Model A Constant Pressure Expansion Valves

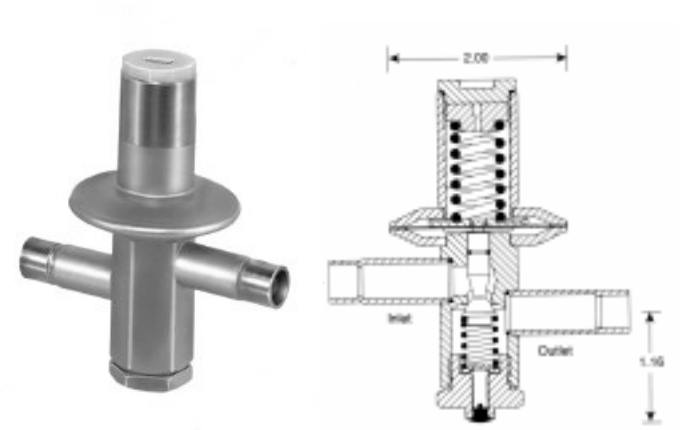
Specifications

- 0-90 psig adjustment range
- Bypass bleeds available
- Construction: Brass, copper and stainless steel.
- Optional external equalizer
- U.L. recognized for maximum operating pressure of 500 psig high side, 225 psig low side

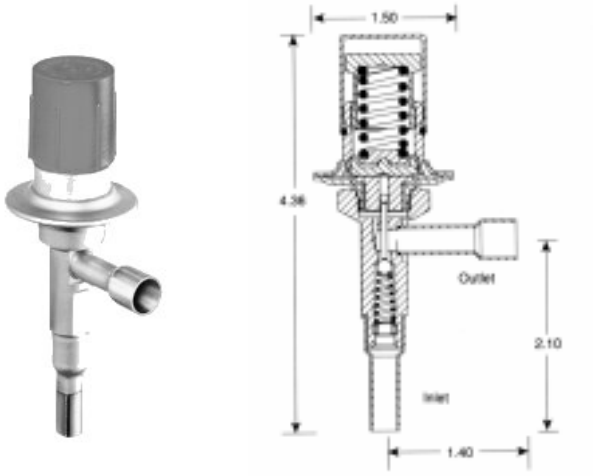
Model No.	Equalizer	Connections	
		Inlet	Outlet
A-1	Internal	1/4" SAE	1/4" NPTF
A-2*	Internal	1/4" SAE	1/2 SAE
A-3	Internal	3/8" SAE	1/2" SAE
AE-3**	External	3/8" SAE	1/2" SAE
A-4	Internal	1/4" SAE	1/2" SAE
AS	Internal	1/4" ODF	3/8" ODF
A-7	Internal	3/8" ODF	3/8" ODF
AT	Internal	1/4 SAE 1/4 ODF 8 mm ODF	1/4 NPTF 8 mm ODF

* 1/2" x 3/8" SAE flare adapter available.
** It is recommended that external equalizer type be used when pressure drop through the evaporator and/or distributor exceeds 5 psi.

