
45-230 L/min.	**FSFS – XAN**	T - 34A	139,7	41,3	30,2	23,1	465 - 500

Operating Characteristics

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation L/min.*
FSCS				
50:50	Max. Rated	30	+/-2.5%	14,3-15,8
	Min. Rated	6	+/-4.5%	2,73-3,27
	Synchronizing Flow:			0,94-2,46
FSDS				
50:50	Max. Rated	60	+/-2.5%	28,5-31,5
	Min. Rated	12	+/-4.5%	5,5-6,5
	Synchronizing Flow:			1,1-2,8

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation L/min.*
FSES				
50:50	Max. Rated	115	+/-2.5%	54,6-60,4
	Min. Rated	23	+/-4.5%	10,5-12,5
	Synchronizing Flow:			3,4-6,6
FSFS				
50:50	Max. Rated	230	+/-2.5%	109-120
	Min. Rated	45	+/-4.5%	21-25
	Synchronizing Flow:			6,6-13,2

The maximum possible variation is at 350 bar differential between legs with the high pressure leg being the higher flow in dividing mode and the lower flow in combining mode.

- Maximum operating pressure = 350 bar.
- Pressure drop at maximum input flow = 24 bar; at minimum input flow = 1 bar.
- Operating characteristics cause the leg of the circuit with the greatest load to receive the higher percentage of the flow in dividing mode. If a rigid mechanism is used to tie actuators together, the lead actuator may pull the lagging actuator and cause it to cavitate.
- In combining mode, compensating characteristics will cause the leg of the circuit with the lowest load to receive the higher percentage of flow. If a synchronization feature is not included, an additive accuracy error will be experienced with each full stroke of the actuator.

OPTION ORDERING INFORMATION

FS ✱ S – X A ✱

Nominal Capacity

- **C** 6-30 L/min.
- **D** 12-60 L/min.
- **E** 23-115 L/min.
- **F** 45-230 L/min.

Control

- **X** Not Adjustable

Flow Split

- **A** 50/50

Seal Material

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

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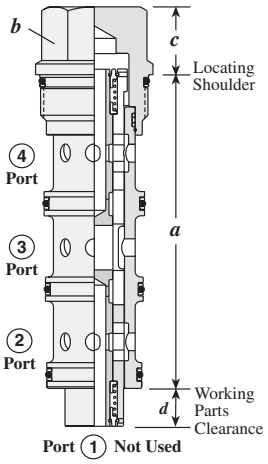
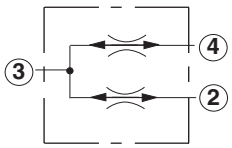
DIVIDER / COMBINER, CLOSED CENTRE, HIGH CAPACITY





Note: Closed centre valves have spring centred internal spools that provide blocked flow paths when centered. Centring occurs when the Port 3 flow is also blocked. This internal blocking isolates Port 2 and 4 from cross flow. These high capacity valves have approximate 30% greater capacity than standard closed-centre divider/combiners and are designed for use in tractive drive systems. Note: Accuracy on these cartridges is not equivalent to the accuracy of standard closed-centre divider/combiners.

Capacity Min/Max	*Typical Cartridge Model Code*	*Cavity*	*Cartridge Dimensions*				*Installation Torque (Nm)*
			a	*b*	*c*	*d*	
8-38 L/min.	**FSCH – XAN**	T - 31A	85,1	22,2	19,1	16,5	45 - 50
15-75 L/min.	**FSDH – XAN**	T - 32A	92,2	28,6	17,5	19,6	60 - 70
30-150 L/min.	**FSEH – XAN**	T - 33A	114,4	31,8	24,6	25,1	200 - 215
60-300 L/min.	**FSFH – XAN**	T - 34A	139,7	41,3	30,2	23,1	465 - 500

Operating Characteristics

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation L/min.*
FSCH				
50:50	Max. Rated	38	+/-3.5%	17,7-20,3
	Min. Rated	8	+/-6.5%	3,5-4,5
FSDH				
50:50	Max. Rated	75	+/-3.5%	35-40
	Min. Rated	15	+/-6.5%	6,5-8,5

Split	*Divisional Accuracy* Input Flow L/min.		Rated Accuracy	*Maximum Possible Flow Variation L/min.*
FSEH				
50:50	Max. Rated	150	+/-3.5%	70-80
	Min. Rated	30	+/-6.5%	13-17
FSFH				
50:50	Max. Rated	300	+/-3.5%	139-160
	Min. Rated	60	+/-6.5%	26-34

The maximum possible variation is at 350 bar differential between legs with the high pressure leg being the higher flow in dividing mode and the lower flow in combining mode.

