

Product Guide 2016

for HFO / HFO Blends



R448A/R449A
R450A/R513A
R1234ze

R134a
R407A/F

R404A/507

R12/502

Preface

Many end-users, equipment and compressor manufacturers are investigating ways to minimize their impact on the environment. Improving system architectures, using a refrigerant with lower global warming potential (GWP) can significantly improve the carbon footprint of an installation.

R404A, R507, R134a are the most commonly used refrigerant in refrigeration systems (R134a also in larger chillers). However, established F-Gas regulation leads the use of refrigerants with low GWP as long term solution.

HFO pure and HFO blends with very low GWP are considered as long term refrigerants and viable alternative to natural flammable Hydro Carbon or high pressure CO₂ where the application of natural refrigerants are not favorable.

Note:

- Please see separate product guide document for use with propane.
- This document provides comprehensive technical data for selection of products required to design of system with HFO/HFO blends.
- Product Guide covers technical data for quick selection. For more detailed technical information please refer to the General Product Guide or the Technical Bulletin of individual products.

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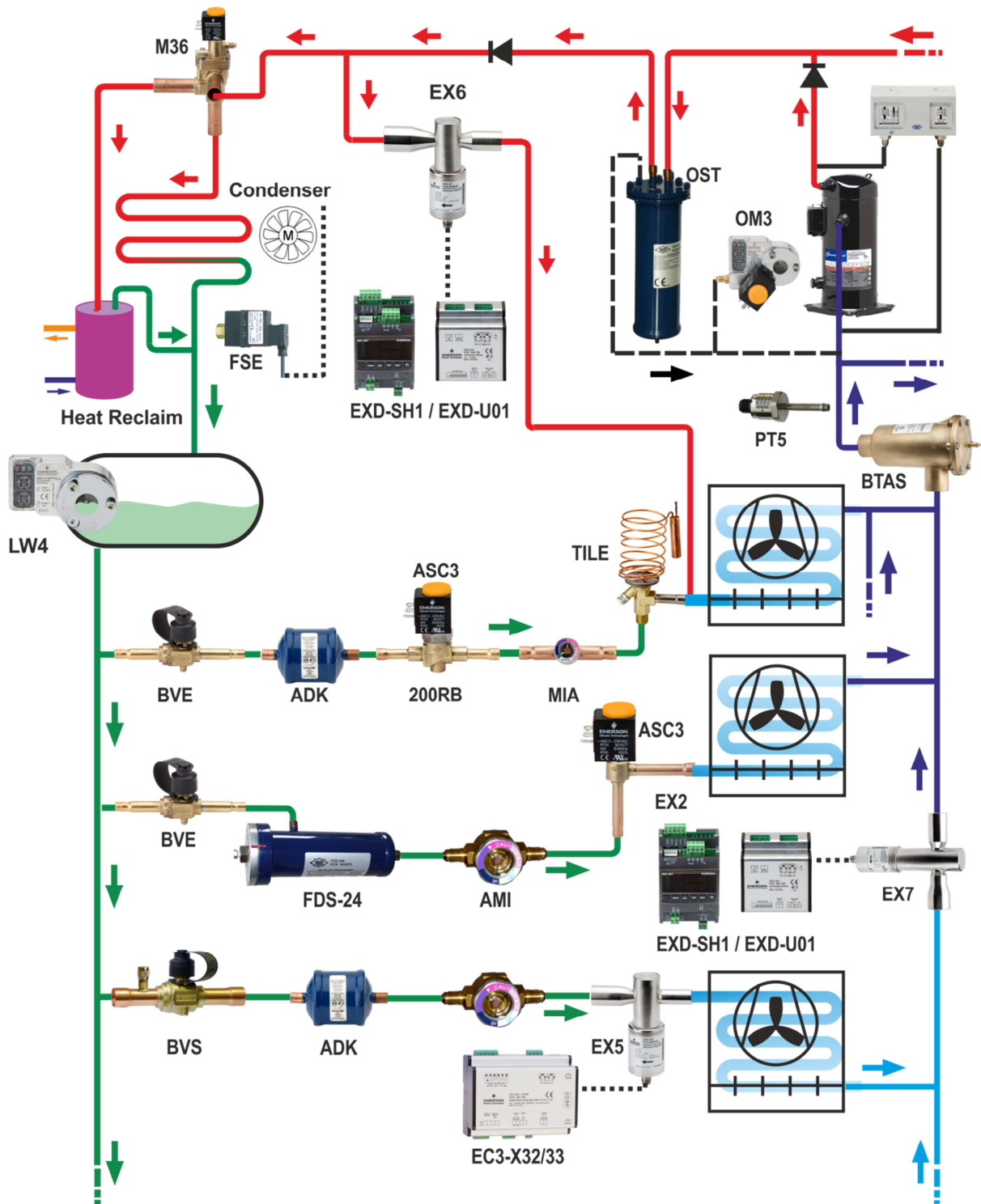
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Introduction and General Information