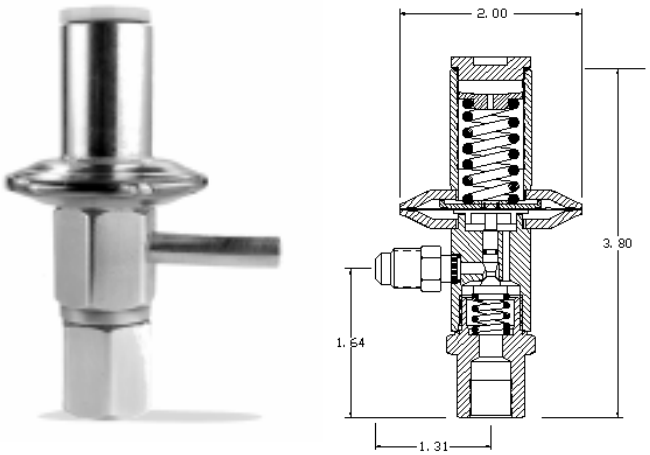
Model A7



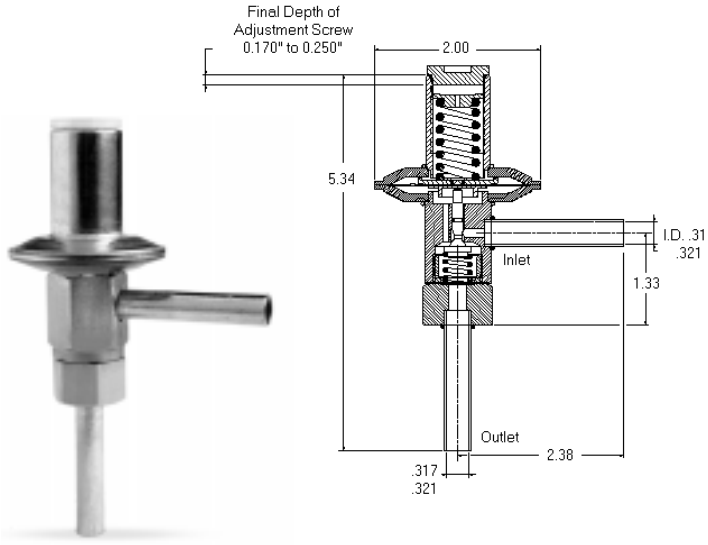
Model AS



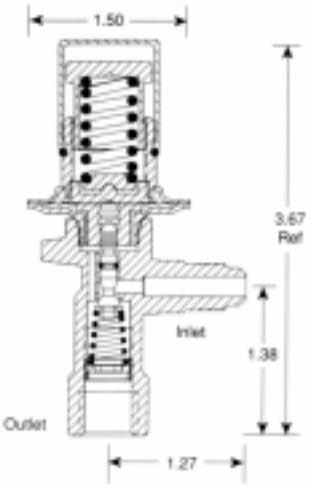
Model ATT



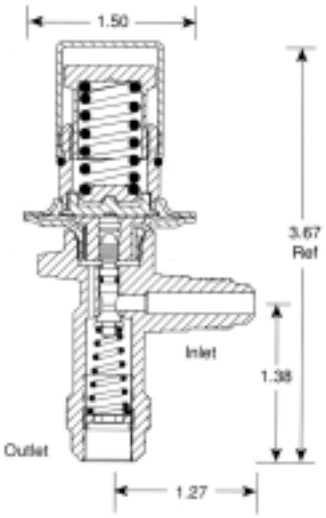
Model ATG



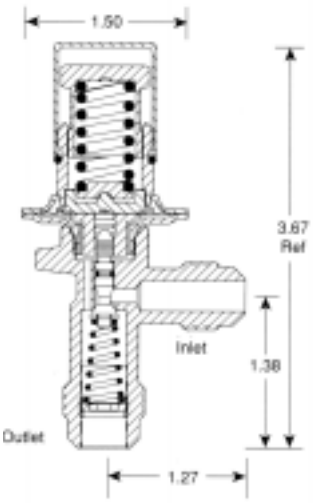
Model A1



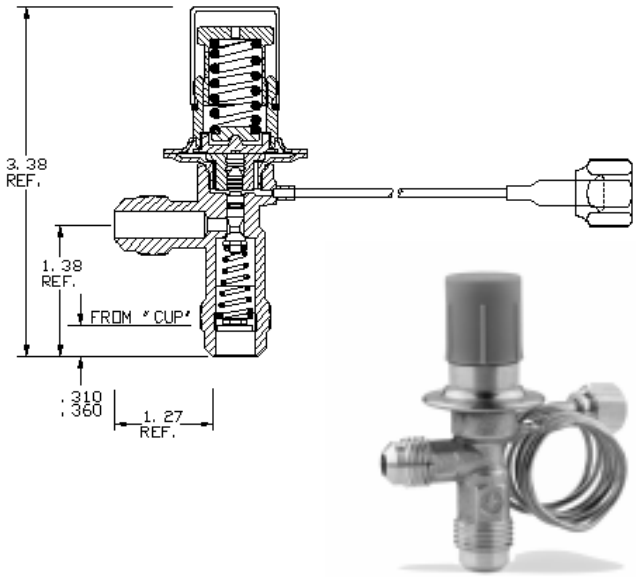
Model A2



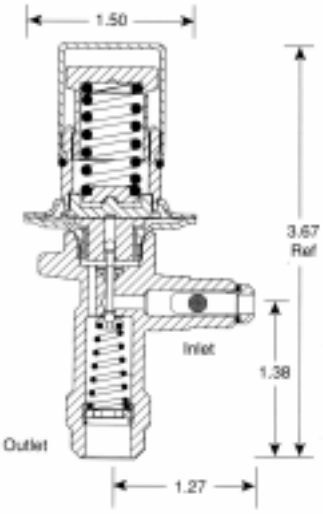
Model A3



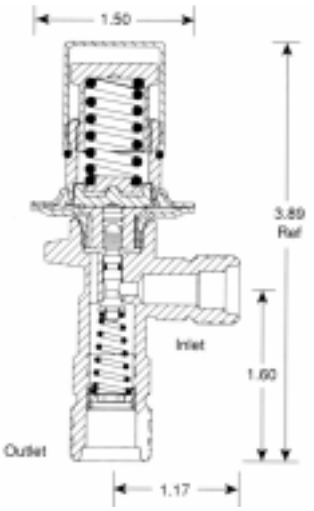
Model AE3



Model A4



Model A6



R-134a / R-401A* / R-401B* / R-12* U.S. Extended Capacities in Tons

Evaporator Temp. (°F)				40°F						20°F						0°F					
Pressure Drop (PSIG)				40	60	80	100	120	140	60	80	100	120	140	160	60	80	100	120	140	160
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	2	1-2	1.63	2.00	2.31	2.58	2.83	3.06	1.90	2.19	2.45	2.69	2.90	3.10	1.70	1.96	2.19	2.40	2.60	2.78
A4		1/2	1/4-3/4	0.61	0.75	0.87	0.97	1.06	1.15	0.71	0.82	0.92	1.01	1.09	1.16	0.64	0.74	0.82	0.90	0.97	1.04
A7-AA	AA	1/2	1/8-1/2	0.41	0.50	0.58	0.65	0.71	0.76	0.48	0.55	0.61	0.67	0.73	0.78	0.43	0.49	0.55	0.60	0.65	0.69
A7-A	A	1	1/4-1	0.82	1.00	1.15	1.29	1.41	1.53	0.95	1.10	1.23	1.34	1.45	1.55	0.85	0.98	1.10	1.20	1.30	1.39
A7-B	B	2	1-2	1.63	2.00	2.31	2.58	2.83	3.06	1.90	2.19	2.45	2.69	2.90	3.10	1.70	1.96	2.19	2.40	2.60	2.78
A7-C	C	3	1 1/2 - 3	2.45	3.00	3.46	3.87	4.24	4.58	2.85	3.29	3.68	4.03	4.35	4.65	2.55	2.94	3.29	3.61	3.90	4.16
AS,ASB 20		1	1/4-1	0.82	1.00	1.15	1.29	1.41	1.53	0.95	1.10	1.23	1.34	1.45	1.55	0.85	0.98	1.10	1.20	1.30	1.39
104A	.093	1		0.82	1.00	1.15	1.29	1.41	1.53	0.95	1.10	1.23	1.34	1.45	1.55	0.85	0.98	1.10	1.20	1.30	1.39
104A, 104F	.120	1 1/4		1.03	1.25	1.44	1.61	1.76	1.91	1.19	1.38	1.54	1.68	1.81	1.94	1.06	1.23	1.38	1.50	1.63	1.74
104A, 104F	.140	1 1/2		1.23	1.50	1.73	1.94	2.12	2.30	1.43	1.65	1.85	2.01	2.18	2.33	1.28	1.47	1.65	1.80	1.95	2.09
Evaporator Temp. (°F)				-10°F						-20°F						-40°F					
Pressure Drop (PSIG)				80	100	120	140	160	180	80	100	120	140	160	180	80	100	120	140	160	180
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	2	1-2	1.64	1.83	2.01	2.17	2.32	2.46	1.34	1.50	1.64	1.77	1.89	2.01	0.88	0.98	1.07	1.16	1.24	1.32
A4		1/2	1/4-3/4	0.61	0.69	0.75	0.81	0.87	0.92	0.50	0.56	0.62	0.66	0.71	0.75	0.33	0.37	0.40	0.44	0.47	0.49
A7-AA	AA	1/2	1/8-1/2	0.41	0.46	0.50	0.54	0.58	0.61	0.33	0.37	0.41	0.44	0.47	0.50	0.22	0.25	0.27	0.29	0.31	0.33
A7-A	A	1	1/4-1	0.82	0.92	1.00	1.08	1.16	1.23	0.67	0.75	0.82	0.89	0.95	1.00	0.44	0.49	0.54	0.58	0.62	0.66
A7-B	B	2	1-2	1.64	1.83	2.01	2.17	2.32	2.46	1.34	1.50	1.64	1.77	1.89	2.01	0.88	0.98	1.07	1.16	1.24	1.32
A7-C	C	3	1 1/2 - 3	2.46	2.75	3.01	3.25	3.48	3.69	2.01	2.25	2.46	2.66	2.84	3.01	1.32	1.47	1.61	1.74	1.86	1.97
AS,ASB 20		1	1/4-1	0.82	0.92	1.00	1.08	1.16	1.23	0.67	0.75	0.82	0.89	0.95	1.00	0.44	0.49	0.54	0.58	0.62	0.66
Pressure Drop (PSIG)				40	60	80	100	120	140	60	80	100	120	140	160	60	80	100	120	140	160
104A	.093	1		0.82	0.92	1.00	1.08	1.16	1.23	0.67	0.75	0.82	0.89	0.95	1.00	0.44	0.49	0.54	0.58	0.62	0.66
104A, 104F	.120	1 1/4		1.03	1.15	1.25	1.35	1.45	1.54	0.84	0.94	1.03	1.11	1.19	1.25	0.55	0.61	0.60	0.73	0.78	0.83
104A, 104F	.140	1 1/2		1.23	1.38	1.50	1.62	1.74	1.85	1.01	1.13	1.23	1.34	1.43	1.50	0.66	0.74	0.81	0.87	0.93	0.99

* See page 28
Shaded areas are standard conditions.

