Electrical Control Valves Series EX2

Pulse width modulated with exchangeable orifices

Can be used with EC2 display case controllers (see page 145)

Features

- Pulse width modulated
- Shut off function eliminates the necessity of a separate solenoid valve
- Dampened plunger reduces noise effects of water hammer
- One valve body can be combined with 6 orifices to make 7 capacity ranges up to 18.7 kW (R407C)
- Applicable to all common refrigerants (HCFC, HFC) and for subcritical CO_2 applications
- Long lifetime, high reliability
- PS: 40bar, TS: -40 to +65°C

EX2 with Orifice

Selection Chart

Type	Part No.	Function	Capacity Q_n at 100% open Valve (kW) *					
			R134a	**R22**	**R404A**	**R507**	**R407C**	**R744**
EX2-M00	801 091	10 mm inlet / 12 mm outlet ODF	13.3	17.2	12.1	12.1	18.7	35.0
EX2-I00	801 090	3/8" inlet / 1/2" outlet ODF						
EXO-004	801 089	Orifice 4	8.5	10.9	7.7	7.7	11.8	22.2
EXO-003	801 088	Orifice 3	5.6	7.2	5.1	5.1	7.8	14.6
EXO-002	801 087	Orifice 2	3.3	4.3	3.0	3.0	4.7	8.7
EXO-001	801 086	Orifice 1	2.5	3.2	2.3	2.3	3.5	6.5
EXO-000	801 085	Orifice 0	1.2	1.6	1.1	1.1	1.7	3.3
EXO-00X	801 084	Orifice X	0.7	0.9	0.6	0.6	1.0	1.8
ASC 24V	801 062	Coil 24 VAC 50-60HZ (8W)						

* Orifice should be selected at max. 80% of Q_n to allow covering the load fluctuation.

The nominal capacity (Qn) is based on the following conditions:

Refrigerant	Evaporating temperature	Condensing temperature	Subcooling
R407C	+4°C (dew point)	+38°C bubble point / +43°C dew point	1K
R22, R134a, R404A, R507	+4°C	+38°C	1K
R744	-40°C	-10°C	1K

For other operating conditions an Excel based selection tool can be downloaded from www.emersonclimate.eu, or use correction factors with following formula:

$$Qn = Qo \times Kt \times K\Delta p$$

Q_n: Nominal valve capacity
Q_o: Required cooling capacity
K_t: Correction factor for evaporating and liquid temperature
$K\Delta p$: Correction factor for pressure drop at valve

Liquid Temperature entering Valve °C	R134a	Correction Factor Kt										
		Evaporating Temperature °C										
	15	10	5	0	-5	-10	-15	-20	-25	-30	-40	
55	1.21	1.23	1.26	1.29	1.33	1.33	1.39	1.43	1.47	1.52	1.62	
50	1.13	1.15	1.17	1.20	1.23	1.26	1.28	1.32	1.36	1.39	1.48	
45	1.06	1.08	1.10	1.12	1.15	1.17	1.19	1.22	1.26	1.29	1.37	
40	0.99	1.01	1.03	1.05	1.08	1.10	1.12	1.14	1.17	1.20	1.27	
35	0.94	0.96	0.97	0.99	1.01	1.03	1.05	1.07	1.10	1.12	1.18	
30	0.89	0.91	0.92	0.94	0.96	0.98	0.99	1.01	1.03	1.06	1.11	
25	0.85	0.86	0.87	0.89	0.91	0.92	0.94	0.95	0.97	1.00	1.04	
20	0.81	0.82	0.83	0.85	0.89	0.88	0.89	0.91	0.92	0.94	0.98	
15	0.77	0.78	0.79	0.81	0.82	0.84	0.84	0.86	0.88	0.89	0.93	
10		0.75	0.76	0.77	0.78	0.80	0.81	0.82	0.84	0.85	0.89	
5			0.73	0.74	0.75	0.76	0.77	0.78	0.80	0.81	0.84	
0				0.71	0.72	0.73	0.74	0.75	0.76	0.78	0.81	
-5					0.69	0.70	0.71	0.72	0.73	0.74	0.77	
-10						0.68	0.68	0.69	0.70	0.71	0.74	