Introduction

HFO/ HFO blends are new generation of refrigerants with low GWP as successor of HFC. The release of standard products with these new refrigerants is based on compatibility test and required modification/consideration in order to provide optimum performance.

The following subjects have been considered:

- Material compatibility of used elastomer in products
- Operating conditions in comparison with HFC refrigerant in term of pressure, temperature, enthalpy etc.
- Selection of valves based on new flow capacity resulted from refrigerant thermodynamic properties
- Software modification in electronic devices when it is required
- Behavior of Thermo™-Expansion Valves with these new refrigerant and required correction by setting or new charges

All products in this document have been qualified for use with the following refrigerants:

Refrigerant group	Refrigerant	Composition					Safety classification	Replacement for
		R1234ze	R1234yf	R32	R125	R134a		
HFO blend	R448A	7%	20%	26%	-	21%	A1	R404A, R507, R407A, R407F
	R449A	-	25.3%	24.3%	24.7%	25.7%		
	R450A	58%	-	-	-	42%		
	R513A	-	56%	-	-	44%		
HFO pure	R1234ze	100%	-	-	-	-	A2L	R134a

Note 1: As long as R1234ze is classified in A2L category, the uses of products are permitted only in non-explosive environment, non ATEX.

Note 2: All products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Guideline for conditional use of product in conjunction with A2L classified R1234ze refrigerant

Products	Compliance according PED		Compliance according ATEX Zone 0, 1 and 2
	Fluid group II Category	Fluid group I Category	
Mechanical devices	SEP, I or II *	Products have not been assessed/released	Out of scope
Electrical operated devices	SEP, I or IV *		Products do not comply

Note: *) Compliance category based on connection size (valves), net volume (vessels) or safety function (pressure switches).

Capacity changes

Due to the fact of property differences between HFC and HFO/HFO blends, system designer needs to consider the impact during system design and retrofit.

Condensing temperature	30°C						40°C						50°C					
	-40	-30	-20	-10	0	10	-40	-30	-20	-10	0	10	-40	-30	-20	-10	0	10
Evaporating temperature [°C]	Expansion valve and solenoid valve capacity change from R134a/R404A to HFO/HFO-blends																	
R448A versus R404A	42%	41%	40%	40%	41%	44%	50%	47%	45%	44%	43%	44%	63%	58%	55%	52%	50%	49%
R449A versus R404A	40%	43%	44%	42%	36%	25%	37%	42%	44%	45%	43%	36%	29%	34%	39%	41%	42%	39%
R450A versus R134a	-	-5%	-3%	-4%	-8%	-17%	-	-3%	0%	1%	1%	-4%	-	-5%	0%	3%	4%	3%
R513A versus R134a	-	-2%	0%	-1%	-5%	-14%	-	-2%	1%	3%	3%	-2%	-	-7%	-2%	2%	4%	4%
R1234ze versus R134a	-	-24%	-24%	-23%	-22%	-21%	-	-25%	-24%	-23%	-22%	-21%	-	-25%	-24%	-23%	-22%	-21%

Thermo™-Expansion Valves behavior

Standard expansion valves with optimized charges are developed for HFC however the use of these valves will not provide the same performances in term of operating superheat. There are two approaches to match the performance of valve with HFO/HFO blends:

- Readjusting the setting of valve
- New optimized charges

The following tables show TI Thermo™-Expansion Valves designed for HFC but to be used with HFO/HFO blends and required readjusting enabling to use with systems having HFO/HFO blends as refrigerant.