R-22 / R-407C* U.S. Extended Capacities in Tons

Evaporator Temp. (°F)				40°F						20°F						0°F					
Pressure Drop (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	3	1 1/2-3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
A4		1	1/2-1	0.87	1.00	1.12	1.22	1.32	1.41	0.85	0.98	1.10	1.20	1.30	1.39	0.76	0.88	0.98	1.08	1.16	1.24
A7-AA	AA	3/4	1/5-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.64	0.74	0.82	0.90	0.97	1.04	0.57	0.66	0.74	0.81	0.87	0.93
A7-A	A	11/2	1/2-1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
A7-B	B	3	11/2-3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
A7-C	C	5	3 1/2-5	4.33	5.00	5.59	6.12	6.61	7.07	4.24	4.90	5.48	6.00	6.48	6.93	3.81	4.40	4.92	5.39	5.82	6.22
AS,ASB 20		11/2	1/2-1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
104A	.093	1.5		1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
104A, 104F	.120	2.0		1.63	2.00	2.10	2.30	2.48	2.65	1.59	1.84	2.05	2.25	2.43	2.60	1.43	1.65	1.85	2.03	2.19	2.34
104A, 104F	.140	2.5		1.95	2.50	2.52	2.76	2.97	3.18	1.91	2.21	2.46	2.70	2.91	3.12	1.71	1.98	2.22	2.43	2.63	2.81
Evaporator Temp. (°F)				-10°F						-20°F						-40°F					
Pressure Drop (PSIG)				100	125	150	175	200	225	125	150	175	200	225	250	125	150	175	200	225	250
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	3	1 1/2-3	2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
A4		1	1/2-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.46	0.50	0.54	0.58	0.62	0.65
A7-AA	AA	3/4	1/5-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.34	0.38	0.41	0.43	0.46	0.49
A7-A	A	11/2	1/2-1 1/2	1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
A7-B	B	3	1 1/2-3	2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
A7-C	C	5	3 1/2-5	3.70	4.14	4.53	4.89	5.23	5.55	3.41	3.74	4.03	4.31	4.58	4.82	2.29	2.51	2.71	2.90	3.08	3.24
AS,ASB 20		11/2	1/2-1 1/2	1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
Pressure Drop (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
104A	.093	1.5		1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
104A, 104F	.120	2.0		1.39	1.55	1.70	1.84	1.96	2.09	1.28	1.40	1.51	1.61	1.71	1.81	0.86	0.94	1.01	1.09	1.15	1.21
104A, 104F	.140	2.5		1.67	1.86	2.04	2.21	2.36	2.51	1.53	1.68	1.82	1.94	2.06	2.18	1.04	1.13	1.22	1.31	1.38	1.46

R-404A / R-502* / R-402A*, B* / R-507* U.S. Extended Capacities in Tons

Evaporator Temp. (°F)				40°F						20°F						0°F					
Pressure Drop (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	2	1-2	1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
A4		1/2	1/4-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.62	0.72	0.80	0.88	0.95	1.02	0.57	0.65	0.73	0.80	0.86	0.92
A7-AA	AA	1/2	1/8-1/2	0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.48	0.54	0.59	0.63	0.68	0.38	0.44	0.49	0.53	0.58	0.62
A7-A	A	1	1/4-1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
A7-B	B	2	1-2	1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
A7-C	C	4	1 1/2 - 4	3.46	4.00	4.47	4.90	5.29	5.66	3.33	3.84	4.29	4.70	5.08	5.43	3.01	3.48	3.89	4.26	4.60	4.92
AS,ASB 20		1	1/4-1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
104A	.093	1.5		0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
104A, 104F	.120	2.0		1.09	1.25	1.40	1.53	1.65	1.76	1.04	1.20	1.34	1.48	1.59	1.70	0.94	1.09	1.21	1.34	1.44	1.54
104A, 104F	.140	2.5		1.31	1.50	1.68	1.83	1.98	2.12	1.25	1.44	1.61	1.77	1.91	2.04	1.13	1.31	1.46	1.61	1.73	1.85
Evaporator Temp. (°F)				-10°F						-20°F						-40°F					
Pressure Drop (PSIG)				100	125	150	175	200	225	125	150	175	200	225	250	125	150	175	200	225	250
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	2	1-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
A4		1/2	1/4-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.33	0.36	0.39	0.41	0.44	0.46
A7-AA	AA	1/2	1/8-1/2	0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.22	0.24	0.26	0.28	0.29	0.31
A7-A	A	1	1/4-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
A7-B	B	2	1-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
A7-C	C	4	1 1/2 - 4	2.96	3.31	3.63	3.92	4.19	4.44	2.73	2.99	3.23	3.45	3.66	3.86	1.74	1.91	2.06	2.21	2.34	2.47
AS,ASB 20		1	1/4-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
Pressure Drop (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
104A	.093	1.5		0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
104A, 104F	.120	2.0		0.93	1.04	1.14	1.23	1.31	1.39	0.85	0.94	1.01	1.08	1.15	1.20	0.55	0.60	0.65	0.69	0.74	0.78
104A, 104F	.140	2.5		1.11	1.25	1.37	1.47	1.58	1.67	1.02	1.13	1.22	1.29	1.38	1.44	0.66	0.72	0.78	0.83	0.89	0.93

* See page 28
Shaded areas are standard conditions.

Liquid Refrigerant Correction Factors

R-12	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-12 Multiplier	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-404A	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-404A Multiplier	1.48	1.39	1.30	1.19	1.10	1.00	0.89	0.78	0.67	0.56
R-134a	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-134a Multiplier	1.33	1.27	1.21	1.11	1.07	1.00	0.93	0.87	0.81	0.71
R-22	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-22 Multiplier	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.77
R-502	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-502 Multiplier	1.43	1.33	1.24	1.17	1.08	1.00	0.91	0.83	0.73	0.64

R-12	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-12	1.30	1.21	1.10	1.00	0.89	0.77
R-22	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-22	1.30	1.21	1.10	1.00	0.89	0.78
R-404A	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-404A	1.48	1.33	1.14	1.00	0.76	0.56
R-134a	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-134a	1.33	1.21	1.09	1.00	0.85	0.71
R-502	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-502	1.43	1.31	1.17	1.00	0.84	0.67

