October 2017 / **Bulletin 100-20-1**

Electric Expansion Valves

SER-AA, -A (-HP)

SPORLAN

Parker

ENGINEERING YOUR SUCCESS.

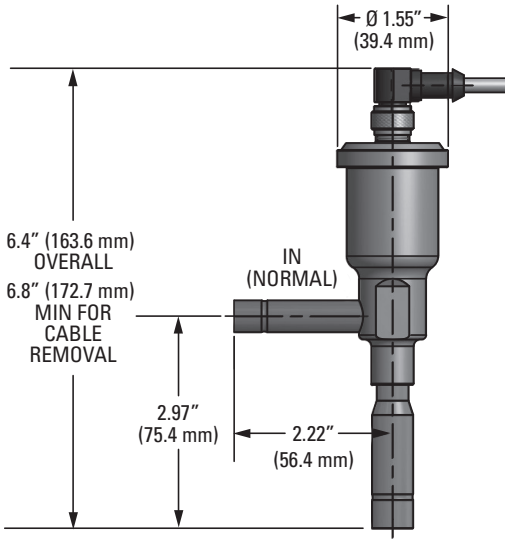
SER-AA, -A (-HP) ELECTRIC EXPANSION VALVES

The SER-AA and –A valves are suitable for use in subcritical and transcritical CO_2 and other HFC refrigerant systems as electric expansion valves. The –AA and –A models are available with two distinct pressure ratings. The standard SER valves have a maximum rated pressure (MRP) of 1015 psig (70 bar). The high pressure SER-HP version has a 1305 psig (90 bar) MRP. Both the SER and SER-HP models have a maximum operating pressure differential (MOPD) of 580 psid (40 bar). This higher MRP allows the SER-HP models to be applied on transcritical CO_2 systems that maintain safety relief valves at pressures above 70 bar, up to 90 bar.

With advanced pin and port geometries and precision machined components, these bi-flow valves provide unmatched resolution under the lightest load conditions. The SER-HP valves utilize the existing SER body design and improves its pressure rating with newly designed copper fittings.

The SER-HP has the same robust design, corrosion resistance and mounting flexibility for which the SER valve has become known. The SER and SER-HP valves have a removable M12 style cable that is IP67 rated.

REFERENCE DIMENSIONS



SPECIFICATIONS

MODEL	STANDARD	HIGH PRESSURE
Motor Type	2 phase, bipolar wet motor	
Compatible Refrigerant	All common HCFC and HFC refrigerants, including R-410A and subcritical R-744 (CO_2)	
Compatible Oil	All common mineral, polyester and alkybenzene oils	
Supply Voltage	12 volts DC, -5% +10% (L/R)	
Cable Type	IP67 removable M12 connection	
Phase Resistance	100 ohms ± 10%	
Stepping Current	Evaluate to avoid step loss or damage to the valve *	
Holding Current	Not recommended	
Step Rate	200 steps/second	
Number of Steps	2500 full steps	
MOPD	580 psid (40 bar)	
MRP	1015 psig (70 bar)	1305 psig (90 bar)
Max Internal Leakage	100 cc/min @ 100 psid (6.9 bar), dry air	
Max External Leakage	.10 oz/yr at 300 psig (2.8 gram/yr @ 20 bar)	
Operating Temp. Range	-50°F to 155°F (-45°C to 68°C)	

* Contact Sporlan Application Engineering for qualification testing details.

STANDARD PRESSURE RATING - 70 bar	
Description	**Item Number**
SER-AA 3x4 ODF Less Cable	805221
SER-A 3x4 ODF Less Cable	805237
SER-AA 3x4 ODF 10'-S	805217
SER-A 3x4 ODF 10'-S	805223
HIGH PRESSURE RATING - 90 bar	
Description	**Item Number**
SER-AA-HP 3x4 ODF Less Cable	805631
SER-A-HP 3x4 ODF Less Cable	805633
SER-AA-HP 3x4 ODF 10'-S	805639
SER-A-HP 3x4 ODF 10'-S	805641

Bulletin 100-20-1, October 2017 supersedes Bulletin 100-20-1, September 2016 and all prior publications.
For more information about our products visit us at www.sporlan.com.

