

# Thermo®-Expansion Valve Series ZZ

for Low Evaporating Temperatures between -45 and -120°C

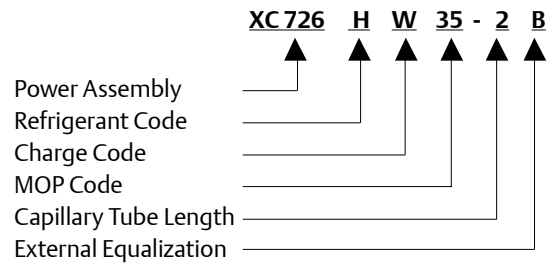
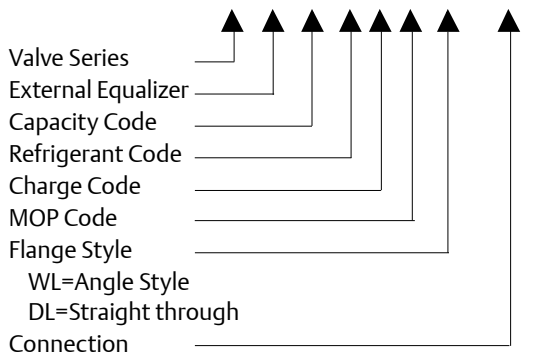
### Features

- Modular design for economical logistics and easy assembly and servicing
- Very good stability is attained because of the large forces generated by the large diaphragm diameter
- High quality materials and processes for high reliability and long lifetime
- Capillary tube length 3 m
- PS: 31 bar, TS: -120 ... +65°C
- No CE marking according art. 3.3 PED 97/23 EC



ZZCE

### Type Code



### Available upon special request:

- Power assembly with solder connection for external pressure equalization
- Non-standard MOPs
- Non-standard charges
- Non-standard connection sizes (Selection see page 86)

Series	R 22		R 23		R 404A / R 507		Orifice	Connection		Power Assembly
	Type	Nom. Cap. kW	Type	Nom. Cap. kW	Type	Nom. Cap. kW		Standard Flange, Angle Solder/ODF	Zoll	
ZZCE	3/4 HW	1,8	2 BG	1,9	3/4 SW	1,2	<b>X 10-B01</b>	<b>C 501 - 5 mm</b> 10 x 16	<b>C 501 - 5</b> 3/8" x 5/8"	<b>XC726...</b> ...2B
	1 1/2 HW	3,8	6 BG	4,0	1 1/2 SW	2,6	<b>X 10-B02</b>			
	2 1/2 HW	6,4	8 BG	6,8	2 1/2 SW	4,4	<b>X 10-B03</b>			
	4 HW	10,2	12 BG	10,8	3 1/2 SW	7,0	<b>X 10-B04</b>	<b>C 501 - 7 mm</b> 12 x 16	<b>C 501 - 7</b> 1/2" x 5/8"	
	6 HW	15,4	17 BG	16,3	5 SW	10,6	<b>X 10-B05</b>			
	8 HW	20,5	25 BG	21,7	8 SW	14,1	<b>X 10-B06</b>	<b>A 576 mm</b> 16 X 22 (22 x 28 ODM)	<b>A 576</b> 5/8" x 7/8" (7/8" x 1 1/8" ODM)	
	10 HW	25,6	31 BG	27,1	9 SW	17,6	<b>X 10-B07</b>			

**Attention:** To withstand stress at extremely low temperatures, thermo expansion valves series ZZ feature bronze bolts.

### Preferred MOPs

MOP Code	MOP		Evaporating Temperature Range (°C)		
	bar	T <sub>max</sub>	R 22	R 23	R 404A / R 507
<b>20</b>	1,4	-66°C		-100 .. -71	
<b>35</b>	2,4	-11°C	-70 .. -15		
<b>40</b>	2,8	-14°C			-75 .. -18
<b>55</b>	3,8	-7°C			-75 .. -10
<b>60</b>	4,1	-48°C		-100 .. -51	
<b>125</b>	8,6	-32°C		-100 .. -33	

Nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature	Condensing temperature	Sub-cooling
R 22, R 23, R 404A, R 507	+4°C	+38°C	1K

Valve selection at other operating conditions see page 78.