R-134a / R-401A*/ R-401B*/ R-12* U.S. Extended Capacities in Kilowatts

Evaporator Temp. (°C)				10°C						0°C						-10°C					
Pressure Drop (BAR)				3	4	6	7	8	10	4	6	7	8	10	11	4	6	7	8	10	11
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	7	4-7	6.21	7.17	8.79	9.49	10.10	11.30	6.89	8.44	9.11	9.74	10.90	11.40	6.46	7.91	8.54	9.13	10.20	10.70
A4		3	1-3	2.33	2.69	3.30	3.56	3.80	4.25	2.58	3.16	3.42	3.65	4.08	4.28	2.42	2.97	3.20	3.42	3.83	4.02
A7-AA	AA	2	1/2-2	1.55	1.79	2.20	2.37	2.54	2.84	1.72	2.11	2.28	2.44	2.72	2.86	1.61	1.98	2.14	2.28	2.55	2.68
A7-A	A	4	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.44	4.22	4.56	4.87	5.45	5.71	3.23	3.95	4.27	4.57	5.10	5.35
A7-B	B	7	4-7	6.21	7.17	8.79	9.49	10.10	11.30	6.89	8.44	9.11	9.74	10.90	11.40	6.46	7.91	8.54	9.13	10.20	10.70
A7-C	C	11	5-11	9.32	10.80	13.20	14.20	15.20	17.00	10.30	12.70	13.70	14.60	16.30	17.10	9.69	11.90	12.80	13.70	15.30	16.10
AS,ASB 20		4	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.44	4.22	4.56	4.87	5.45	5.71	3.23	3.95	4.27	4.57	5.10	5.35
104A	.093	1	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.44	4.22	4.56	4.87	5.45	5.71	3.23	3.95	4.27	4.57	5.10	5.35
104A, 104F	.120	1 1/4	2-5	3.89	4.49	5.49	5.94	6.34	7.09	4.30	5.28	5.70	6.09	6.81	7.14	4.04	4.94	5.34	5.71	6.38	6.69
104A, 104F	.140	1 1/2	3-6	4.67	5.39	6.59	7.13	7.61	8.51	5.16	6.33	6.84	7.31	8.18	8.57	4.85	5.93	6.41	6.86	7.65	8.03
Evaporator Temp. (°C)				-20°C						-30°C						-40°C					
Pressure Drop (BAR)				6	7	8	10	11	12	6	7	8	10	11	12	6	7	8	10	11	12
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	7	4-7	6.77	7.31	7.81	8.74	9.16	9.57	5.01	5.41	5.78	6.47	6.78	7.08	3.25	3.51	3.75	4.20	4.40	4.60
A4		3	1-3	2.54	2.74	2.93	3.28	3.44	3.59	1.88	2.03	2.17	2.42	2.54	2.66	1.22	1.32	1.41	1.57	1.65	1.72
A7-AA	AA	2	1/2-2	1.69	1.83	1.95	2.18	2.29	2.39	1.25	1.35	1.45	1.62	1.70	1.77	0.81	0.88	0.94	1.05	1.10	1.15
A7-A	A	4	1-4	3.38	3.65	3.91	4.37	4.58	4.78	2.50	2.70	2.89	3.23	3.39	3.54	1.63	1.76	1.88	2.10	2.20	2.30
A7-B	B	7	4-7	6.77	7.31	7.81	8.74	9.16	9.57	5.01	5.41	5.78	6.47	6.78	7.08	3.25	3.51	3.75	4.20	4.40	4.60
A7-C	C	11	5-11	10.10	11.00	11.70	13.10	13.70	14.40	7.51	8.11	8.68	9.70	10.20	10.60	4.88	5.27	5.63	6.30	6.60	6.90
AS,ASB 20		4	1-4	3.38	3.65	3.91	4.37	4.58	4.78	2.50	2.70	2.89	3.23	3.39	3.54	1.63	1.76	1.88	2.10	2.20	2.30
104A	.093	1	1-4	3.38	3.65	3.91	4.37	4.58	4.78	2.50	2.70	2.89	3.23	3.39	3.54	1.63	1.76	1.88	2.10	2.20	2.30
104A, 104F	.120	1 1/4	2-5	4.23	4.56	4.89	5.46	5.73	5.98	3.13	3.38	3.61	4.04	4.24	4.43	2.04	2.20	2.35	2.63	2.75	2.88
104A, 104F	.140	1 1/2	3-6	5.07	5.48	5.87	6.56	6.87	7.17	3.75	4.05	4.34	4.85	5.09	5.31	2.45	2.64	2.82	3.15	3.30	3.45

* See page 28
Shaded areas are standard conditions.

R-22 / R-407C* U.S. Extended Capacities in Kilowatts

Evaporator Temp. (°C)				10°C						0°C						-10°C					
Pressure Drop (BAR)				5	7	9	10	12	14	5	7	9	10	12	14	7	9	10	12	14	16
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	11	5-11	9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
A4		4	2-4	3.00	3.55	4.03	4.25	4.65	5.02	2.94	3.48	3.95	4.16	4.56	4.92	3.37	3.83	4.03	4.42	4.77	5.10
A7-AA	AA	3	3/4-3	2.25	2.66	3.02	3.18	3.49	3.77	2.21	2.61	2.96	3.12	3.42	3.69	2.53	2.87	3.03	3.31	3.58	3.83
A7-A	A	5	2-5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
A7-B	B	11	5-11	9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
A7-C	C	18	12-18	15.00	17.80	20.10	21.20	23.30	25.10	14.70	17.40	19.70	20.80	22.80	24.60	16.90	19.10	20.20	22.10	23.90	25.50
AS,ASB 20		5	2-5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
104A	.093	5	2 - 5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
104A, 104F	.120	6 1/2	3 - 6 1/2	5.63	6.66	7.55	7.96	8.73	9.43	5.51	6.53	7.40	7.80	8.55	9.23	6.33	7.18	7.56	8.29	8.95	9.56
104A, 104F	.140	8	4 - 8	6.75	7.99	9.06	9.56	10.50	11.30	6.62	7.83	8.88	9.36	10.30	11.10	7.59	8.61	9.08	9.95	10.70	11.50
Evaporator Temp. (°C)				-20°C						-30°C						-40°C					
Pressure Drop (BAR)				9	10	12	14	16	17	9	10	12	14	16	17	9	10	12	14	16	17
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	11	5-11	9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
A4		4	2-4	3.26	3.44	3.77	4.07	4.35	4.48	2.42	2.55	2.79	3.01	3.22	3.32	1.61	1.70	1.86	2.01	2.15	2.21
A7-AA	AA	3	3/4-3	2.45	2.58	2.83	3.05	3.26	3.36	1.81	1.91	2.09	2.26	2.42	2.49	1.21	1.27	1.40	1.51	1.61	1.66
A7-A	A	5	2-5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
A7-B	B	11	5-11	9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
A7-C	C	18	12-18	16.30	17.20	18.80	20.30	21.80	22.40	12.10	12.70	14.00	15.10	16.10	16.60	8.06	8.49	9.30	10.00	10.70	11.10
AS,ASB 20		5	2-5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
104A	.093	5	2 - 5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
104A, 104F	.120	6 1/2	3 - 6 1/2	6.11	6.45	7.06	7.63	8.16	8.41	4.54	4.78	5.24	5.65	6.04	6.23	3.03	3.19	3.49	3.76	4.03	4.15
104A, 104F	.140	8	4 - 8	7.34	7.74	8.48	9.15	9.80	10.10	5.45	5.73	6.29	6.78	7.25	7.47	3.63	3.83	4.19	4.52	4.83	4.98