Correction Factor KΔp																							
Δp	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
KΔp	1.34	1.25	1.18	1.12	1.07	1.02	0.98	0.95	0.91	0.88	0.86	0.83	0.79	0.75	0.72	0.69	0.67	0.65	0.63	0.61	0.59	0.57	0.56	0.55

Liquid Temperature entering Valve °C	R404A	Correction Factor Kt											
		Evaporating Temperature °C											
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	
55	1.42	1.46	1.50	1.55	1.61	1.68	1.75	1.83	1.92	2.01	2.13	2.25	
50	1.23	1.26	1.30	1.34	1.38	1.43	1.48	1.54	1.61	1.68	1.75	1.84	
45	1.10	1.12	1.15	1.18	1.22	1.26	1.30	1.34	1.39	1.45	1.51	1.57	
40	0.99	1.02	1.04	1.07	1.09	1.13	1.16	1.20	1.24	1.28	1.33	1.38	
35	0.91	0.93	0.95	0.97	1.00	1.02	1.05	1.08	1.11	1.15	1.19	1.23	
30	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.99	1.02	1.05	1.08	1.11	
25	0.79	0.80	0.82	0.83	0.85	0.87	0.89	0.92	0.94	0.97	0.99	1.02	
20	0.74	0.75	0.77	0.78	0.80	0.81	0.83	0.85	0.87	0.90	0.92	0.95	
15	0.70	0.71	0.72	0.73	0.75	0.76	0.78	0.80	0.82	0.84	0.86	0.88	
10		0.67	0.68	0.69	0.71	0.72	0.74	0.75	0.77	0.79	0.81	0.83	
5			0.65	0.66	0.67	0.68	0.70	0.71	0.73	0.74	0.76	0.78	
0				0.63	0.64	0.65	0.66	0.68	0.69	0.71	0.72	0.74	
-5					0.61	0.62	0.63	0.65	0.66	0.67	0.69	0.70	
-10						0.60	0.61	0.62	0.63	0.64	0.65	0.67	

Correction Factor KΔp																							
Δp	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
KΔp	1.74	1.63	1.54	1.46	1.39	1.33	1.28	1.23	1.19	1.15	1.12	1.09	1.03	0.98	0.94	0.9	0.87	0.84	0.81	0.79	0.77	0.75	0.73	0.71

Liquid Temperature entering Valve °C	R744	Correction Factor Kt										
		Evaporating Temperature °C										
	5	0	-5	-10	-15	-20	-25	-30	-35	-40		
5	1.12	1.10	1.09	1.08	1.08	1.08	1.07	1.07	1.08	1.08		
0		1.02	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.01		
-5			0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94		
-10				0.89	0.89	0.88	0.88	0.88	0.89	0.89		
-15					0.84	0.84	0.84	0.84	0.84	0.84		
-20						0.80	0.80	0.80	0.80	0.80		
-25							0.76	0.76	0.76	0.76		
-30								0.73	0.73	0.73		
-35									0.70	0.70		
-40										0.67		

Correction Factor KΔp																							
Δp	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0
KΔp	1.81	1.65	1.53	1.43	1.35	1.28	1.22	1.17	1.12	1.08	1.05	1.01	0.98	0.95	0.93	0.91	0.88	0.86	0.84	0.83	0.81	0.79	0.78	0.77

Liquid Temperature entering Valve °C	R22	Correction Factor Kt										
		Evaporating Temperature °C										
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
55	1.17	1.19	1.20	1.22	1.24	1.25	1.27	1..29	1.32	1.34	1.37	1.39
50	1.11	1.11	1.13	1.15	1.16	1.18	1.20	1.22	1.24	1.26	1.28	1.30
45	1.05	1.05	1.07	1.08	1.10	1.12	1.13	1.15	1.17	1.18	1.20	1.23
40	1.00	1.01	1.02	1.03	1.04	1.06	1.07	1.09	1.10	1.12	1.14	1.16
35	0.95	0.96	0.97	0.98	0.99	1.01	1.02	1.03	1.05	1.06	1.08	1.10
30	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	1.00	1.01	1.03	1.04
25	0.87	0.88	0.89	0.89	0.91	0.92	0.93	0.94	0.95	0.96	0.98	0.99
20	0.83	0.84	0.85	0.86	0..87	0.88	0.89	0.90	0.91	0.92	0.93	0.95
15	0.80	0.81	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.91
10		0.78	0.78	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87
5			0.75	0.76	0.77	0.78	0.79	0.79	0.80	0.81	0.82	0.83
0				0.73	0.74	0.75	0.76	0.77	0.77	0.78	0.79	0.80
-5					0.72	0.72	0.73	0.74	0.75	0.75	0.76	0.77
-10						0.70	0.71	0.71	0.72	0.73	0.74	0.74