## Spare Parts

	Type	Part No.
Gasket Set for ZZ Series Valves	X 13455 -1	027 579
Service Tool for ZZ Series	X 99999	800 005
Bronze screws for following flange types (ZZ-Valves): C501 , 9761 , 6346 , A576 9152, 9153, 10331 , 10332	Screw BZ 32 Screw BZ 48	803 575 803 576

## Correction Tables for Series ZZ

Valve selection for operating conditions other than specified on page 77:

$$Q_n = Q_o \times K_t \times K_{\Delta p}$$

$Q_n$ : 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	Correction Factor $K_t$											
	Evaporating Temperature °C											
	-45	-50	-55	-60	-65	-70						
+10	1,02	1,21	1,42	1,66	1,97	2,30						
0	0,94	1,12	1,30	1,53	1,75	2,02						
-10	0,88	1,04	1,21	1,42	1,61	1,83						
-20	0,82	0,98	1,13	1,32	1,50	1,71						
-30	0,77	0,92	1,05	1,23	1,39	1,56						
-40		0,86	1,00	1,15	1,30	1,47						
-50				1,09	1,25	1,42						
Correction Factor $K_{\Delta p}$												
$\Delta p$ (bar)	0,5	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	6,0	7,0
$K_{\Delta p}$	4,40	3,10	2,50	2,20	2,00	1,80	1,70	1,60	1,50	1,40	1,30	1,20
$\Delta p$ (bar)	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	19,0
$K_{\Delta p}$	1,10	1,04	0,98	0,94	0,90	0,87	0,83	0,81	0,78	0,76	0,74	0,72

For the proper sizing of thermo expansion valves in cases of sub-cooling of more than 15K please use additionally the correction factors on page 60 of this brochure.

Liquid Temperature entering valve °C	Correction Factor $K_t$											
	Evaporating Temperature °C											
	-45	-50	-55	-60	-65	-70	-75	-80	-85	-90	-95	-100
-10	1,18	1,18	1,19	1,21	1,28	1,48	1,86	2,21	2,73	3,36	4,15	5,06
-15	1,11	1,11	1,12	1,13	1,20	1,39	1,74	2,07	2,56	3,14	3,88	4,72
-20	1,04	1,05	1,06	1,07	1,13	1,31	1,64	1,95	2,41	2,95	3,64	4,43
-25	0,99	0,99	1,00	1,01	1,07	1,24	1,55	1,84	2,27	2,78	3,43	4,17
-30	0,94	0,94	0,95	0,96	1,02	1,17	1,47	1,75	2,15	2,63	3,24	3,94
-35	0,89	0,90	0,91	0,91	0,97	1,12	1,40	1,66	2,04	2,50	3,08	3,74
-40	0,85	0,86	0,86	0,87	0,92	1,06	1,33	1,58	1,94	2,38	2,92	3,55
-45		0,82	0,83	0,83	0,88	1,02	1,27	1,51	1,85	2,27	2,79	3,38
-50			0,79	0,80	0,84	0,97	1,22	1,44	1,77	2,17	2,86	3,23
-55				0,76	0,81	0,93	1,17	1,38	1,70	2,07	2,55	3,09
-60					0,78	0,90	1,12	1,33	1,63	1,99	2,44	2,96
-65						0,86	1,08	1,27	1,57	1,91	2,35	2,84
-70							1,04	1,23	1,51	1,84	2,26	2,73
-75								1,18	1,45	1,77	2,18	2,63
-80									1,40	1,71	2,10	2,54
Correction Factor $K_{\Delta p}$												
$\Delta p$ (bar)	0,5	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	6,0	7,0
$K_{\Delta p}$	4,20	2,97	2,43	2,10	1,88	1,72	1,59	1,49	1,40	1,33	1,21	1,12
$\Delta p$ (bar)	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	19,0
$K_{\Delta p}$	1,05	0,99	0,94	0,90	0,86	0,82	0,79	0,77	0,74	0,72	0,70	0,68