R-404A / R-502 / R-402A, B / R-507 U.S. Extended Capacities in Kilowatts

Evaporator Temp. (°C)				10°C						0°C						-10°C					
Pressure Drop (BAR)				5	7	9	10	12	14	5	7	9	10	12	14	5	7	9	10	12	14
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	7	4-7	6.06	7.17	8.14	8.58	9.39	10.10	5.88	6.96	7.89	8.32	9.11	9.84	5.58	6.60	7.48	7.89	8.64	9.33
A4		3	1-3	2.27	2.69	3.05	3.22	3.52	3.80	2.21	2.61	2.96	3.12	3.42	3.69	2.09	2.48	2.81	2.96	3.24	3.50
A7-AA	AA	2	1/2-2	1.52	1.79	2.03	2.14	2.35	2.54	1.47	1.74	1.97	2.08	2.28	2.46	1.39	1.65	1.87	1.97	2.16	2.33
A7-A	A	4	1-4	3.03	3.59	4.07	4.29	4.70	5.07	2.94	3.48	3.95	4.16	4.56	4.92	2.79	3.30	3.74	3.94	4.32	4.67
A7-B	B	7	4-7	6.06	7.17	8.14	8.58	9.39	10.10	5.88	6.96	7.89	8.32	9.11	9.84	5.58	6.60	7.48	7.89	8.64	9.33
A7-C	C	14	5-14	12.1	14.3	16.3	17.2	18.8	20.3	11.8	13.9	15.8	16.6	18.2	19.7	11.2	13.2	15.0	15.8	17.3	18.7
AS,ASB 20		4	1-4	3.03	3.59	4.07	4.29	4.70	5.07	2.94	3.48	3.95	4.16	4.56	4.92	2.79	3.30	3.74	3.94	4.32	4.67
104A	.093	1	1-4	3.03	3.59	4.07	4.29	4.70	5.07	2.94	3.48	3.95	4.16	4.56	4.92	2.79	3.30	3.74	3.94	4.32	4.67
104A, 104F	.120	1 1/4	2-5	3.79	4.49	5.09	5.36	5.88	6.34	3.68	4.35	4.94	5.20	5.70	6.15	3.49	4.13	4.68	4.93	5.40	5.84
104A, 104F	.140	1 1/2	3-6	4.55	5.39	6.11	6.44	7.05	7.61	4.41	5.22	5.93	6.24	6.84	7.38	4.19	4.95	5.61	5.91	6.48	7.01
Evaporator Temp. (°C)				-20°C						-30°C						-40°C					
Pressure Drop (BAR)				7	9	10	12	14	16	9	10	12	14	16	17	9	10	12	14	16	17
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1,A2,A(E)3,A(E)6	B	7	4-7	5.67	6.43	6.77	7.42	8.02	8.57	4.80	5.06	5.54	5.99	6.40	6.60	3.09	3.26	3.57	3.86	4.12	4.25
A4		3	1-3	2.13	2.41	2.54	2.78	3.01	3.21	1.80	1.90	2.08	2.24	2.40	2.47	1.16	1.22	1.34	1.45	1.55	1.59
A7-AA	AA	2	1/2-2	1.42	1.61	1.69	1.86	2.00	2.14	1.20	1.26	1.39	1.50	1.60	1.65	0.77	0.81	0.89	0.96	1.03	1.06
A7-A	A	4	1-4	2.83	3.21	3.39	3.71	4.01	4.28	2.40	2.53	2.77	2.99	3.20	3.30	1.55	1.63	1.78	1.93	2.06	2.12
A7-B	B	7	4-7	5.67	6.43	6.77	7.42	8.02	8.57	4.80	5.06	5.54	5.99	6.40	6.60	3.09	3.26	3.57	3.86	4.12	4.25
A7-C	C	14	5-14	11.3	12.9	13.5	14.8	16.0	17.1	9.60	10.1	11.1	12.0	12.8	13.2	6.18	6.52	7.14	7.71	8.24	8.50
AS,ASB 20		4	1-4	2.83	3.21	3.39	3.71	4.01	4.28	2.40	2.53	2.77	2.99	3.20	3.30	1.55	1.63	1.78	1.93	2.06	2.12
104A	.093	1	1-4	2.83	3.21	3.39	3.71	4.01	4.28	2.40	2.53	2.77	2.99	3.20	3.30	1.55	1.63	1.78	1.93	2.06	2.12
104A, 104F	.120	1 1/4	2-5	3.54	4.01	4.24	4.64	5.01	5.35	3.00	3.16	3.46	3.74	4.00	4.13	1.94	2.04	2.23	2.41	2.58	2.65
104A, 104F	.140	1 1/2	3-6	4.25	4.82	5.09	5.57	6.02	6.42	3.60	3.80	4.16	4.49	4.80	4.95	2.33	2.45	2.67	2.90	3.09	3.18

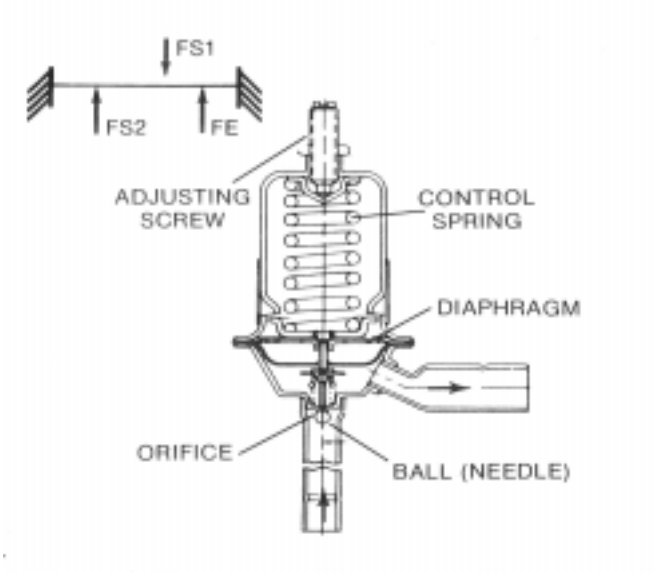
Understanding the Constant Pressure Valve

The constant pressure valve is a vital component of many refrigeration and A/C systems. It automatically meters refrigerant to the evaporator at a rate equal to compressor pumping capacity.

The constant pressure valve contains a diaphragm, control spring (FS1), seat and valve needle or ball. The control spring, above the diaphragm, moves the diaphragm down. This moves the valve open.

The opposing force is provided by low side evaporator pressure (FE) and a constant body spring force (FS2). This moves the valve closed. During the off cycle, evaporator pressure builds and overcomes spring pressure. This keeps the valve closed until the next on cycle. At the start of the on cycle, the compressor quickly reduces evaporator pressure. When this pressure equals the control spring pressure, the valve begins to open.