ORDERING INSTRUCTIONS / NOMENCLATURE

SER	–	AA A	–	HP	3/8″	x	3/8″ 1/2″	ODF	–	10′ 20′ LESS CABLE	–	S
Valve Family		Valve Model		High MRP Designation	Inlet Fitting		Outlet Fitting	Fitting Type		Cable Length		Stripped and Tinned Cable Ends (Custom Connectors Available)

CAPACITY - Full Stroke Capacity in Tons (at Evaporator Temperature °F)

R-134a

Valve Type	40°F								20°F								0°F							
	Pressure Drop Across Valve (psid)																							
	40	60	80	100	120	140	160	180	40	60	80	100	120	140	160	180	40	60	80	100	120	140	160	180
SER-AA	0.36	0.44	0.50	0.56	0.62	0.67	0.71	0.76	0.34	0.42	0.48	0.54	0.59	0.64	0.68	0.72	0.32	0.40	0.46	0.51	0.56	0.60	0.65	0.68
SER-A	0.77	0.94	1.09	1.22	1.33	1.44	1.54	1.63	0.73	0.90	1.04	1.16	1.27	1.37	1.47	1.56	0.70	0.85	0.99	1.10	1.21	1.30	1.39	1.48

R-22

Valve Type	40°F								20°F								0°F							
	Pressure Drop Across Valve (psid)																							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
SER-AA	0.52	0.60	0.67	0.74	0.80	0.85	0.90	0.95	0.51	0.59	0.66	0.72	0.78	0.83	0.88	0.93	0.49	0.57	0.64	0.70	0.76	0.81	0.86	0.90
SER-A	1.13	1.30	1.46	1.60	1.72	1.84	1.96	2.06	1.10	1.27	1.42	1.56	1.68	1.80	1.91	2.01	1.07	1.24	1.38	1.51	1.63	1.75	1.85	1.95

R-407A/C/F

Valve Type	40°F								20°F								0°F								-20°F							
	Pressure Drop Across Valve (psid)																															
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
SER-AA	0.48	0.56	0.62	0.68	0.73	0.79	0.83	0.88	0.46	0.53	0.60	0.65	0.70	0.75	0.80	0.84	0.44	0.51	0.57	0.62	0.67	0.72	0.76	0.80	0.42	0.48	0.54	0.59	0.64	0.69	0.73	0.77
SER-A	1.04	1.20	1.34	1.47	1.59	1.70	1.80	1.90	1.00	1.15	1.29	1.41	1.52	1.63	1.73	1.82	0.95	1.10	1.23	1.35	1.45	1.55	1.65	1.74	0.91	1.05	1.17	1.28	1.39	1.48	1.57	1.66

R-448A/449A

Valve Type	40°F								20°F								0°F							
	Pressure Drop Across Valve (psid)																							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
SER-AA	0.48	0.56	0.62	0.68	0.74	0.79	0.84	0.88	0.47	0.54	0.60	0.66	0.71	0.76	0.81	0.85	0.45	0.52	0.58	0.63	0.69	0.73	0.78	0.82
SER-A	1.05	1.21	1.35	1.48	1.60	1.71	1.81	1.91	1.01	1.17	1.30	1.43	1.54	1.65	1.75	1.84	0.97	1.12	1.25	1.37	1.48	1.58	1.68	1.77

Valve Type	-20°F								-40°F							
	Pressure Drop Across Valve (psid)															
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
SER-AA	0.43	0.49	0.55	0.61	0.65	0.70	0.74	0.78	0.41	0.47	0.53	0.58	0.62	0.67	0.71	0.74
SER-A	0.93	1.07	1.20	1.31	1.41	1.51	1.60	1.69	0.88	1.02	1.14	1.24	1.34	1.44	1.52	1.61