Correction Factor KΔp																								
Δp	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
KΔp	1.59	1.49	1.40	1.33	1.27	1.22	1.17	1.13	1.09	1.05	1.02	0.99	0.94	0.90	0.86	0.83	0.80	0.77	0.75	0.72	0.70	0.68	0.67	0.65

Liquid Temperature entering Valve °C	R507	Correction Factor Kt										
		Evaporating Temperature °C										
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
55	1.39	1.43	1.47	1.52	1.57	1.62	1.69	1.76	1.83	1.92	2.02	2.12
50	1.22	1.24	1.28	1.31	1.35	1.40	1.44	1.49	1.55	1.61	1.68	1.76
45	1.09	1.11	1.14	1.17	1.20	1.23	1.27	1.31	1.36	1.40	1.46	1.52
40	0.99	1.01	1.03	1.06	1.08	1.11	1.14	1.17	1.21	1.25	1.29	1.34
35	0.91	0.93	0.95	0.97	0.99	1.01	1.04	1.07	1.10	1.13	1.16	1.20
30	0.85	0.86	0.88	0.89	0.91	0.93	0.96	0.98	1.01	1.03	1.06	1.09
25	0.79	0.80	0.82	0.83	0.85	0.87	0.89	0.91	0.93	0.95	0.98	1.01
20	0.74	0.75	0.77	0.78	0.79	0.81	0.83	0.85	0.87	0.89	0.91	0.93
15	0.71	0.71	0.72	0.73	0.75	0.76	0.78	0.79	0.81	0.83	0.85	0.87
10		0.67	0.68	0.69	0.70	0.72	0.73	0.74	0.76	0.78	0.79	0.81
5			0.64	0.65	0.67	0.68	0.69	0.70	0.72	0.73	0.75	0.76
0				0.62	0.63	0.64	0.65	0.66	0.68	0.69	0.70	0.72
-5					0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.68
-10						0.58	0.59	0.60	0.61	0.62	0.63	0.64

Correction Factor KΔp																								
Δp	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
KΔp	1.75	1.64	1.54	1.46	1.4	1.34	1.28	1.24	1.19	1.16	1.12	1.09	1.03	0.99	0.94	0.91	0.87	0.84	0.82	0.79	0.77	0.75	0.73	0.71

Liquid Temperature entering Valve °C	R407C	Correction Factor Kt										
		Evaporating Temperature °C										
	15	10	5	0	-5	-10	-15	-20	-25			
55	1.26	1.28	1.31	1.34	1.37	1.40	1.44	1.48	1.52			
50	1.15	1.17	1.19	1.22	1.24	1.27	1.30	1.33	1.37			
45	1.06	1.08	1.10	1.12	1.14	1.17	1.19	1.22	1.25			
40	0.99	1.01	1.02	1.04	1.06	1.08	1.11	1.13	1.16			
35	0.93	0.94	0.96	0.98	0.99	1.01	1.03	1.05	1.07			
30	0.88	0.89	0.90	0.92	0.93	0.95	0.97	0.99	1.01			
25	0.83	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.95			
20	0.79	0.80	0.81	0.82	0.84	0.85	0.86	0.88	0.90			
15	0.75	0.76	0.77	0.78	0.80	0.81	0.82	0.84	0.85			
10		0.73	0.74	0.75	0.76	0.77	0.78	0.80	0.81			
5			0.71	0.72	0.73	0.74	0.75	0.76	0.77			
0				0.69	0.70	0.71	0.72	0.73	0.74			
-5					0.67	0.68	0.69	0.70	0.71			
-10						0.65	0.66	0.67	0.68			

Correction Factor KΔp																								
Δp	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
KΔp	1.81	1.69	1.59	1.51	1.44	1.38	1.33	1.28	1.23	1.19	1.16	1.13	1.07	1.02	0.98	0.94	0.9	0.87	0.84	0.82	0.8	0.78	0.76	0.74