The valve opens when evaporator pressure is just below the control spring pressure setting. This is the valve's opening point, or setting.



Bleeds

Bleed type valves permit pressures in the system to reach a balance point during the off cycle. At the next running cycle, the motor starts under practically no load. This allows the use of low starting torque compressor motors.

The bleed type (or slotted orifice) valve has a small slot in the valve seat. This prevents complete close off at the end of the machine's-on cycle, permitting refrigerant flow at a reduced rate.

Proper selection should result in a bleed and orifice which will always have control over the refrigerant flow at all standard operating conditions. Application of a larger bleed will speed equalization time, but may cause the valve to lose control at high head pressure operating conditions. Loss of control means all the flow will be through the bleed and the valve will be closed because the bleed capacity matches the compressor capacity.

How to Select Constant Pressure Expansion Valves

1. Load on the system in Btu's per hour or in tons (12,000 Btu per hour equals 1 ton)
2. System refrigerant
3. Evaporator temperature or pressure
4. Condensing temperature or pressure
5. Pressure drop across the valve
6. Off-cycle unloading, if required

Elevation Change and Valve Setting

The control spring in a constant pressure valve works with atmospheric pressure to move the valve in an opening direction. Any substantial change in altitude after a valve has been adjusted will alter the low side flow rate maintained by the valve.

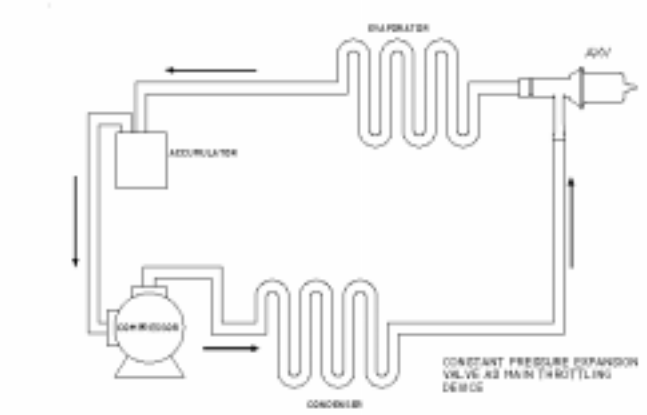
If a low side gauge is available, adjust the valve to increase the system pressure above the sea level reading by the amount shown in the gauge pressure correction column of the table below.

Altitutde	Barametric Pressure		Gage Pressure
Feet	Inches Hg.	psia	correction (psia)
0	29.92	14.70	-
500	29.38	14.70	-0.30
1000	28.86	14.19	-0.51
1500	28.33	13.91	-0.79
2000	27.82	13.58	-1.12
2500	27.32	13.41	-1.29
3000	26.82	13.20	-1.50
3500	26.33	12.92	-1.78
4000	25.84	12.70	-2.00
4500	25.37	12.44	-2.26
5000	24.90	12.23	-2.57
5500	24.43	12.01	-2.69
6000	23.98	11.78	-2.92
6500	23.53	11.55	-3.15
7000	23.09	11.33	-3.37
7500	22.65	11.10	-3.60
8000	22.22	10.92	-3.78
8500	21.80	10.70	-4.00
9000	21.39	10.50	-4.20
9500	20.98	10.30	-4.40
10000	120.58	10.10	-4.60

Constant Pressure Valve Applications

Constant Evaporator Pressure

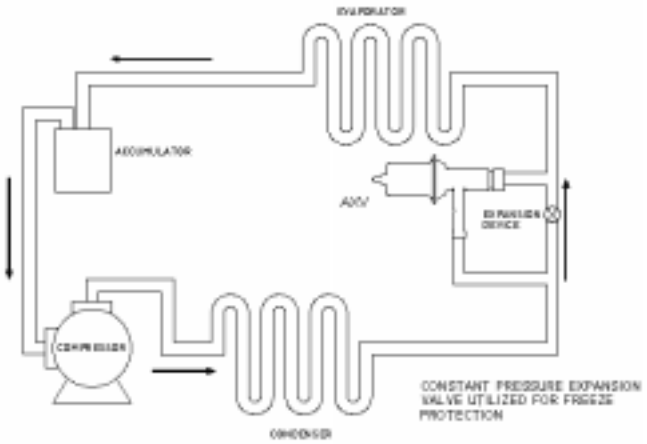
Parker constant pressure expansion valves maintain a constant evaporator pressure for applications when close control of evaporator pressure and temperature are required.



MAIN THROTTLE

Freeze Protection

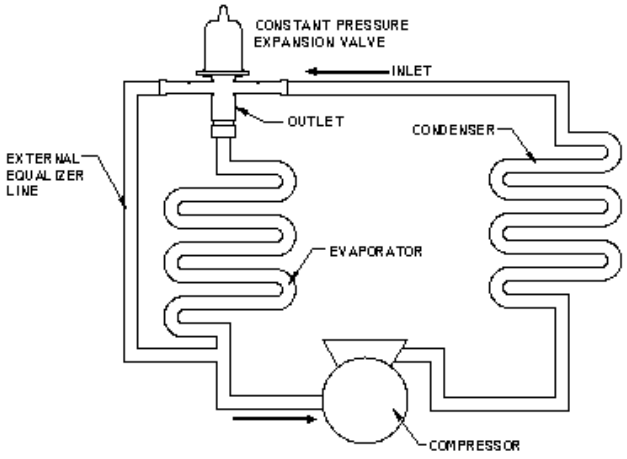
Parker constant pressure expansion valves can be used to prevent evaporator freezing, which may occur at low loads on small air conditioning applications. The valve is installed in parallel with the system expansion device to maintain a minimum evaporator pressure when flow through the main expansion device is insufficient. An accumulator to protect the compressor from liquid is recommended.



FREEZE PROTECTION

External Equalizer

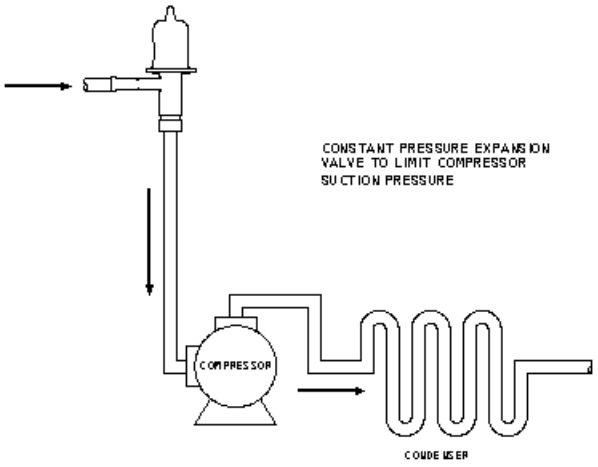
The Parker Model AE3 is available with an external equalizer. External equalizer models are recommended in applications where the pressure drop through the distributor and/or evaporator exceeds 5 psi. The outlet pressure of the evaporator is communicated to the underside of the diaphragm through the external equalizer line.