Adjusting stem position	Standard MW (R134a) Charge with refrigerant R1234ze					
	Evaporating temperature [°C]					
	-30	-20	-10	0	5	10
Number of Turn	Operating superheat [K]					
0	0	-0.8	-1.2	-1.5	-1.8	-2
+1	5.5	3.4	1.9	0.5	0.2	-0.2
+2	10	7	4.8	2.5	2.1	1.5
+3	14	10.2	7.2	5	4	3
+4	17.3	13.2	9.7	6.9	6	4.8

Adjusting stem position	Standard MW (R134a) Charge with refrigerant R450A					
	Evaporating temperature [°C]					
	-30	-20	-10	0	5	10
Number of Turn	Operating superheat [K]					
0	3.1	2.7	2.5	2.4	2.4	2.3
+1	8.2	6.4	5.3	4.5	4.2	3.9
+2	12.3	9.7	7.9	6.5	5.9	5.4

Adjusting stem position	Standard MW (R134a) Charge with refrigerant R513A					
	Evaporating temperature [°C]					
	-30	-20	-10	0	5	10
Number of Turn	Operating superheat [K]					
0	9.6	8.97	8.96	9	9.04	9.07
-0.5	6.8	7.3	7.8	8.1	8.2	8.3
-1	4.2	5.6	6.5	7.2	7.4	7.7
-1.5	1.5	3.8	5.2	6.2	6.6	6.9

Adjusting stem position	Standard SW (R404A) charge with refrigerant R448A					
	Evaporating temperature [°C]					
	-30	-20	-10	0	5	10
Number of Turn	Operating superheat [K]					
0	0	-1.4	-0.75	-0.1	0.9	1.4
+1	3	1.65	1.45	1.6	2.18	2.58
+2	6.5	4.3	3.6	3.2	3.4	3.6
+3	10	6.8	5.5	4.7	4.6	4.7

Note 1: number of turns in direction of clockwise as positive number and in direction of counterclockwise as negative number.

Note 2: Desired operating superheat of 6K ± 1.5K.

Note 3: Red cells are indication for low superheat below 4.5 K. Yellow cells are indicating for higher superheat above 7.5 K.

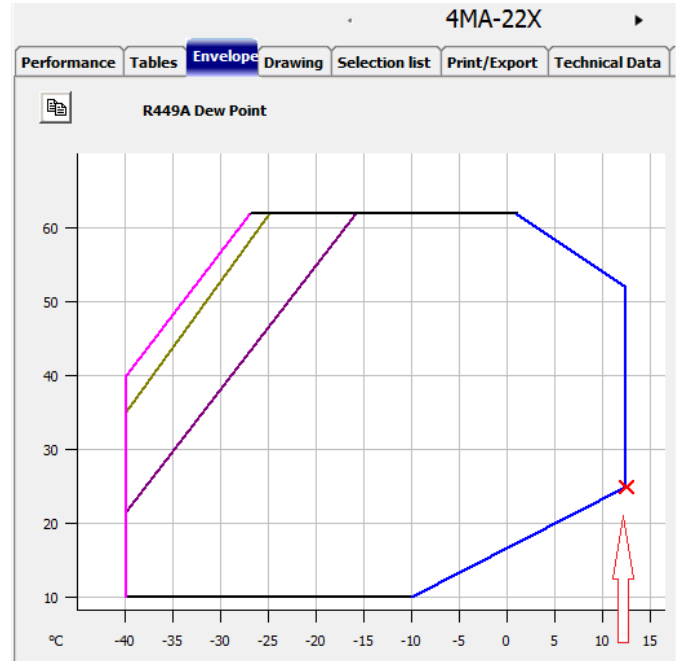
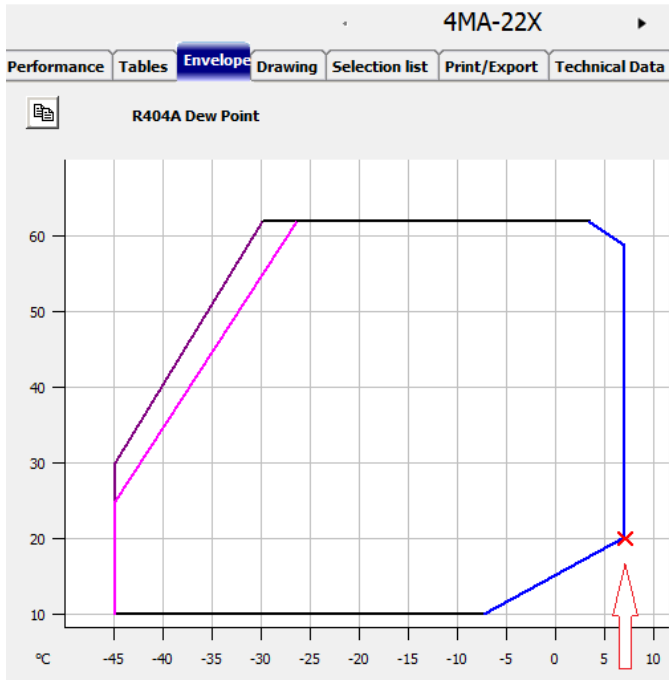
Please see section Thermo™-Expansion Valves for detailed information and guideline for readjustment.