- Maximum operating pressure = 350 bar.
- Pressure drop at maximum input flow = 24 bar; at minimum input flow = 1 bar.
- Operating characteristics cause the leg of the circuit with the greatest load to receive the higher percentage of the flow in dividing mode. If a rigid mechanism is used to tie actuators together, the lead actuator may pull the lagging actuator and cause it to cavitate.
- In combining mode, compensating characteristics will cause the leg of the circuit with the lowest load to receive the higher percentage of flow. If a synchronization feature is not included, an additive accuracy error will be experienced with each full stroke of the actuator.

OPTION ORDERING INFORMATION

FS ✱ H – X A ✱

Nominal Capacity
- **C** 8-38 L/min.
- **D** 15-75 L/min.
- **E** 30-150 L/min.
- **F** 60-300 L/min.

Control
- **X** Not Adjustable

Flow Split
- **A** 50/50

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

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CARTRIDGE FILTERS

Sun Filter Cartridges are pressure rated the same as all other Sun Cartridges

Surface Type (Last Chance) Elements

Surface type (Last Chance) elements are 40 µm nominal range with single layer stainless steel mesh supported by a perforated sheet tube. Crush pressure is greater than 350 bar. The flow path is port 2 to port 1 only. Do not use in reverse flow mode even with a reverse free flow check valve installed. The stainless steel mesh is not externally supported and will fail through fatigue. The four sizes are rated for 38, 76, 151, and 303 L/min. with a maximum differential pressure of 2.4 bar in the clean state.

Surface type elements are designed to capture errant particles that may not be trapped in the main system filter or particles resulting from a component failure. The 40 µm surface type element will not provide system filtration but is a "last chance" element. With a correctly assembled system, these elements will be unnoticed during regular operation but will provide protection from sudden component failure. Installation directly above the subplate will protect the entire valve stack from particles.

Depth Style Elements

Depth type elements are available in 3µm, 10µm, and 25µm nominal ranges. The crush pressure is 350 bar and the flow path is port 2 to port 1 only. Do not use in reverse flow mode. Due to their physical size and the requirement for a pleated filtration material, the elements are only available in Series 3 and Series 4 sizes. The flow capacities for cartridges limit their use to flows of 30 and 90 L/min. respectively at 7 bar. They are offered as a means to install a system filter in small manifold packages using your available Sun cavity tooling. These elements provide contamination holding capability that the "last chance" 40µm elements do not. For small manifold packages with expensive proportional or servo valves installed, very fine filtration in an extremely small space is available. Filter life will depend on initial system cleanliness and the amount of dirt ingression to the system when operating.

FILTER CARTRIDGES

Sun filter cartridges are pressure rated the same as all other Sun cartridges.

Model Code	*Series*	*Micron Rating*	*Nominal Flow Rating (L/min.)*	*Cavity*	*Filter Type*
FLDA-XD*	1	40	10/40	T-13A	Surface
FLFA-XD*	2	40	20/80	T-5A	Surface
FLHA-XA*	3	3	8/32	T-16A	Depth
FLHA-XB*	3	10	8/32	T-16A	Depth
FLHA-XC*	3	25	8/32	T-16A	Depth
FLHA-XD*	3	40	40/160	T-16A	Surface
FLJA-XA*	4	3	24/95	T-18A	Depth
FLJA-XB*	4	10	24/95	T-18A	Depth
FLJA-XC*	4	25	24/95	T-18A	Depth
FLJA-XD*	4	40	80/320	T-18A	Surface

View our full range of filter cartridges and manifold products on the Sun website:

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