EXTERNAL EQUALIZER

Crankcase Pressure Limiting

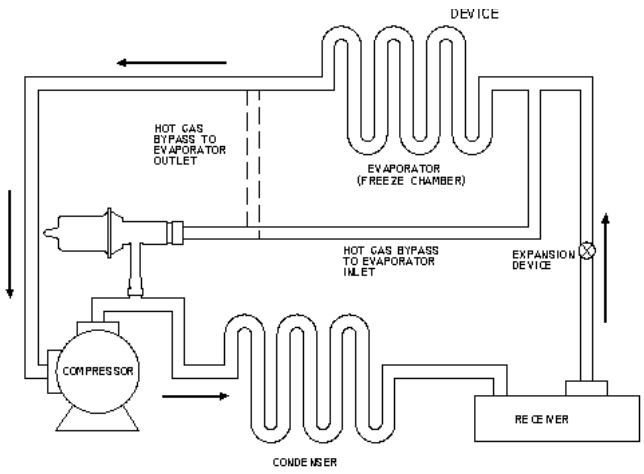
Parker constant pressure expansion valves can be used to limit the maximum operating suction pressure to the compressor. The valve is adjusted to open at a predetermined outlet pressure while restricting flow at higher system inlet pressures in order to protect the compressor. Non-bleed type valves are recommended for this type application.



CRANKCASE PRESSURE LIMITING

Hot Gas Bypass to Evaporator Inlet

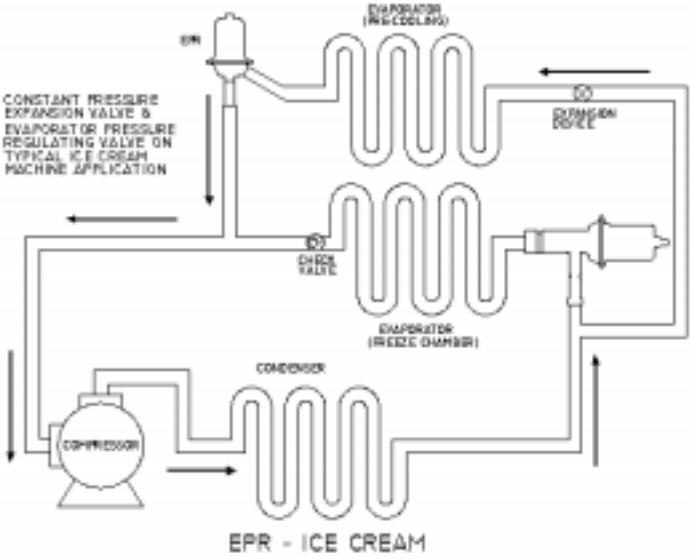
Constant pressure expansion valves control hot gas bypass in systems where temperature is extremely critical and load conditions vary widely – particularly low loads. Installed between the discharge line and the evaporator, the valve controls pressure precisely. As the load drops, evaporator pressure decreases. It throttles open to maintain outlet pressure. This action maintains the temperature of the evaporator. This application may also be used as freeze protection.



HOT GAS BYPASS TO EVAPORATOR INLET

EPR - Ice Cream Machine

Parker Model 139 EPRs are specifically designed for fractional horsepower evaporator applications where precise control of evaportor pressure is required when using a primary expansion device. A typical application is in a multiple evaporator system where different evaporator pressures and temperatures are desired. The 139 EPR may be used to control at a higher evaporator pressure then is present at the compressor suction.