R-404A/507A

Valve Type	40°F								20°F								0°F							
	Pressure Drop Across Valve (psid)																							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
SER-AA	0.34	0.39	0.44	0.48	0.52	0.55	0.59	0.62	0.32	0.37	0.41	0.45	0.49	0.52	0.56	0.59	0.30	0.35	0.39	0.43	0.46	0.49	0.52	0.55
SER-A	0.73	0.85	0.94	1.04	1.12	1.20	1.27	1.34	0.69	0.80	0.89	0.98	1.06	1.13	1.20	1.27	0.65	0.75	0.84	0.92	1.00	1.07	1.13	1.19

Valve Type	-20°F								-40°F							
	Pressure Drop Across Valve (psid)															
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
SER-AA	0.28	0.33	0.36	0.40	0.43	0.46	0.49	0.51	0.26	0.30	0.34	0.37	0.40	0.43	0.45	0.48
SER-A	0.61	0.70	0.79	0.86	0.93	1.00	1.06	1.11	0.57	0.65	0.73	0.80	0.87	0.93	0.98	1.03

R-410A

Valve Type	40°F								20°F								0°F							
	Pressure Drop Across Valve (psid)																							
	80	120	160	200	240	280	320	360	80	120	160	200	240	280	320	360	80	120	160	200	240	280	320	360
SER-AA	0.51	0.63	0.72	0.81	0.89	0.96	1.02	1.08	0.50	0.61	0.71	0.79	0.86	0.93	1.00	1.06	0.48	0.59	0.69	0.77	0.84	0.91	0.97	1.03
SER-A	1.10	1.35	1.56	1.75	1.91	2.07	2.21	2.34	1.08	1.32	1.52	1.70	1.87	2.02	2.15	2.29	1.05	1.28	1.48	1.66	1.81	1.96	2.09	2.22

R-744

Valve Type	0°F					-20°F					-40°F				
	Pressure Drop Across Valve (psid)														
	100	150	200	250	300	150	200	250	300	350	200	250	300	350	400
SER-AA	0.88	1.08	1.24	1.39	1.52	1.08	1.24	1.39	1.52	1.64	1.24	1.38	1.51	1.63	1.75
SER-A	1.90	2.32	2.68	3.00	3.29	2.33	2.69	3.00	3.29	3.55	2.67	2.98	3.27	3.53	3.78

Liquid Temperature Correction Factors

°F	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
R-134a	1.69	1.63	1.56	1.49	1.42	1.35	1.28	1.21	1.14	1.07	1.00	0.93	0.86	0.78	0.71
R-22	1.57	1.51	1.46	1.40	1.34	1.29	1.23	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-407A	1.78	1.70	1.63	1.55	1.48	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.75	0.66
R-407C	1.72	1.65	1.58	1.51	1.44	1.37	1.30	1.22	1.15	1.08	1.00	0.92	0.85	0.77	0.69
R-407F	1.72	1.65	1.58	1.51	1.44	1.37	1.30	1.23	1.15	1.08	1.00	0.92	0.84	0.76	0.68
R-448A	1.78	1.70	1.63	1.55	1.48	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.75	0.66
R-449A	1.78	1.71	1.63	1.56	1.48	1.40	1.32	1.25	1.17	1.08	1.00	0.92	0.83	0.75	0.66
R-404A	2.01	1.92	1.82	1.72	1.62	1.52	1.42	1.32	1.22	1.11	1.00	0.89	0.78	0.66	0.54
R-507A	2.05	1.95	1.85	1.75	1.64	1.54	1.44	1.33	1.22	1.11	1.00	0.89	0.77	0.65	0.52
R-410A	1.77	1.70	1.62	1.55	1.48	1.40	1.32	1.25	1.17	1.09	1.00	0.92	0.83	0.73	0.63
R-744	1.13	1.07	1.00	0.93	0.86	0.79	0.71	0.62	0.51	--	--	--	--	--	--

Capacity is calculated at full stroke, with no reserve capacity. Valve should be selected with consideration given to entire range of potential system conditions.