Liquid Temperature entering valve °C	<b>R 404A</b>							
	<b>Correction Factor <math>K_t</math></b>							
	Evaporating Temperature °C							
	-40	-45	-50	-55	-60	-65	-70	-75
+40	1,40	1,76	2,21	2,77	3,56	4,30	4,87	5,61
+35	1,24	1,55	1,94	2,42	3,09	3,71	4,17	4,77
+30	1,12	1,39	1,73	2,15	2,74	3,27	3,66	4,17
+25	1,02	1,26	1,57	1,94	2,46	2,93	3,27	3,70
+20	0,94	1,16	1,44	1,77	2,24	1,66	2,96	3,34
+15	0,87	1,07	1,33	1,63	2,06	2,44	2,71	3,05
+10	0,81	1,00	1,23	1,52	1,91	2,26	2,49	2,80
+5	0,76	0,94	1,15	1,42	1,78	2,10	2,32	2,60
0	0,71	0,88	1,08	1,33	1,67	1,97	2,17	2,43
-5	0,68	0,83	1,02	1,25	1,57	1,85	2,04	2,28
-10	0,64	0,79	0,97	1,19	1,49	1,75	1,92	2,14
-15	0,61	0,75	0,92	1,13	1,41	1,66	1,82	2,03
-20	0,58	0,72	0,88	1,07	1,34	1,57	1,73	1,92
-25	0,56	0,69	0,84	1,03	1,28	1,50	1,65	1,83
-30	0,54	0,66	0,80	0,98	1,22	1,43	1,57	1,75
-35	0,51	0,63	0,77	0,94	1,17	1,36	1,49	1,66
-40		0,60	0,74	0,90	1,12	1,31	1,43	1,59
-45			0,71	0,86	1,07	1,25	1,37	1,52
-50				0,83	1,03	1,21	1,32	1,46

<b>Correction Factor <math>K_{\Delta p}</math></b>												
$\Delta p$ (bar)	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5	6	7
$K_{\Delta p}$	4,73	3,34	2,73	2,36	2,11	1,93	1,79	1,67	1,58	1,5	1,37	1,26
$\Delta p$ (bar)	8	9	10	11	12	13	14	15	16	17	18	19
$K_{\Delta p}$	1,18	1,11	1,06	1,01	0,97	0,93	0,89	0,86	0,84	0,8	0,79	0,77

For the proper sizing of thermo expansion valves in cases of sub-cooling of more than 15K please use additionally the correction factors on page 60 of this brochure.

Liquid Temperature entering valve °C	<b>R 507</b>					
	<b>Correction Factor <math>K_t</math></b>					
	Evaporating Temperature °C					
	-45	-50	-55	-60	-65	-70
+30	1,26	1,67	2,10	2,68	3,48	4,58
+20	1,07	1,41	1,77	2,25	2,89	3,78
+10	0,94	1,22	1,52	1,92	2,46	3,23
0	0,83	1,08	1,33	1,68	2,16	2,82
-10	0,75	0,95	1,19	1,49	1,92	2,48
-20	0,67	0,86	1,07	1,34	1,70	2,20
-30	0,61	0,78	0,96	1,21	1,54	2,00
-40	0,55	0,71	0,86	1,08	1,38	1,79
-50			0,79	0,99	1,24	1,62

<b>Correction Factor <math>K_{\Delta p}</math></b>												
$\Delta p$ (bar)	0,5	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	6,0	7,0
$K_{\Delta p}$	4,77	3,37	2,75	2,38	2,13	1,95	1,80	1,69	1,59	1,51	1,38	1,27
$\Delta p$ (bar)	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	19,0
$K_{\Delta p}$	1,19	1,12	1,07	1,02	0,97	0,94	0,90	0,87	0,84	0,82	0,79	0,77

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