EPR - ICE CREAM

Pressure Temperature Chart

Temp		R-12	R-22	R-123	R-134a	R-502	AZ-50 R-507	R-717	MP 39 R-401A		HP 80 R-402A		HP 62 R-404A	FX 10 R-408A	FX 56 R-409A		AZ 20 R-410A
°F	°C								Liquid	Vapor	Liquid	Vapor	Liquid	Liquid	Liquid	Vapor	
-50	-45.6	*15.4*	*6.2*	*29.2*	*18.4*	*0.2*	1.0	*14.4*	-	-	-	-	0.6	1.6	12.4	17.2	5.0
-45	-42.8	*13.3*	*2.7*	*29.0*	*16.6*	1.9	3.0	*11.8*	-	-	-	-	2.7	1.1	9.7	15.2	7.0
-40	-40.0	*11.0*	0.5	*28.9*	*14.7*	4.1	5.5	*8.8*	*8.1*	*13.2*	6.8	6.3	5.0	3.3	6.8	13.1	11.6
-35	-37.2	*8.4*	2.6	*28.7*	*12.3*	6.5	8.2	*5.5*	*5.1*	*10.7*	9.6	9.1	7.6	5.6	3.5	10.7	14.9
-30	-34.4	*5.5*	4.9	*28.4*	*9.7*	9.2	11.1	*1.7*	*1.7*	*7.9*	12.6	12.1	10.4	8.2	0.0	8.1	18.5
-25	-31.7	*2.3*	7.4	*28.1*	*6.8*	12.1	14.3	1.2	1.0	*4.8*	16.0	15.4	13.4	11.0	2.0	5.1	22.5
-20	-28.9	0.6	10.1	*27.8*	*3.6*	15.3	17.8	3.5	3.0	*1.4*	19.6	18.9	16.8	14.1	4.1	1.9	26.9
-15	-26.1	2.4	13.2	*27.4*	*0.1*	18.8	21.7	6.2	5.2	1.2	23.6	22.9	20.5	17.5	6.5	0.8	31.6
-10	-23.3	4.5	16.4	*27.0*	2.0	22.6	25.8	9.0	7.7	3.3	27.9	27.1	24.5	21.2	9.0	2.8	36.8
-5	-20.6	6.7	20.0	*26.5*	4.1	26.6	30.3	12.3	10.3	5.5	32.6	31.7	28.8	25.2	11.8	4.9	42.5
0	-17.8	9.1	24.0	*25.9*	6.5	31.1	35.2	15.6	13.2	8.0	37.6	36.7	33.5	29.5	14.8	7.2	48.6
5	-15.0	11.8	28.2	*25.3*	9.1	35.9	40.5	19.5	16.3	10.7	43.1	42.1	38.6	34.2	18.1	9.7	55.2
10	-12.2	14.6	32.7	*24.6*	11.9	41.0	46.1	23.7	19.7	13.7	49.0	48.0	44.0	39.3	21.7	12.5	62.3
15	-9.4	17.7	37.7	*23.7*	15.1	46.5	52.2	28.3	23.4	16.9	55.3	54.2	49.9	44.8	25.5	15.4	70.0
20	-6.7	21.0	43.0	*22.8*	18.4	52.5	58.8	33.4	27.4	20.4	62.1	60.9	56.2	50.7	29.6	18.7	78.3
25	-3.9	24.6	48.7	*21.8*	22.1	58.8	65.8	38.8	31.7	24.2	69.3	68.1	63.0	57.0	34.0	22.2	87.2
30	-1.1	28.4	54.9	*20.7*	26.1	65.6	73.3	44.9	36.4	28.3	77.1	75.8	70.3	63.7	38.7	26.0	96.8
35	1.7	32.5	61.4	*19.5*	30.4	72.8	81.3	51.4	41.3	32.8	85.4	84.0	78.1	71.0	43.8	30.1	107.0
40	4.4	36.9	68.5	*18.1*	35.1	80.5	89.8	58.4	46.6	37.6	94.2	92.8	86.4	78.7	49.2	34.5	118.0
45	7.2	41.6	76.0	*16.6*	40.0	88.7	98.9	66.1	52.4	42.7	104.0	102.0	95.2	87.0	54.9	39.2	130.0
50	10.0	46.7	84.0	*15.0*	45.4	97.4	109.0	74.3	58.5	48.2	114.0	112.0	104.7	95.8	61.0	44.3	142.0
55	12.8	52.0	92.5	*13.1*	51.2	107.0	119.0	83.2	65.0	54.1	124.0	123.0	114.7	105.1	67.6	49.8	156.0
60	15.6	57.7	101.6	*11.2*	57.4	116.4	130.0	92.6	71.9	60.4	136.0	134.0	125.3	115.1	74.5	55.6	170.0
65	18.3	63.7	111.0	*9.0*	64.0	127.0	141.0	102.8	79.3	67.2	147.0	146.0	136.6	125.6	81.8	61.9	185.0
70	21.1	70.1	121.4	*6.6*	71.1	138.0	154.0	113.8	87.1	74.4	160.0	158.0	148.6	136.8	89.5	68.6	201.0
75	23.9	76.9	132.0	*4.0*	78.6	149.0	167.0	125.5	95.4	82.1	173.0	171.0	161.2	148.7	97.7	75.8	217.0
80	26.7	84.1	144.0	*1.2*	86.7	161.0	180.0	138.0	104.0	90.2	187.0	185.0	174.6	161.2	106.4	83.4	235.0
85	29.4	91.7	156.0	0.9	95.1	174.0	195.0	151.4	114.0	98.9	202.0	200.0	188.8	174.4	115.5	91.5	254.0
90	32.2	99.7	168.4	2.5	104.2	187.4	210.0	165.5	123.0	108.0	218.0	215.0	203.7	188.4	125.2	100.2	274.0
95	35.0	108.0	182.0	4.2	113.8	201.0	226.0	180.6	134.0	118.0	233.0	232.0	219.4	203.1	135.3	109.4	295.0
100	37.8	117.0	196.0	6.1	124.1	216.2	244.0	196.7	145.0	128.0	251.0	249.0	235.9	218.7	146.0	119.2	317.0
105	40.6	127.0	211.0	8.1	134.9	232.0	252.0	213.9	156.0	139.0	269.0	267.0	253.4	235.0	157.2	129.6	341.0
110	43.3	136.0	226.4	10.3	146.3	247.9	281.0	231.8	169.0	151.0	288.0	286.0	271.7	252.1	169.0	140.6	365.0
115	46.1	147.0	243.0	12.6	158.4	265.0	301.0	251.0	181.0	163.0	308.0	305.0	290.9	270.2	181.4	152.3	391.0
120	48.9	158.0	260.0	15.1	171.1	282.7	322.0	271.1	195.0	176.0	238.0	326.0	311.1	289.1	194.4	164.7	418.0
125	51.7	169.0	278.4	17.7	184.5	301.0	344.0	292.5	209.0	189.0	350.0	347.0	332.3	308.9	208.0	177.8	446.0
130	54.4	181.0	296.8	20.6	198.7	320.8	368.0	314.9	224.0	203.0	372.0	370.0	354.5	329.7	222.3	191.6	476.0
135	57.2	193.0	317.0	23.6	213.6	341.0	393.0	338.8	239.0	218.0	396.0	393.0	377.8	351.5	237.2	206.3	507.0
140	60.0	207.0	337.3	26.8	229.3	362.6	419.0	363.5	255.0	234.0	420.0	418.0	402.2	374.3	252.9	221.8	539.0
145	62.8	220.0	359.0	30.2	245.7	385.0	446.0	390.2	272.0	250.0	446.0	443.0	427.7	398.1	269.3	238.2	573.0
150	65.6	235.0	381.0	33.8	263.0	408.4	475.0	417.4	299.0	267.0	472.0	470.0	454.4	423.0	293.0	286.4	608.0

Black figures = psig
Figures in italics = inches Hg. Below 1 ATM

QUICK ALTERNATE REFRIGERANT REFERENCE

ASHRAE #	*Replaces*	*Applications*	*Notes*
R-134a	R-12	New equip. & retrofits	Close match to CFC-12
R-401A	R-12	Retrofits	Close match to R-12
R-402A	R-502/R-12	Retrofits	Higher discharge pressure than R-502
R-404A	R-502/R-22	New equip. & retrofits	Close match to R-502 & R-22
R-407B	R-502	New equip. & retrofits	Close match to R-502
R-407C	R-22	New equipment	Close match to R-22
R-408A	R-502/R-22	Retrofits	Higher discharge pressure than R-502
R-409A	R-12	Retrofits	Higher discharge pressure than R-12
R-410A	R-22	New equipment	Extremely higher discharge pressures
R-507	R-502/R-22	New equip. & retrofits	Close match to R-502

CONVERSION REFERENCE

Temperature F° = ((C° X 9) / 5) + 32
Temperature C° = ((F° - 32) * 5) / 9

COP = KW Out/KW In
EER = BTUH Out/Watts In
BTU min = Kw X 56.92
BTU = KwH X 3,413
BTUs = HP hrs X 2547
BTU hour = Watts X 3.4129
HP = Kw X 1.34
1 Ton (Refrigeration) = 12,000 BTU hour
Watts = HP X 745.7

Cubic Feet = Gallons X 0.1337
Cubic Feet/Hr = GPM X 8.021
kPa = Inches Hg X 3.39
kPa = PSI X 6.89
Atmospheres = PSI X .06804
Inches of Mercury = PSI X 2.037
PSIA = PSIG + 14.7

Meters = inches X 0.0254
Kilograms = lbs. X 0.4536

WATER PROPERTIES
Weight of One Gallon = 8.34 LB. @ 68° F
Specific Heat = 1 BTU/LB/F°
Qt = 500 X GPM X TD
1 ft. (head) = 0.433 PSI

PSYCHOMETRICS
Qs = 1.10 X TD X CFM
Qt = 4.5 X HD X CFM

HOW TO DETERMINE SUPERHEAT

1. Determine suction pressure at the evaporator outlet with gauge. On close coupled installations, suction pressure may be read at compressor suction connection.

2. Use pressure temperature chart to determine saturation temperature at observed suction pressure.

3. Measure suction gas temperature on the line at the expansion valve bulb's remote location.

4. Subtract saturation temperature (from Step 2) from suction gas temperature (from Step 3).

The difference is the superheat of the suction gas. (Example uses R-22).