CAPACITY - Full Stroke Capacity in kW (at Evaporator Temperature °C)

R-134a

Valve Type	5°C								-10°C								-20°C							
	Pressure Drop Across Valve (bar)																							
	2.5	4	5.5	7	8.5	10	11.5	13	2.5	4	5.5	7	8.5	10	11.5	13	2.5	4	5.5	7	8.5	10	11.5	13
SER-AA	1.19	1.51	1.77	1.99	2.20	2.38	2.55	2.72	1.12	1.41	1.66	1.87	2.06	2.23	2.39	2.55	1.06	1.35	1.58	1.78	1.96	2.13	2.28	2.43
SER-A	2.57	3.26	3.82	4.31	4.75	5.15	5.52	5.87	2.41	3.05	3.58	4.04	4.45	4.83	5.17	5.50	2.30	2.91	3.41	3.85	4.24	4.60	4.94	5.25

R-22

Valve Type	5°C								-10°C								-20°C							
	Pressure Drop Across Valve (bar)																							
	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18
SER-AA	1.62	1.98	2.28	2.55	2.80	3.02	3.23	3.43	1.56	1.91	2.20	2.46	2.70	2.91	3.12	3.30	1.52	1.86	2.14	2.40	2.62	2.84	3.03	3.21
SER-A	3.49	4.28	4.94	5.52	6.05	6.53	6.98	7.40	3.37	4.12	4.76	5.32	5.83	6.30	6.73	7.14	3.28	4.01	4.63	5.18	5.67	6.13	6.55	6.95

R-407A/C/F

Valve Type	5°C								-10°C								-20°C								-30°C							
	Pressure Drop Across Valve (bar)																															
	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18
SER-AA	1.48	1.82	2.10	2.35	2.57	2.78	2.97	3.15	1.40	1.71	1.98	2.21	2.42	2.62	2.80	2.97	1.34	1.64	1.90	2.12	2.32	2.51	2.68	2.84	1.28	1.57	1.82	2.03	2.22	2.40	2.57	2.72
SER-A	3.21	3.93	4.54	5.07	5.56	6.00	6.42	6.80	3.03	3.71	4.28	4.78	5.24	5.66	6.05	6.42	2.90	3.55	4.10	4.58	5.02	5.42	5.79	6.14	2.77	3.40	3.92	4.39	4.81	5.19	5.55	5.89

R-448A/449A

Valve Type	5°C								-10°C								-20°C							
	Pressure Drop Across Valve (bar)																							
	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18
SER-AA	1.50	1.83	2.12	2.37	2.59	2.80	2.99	3.18	1.42	1.74	2.01	2.25	2.47	2.66	2.85	3.02	1.37	1.68	1.94	2.17	2.37	2.56	2.74	2.91
SER-A	3.24	3.96	4.58	5.12	5.60	6.05	6.47	6.86	3.08	3.77	4.35	4.87	5.33	5.76	6.16	6.53	2.96	3.63	4.19	4.68	5.13	5.54	5.92	6.28

Valve Type	-30°C								-40°C							
	Pressure Drop Across Valve (bar)															
	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18
SER-AA	1.32	1.61	1.86	2.08	2.28	2.46	2.63	2.79	1.26	1.54	1.78	1.99	2.18	2.35	2.51	2.66
SER-A	2.85	3.48	4.02	4.50	4.93	5.32	5.69	6.04	2.72	3.33	3.84	4.29	4.70	5.08	5.43	5.76

R-404A/507A

Valve Type	5°C								-10°C								-20°C							
	Pressure Drop Across Valve (bar)																							
	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18
SER-AA	1.04	1.28	1.48	1.65	1.81	1.95	2.09	2.22	0.97	1.19	1.37	1.53	1.68	1.81	1.94	2.05	0.92	1.12	1.30	1.45	1.59	1.72	1.83	1.95
SER-A	2.26	2.77	3.19	3.57	3.91	4.22	4.52	4.79	2.09	2.56	2.96	3.31	3.62	3.92	4.19	4.44	1.98	2.43	2.80	3.13	3.43	3.71	3.96	4.21

Valve Type	-30°C								-40°C							
	Pressure Drop Across Valve (bar)															
	4	6	8	10	12	14	16	18	4	6	8	10	12	14	16	18
SER-AA	0.86	1.06	1.22	1.36	1.49	1.61	1.72	1.83	0.81	0.99	1.14	1.27	1.40	1.51	1.61	1.71
SER-A	1.86	2.28	2.64	2.95	3.23	3.49	3.73	3.95	1.74	2.13	2.46	2.75	3.02	3.26	3.48	3.69

R-410A

Valve Type	5°C								-10°C								-20°C							
	Pressure Drop Across Valve (bar)																							
	5	8	11	14	17	20	23	26	5	8	11	14	17	20	23	26	5	8	11	14	17	20	23	26
SER-AA	1.71	2.16	2.54	2.86	3.15	3.42	3.67	3.90	1.65	2.09	2.45	2.76	3.05	3.30	3.54	3.77	1.61	2.03	2.39	2.69	2.97	3.22	3.45	3.67
SER-A	3.70	4.68	5.48	6.19	6.82	7.39	7.93	8.43	3.57	4.52	5.30	5.98	6.58	7.14	7.66	8.14	3.48	4.40	5.16	5.82	6.41	6.95	7.46	7.93

R-744

Valve Type	-20°C				-30°C				-40°C			
	Pressure Drop Across Valve (bar)											
	8	12	16	20	12	16	20	24	16	20	24	28
SER-AA	3.34	4.09	4.73	5.29	4.09	4.73	5.28	5.79	4.70	5.25	5.75	6.22
SER-A	7.22	8.85	10.22	11.42	8.85	10.21	11.42	12.51	10.15	11.35	12.44	13.43

Liquid Temperature Correction Factors

°C	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49	54	60
R-134a	1.69	1.63	1.56	1.49	1.42	1.35	1.28	1.21	1.14	1.07	1.00	0.93	0.86	0.78	0.71
R-22	1.57	1.51	1.46	1.40	1.34	1.29	1.23	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-407A	1.78	1.70	1.63	1.55	1.48	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.75	0.66
R-407C	1.72	1.65	1.58	1.51	1.44	1.37	1.30	1.22	1.15	1.08	1.00	0.92	0.85	0.77	0.69
R-407F	1.72	1.65	1.58	1.51	1.44	1.37	1.30	1.23	1.15	1.08	1.00	0.92	0.84	0.76	0.68
R-448A	1.78	1.70	1.63	1.55	1.48	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.75	0.66
R-449A	1.78	1.71	1.63	1.56	1.48	1.40	1.32	1.25	1.17	1.08	1.00	0.92	0.83	0.75	0.66
R-404A	2.01	1.92	1.82	1.72	1.62	1.52	1.42	1.32	1.22	1.11	1.00	0.89	0.78	0.66	0.54
R-507A	2.05	1.95	1.85	1.75	1.64	1.54	1.44	1.33	1.22	1.11	1.00	0.89	0.77	0.65	0.52
R-410A	1.77	1.70	1.62	1.55	1.48	1.40	1.32	1.25	1.17	1.09	1.00	0.92	0.83	0.73	0.63
R-744	1.13	1.07	1.00	0.93	0.86	0.79	0.71	0.62	0.51	--	--	--	--	--	--

Capacity is calculated at full stroke, with no reserve capacity. Valve should be selected with consideration given to entire range of potential system conditions.

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