Introduction and General Information

MOP (Maximum operating of suction pressure)

Some of HFO/HFO blends tend with lower saturating pressure at certain evaporating temperature compare to HFC. This fact extends the operating map and it might be need for Thermo™-Expansion Valves with higher MOP limit in order to allow system operation at higher suction pressure. This is advantageous for operation at high load or after defrosts.

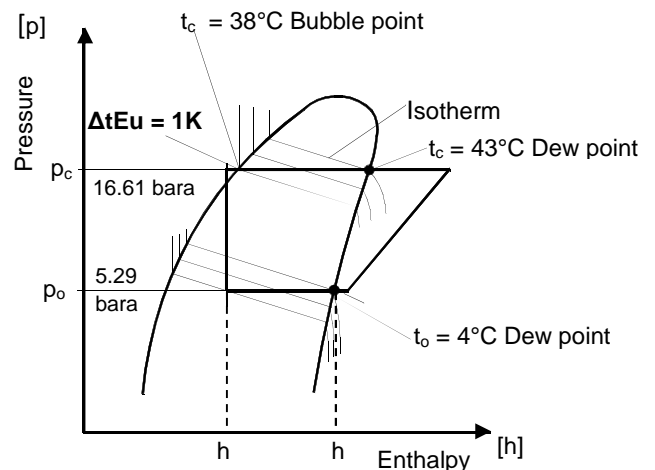
The below example demonstrates operating envelop of identical compressor with R404A and R449A:



Dimensioning of Thermo™-Expansion Valves for systems with refrigerant having temperature glide

As opposed to single substances (e.g. R 134a) where the phase change takes place at a constant temperature/pressure the evaporation and condensation of zeotropic blends are in a "gliding" form (e.g. at a constant pressure the temperature varies within a certain range) through evaporators and condensers. HFO blends R448A and R449A are zeotropic blends.

The condensing /evaporating pressure must be determined at saturated temperatures (bubble for liquid / dew points for vapor) for dimensioning of the expansion valves, solenoid valves etc. The corresponding dew point for liquid pressures is provided in case of compressor selection based on dew point of liquid pressure.



Copeland Scroll and Reciprocating Compressors

Copeland Reciprocating Compressors - Models available with R448A/R449A/R450A/R513A*

The release also applies to reciprocating compressors fitted with capacity control or operated by inverter.

2 Cylinder	3 Cylinder	8 Cylinder	Stream Models		
2DC-50x	3DA-50X	8DH-500X	4M A-22X	4M J-33X	6M I-40X
2DD-50X	3DA-75X	8DL-370X	4M F-13X	4M T-22X	6M M-30X
2DL-40X	3DC-100X	8DJ-600X	4M H-25X	4M K-35X	6M J-45X
2DL-75X	3DC-75X	8DT-450X	4M L-15X	4M U-25X	6M T-35X
2DB-50X	3DS-100X		4M I-30X		6M K-50X
2DB-75X	3DS-150X		4M M-20X		6M U-40X



Digital Models				Demand Cooling**
3DAD-50X	4MAD-22X	4MJD-33X	6MID-40X	4MF-13X DC
3DAD-75X	4MFD-13X	4MTD-22X	6MMD-30X	4ML-15X DC
3DCD-100X	4MHD-25X	4MKD-35X	6MJD-45X	4MM-20X DC
3DCD-75X	4MLD-15X	4MUD-25X	6MTD-35X	4MT-22X DC
3DSD-100X	4MID-30x		6MKD-50X	4MU-25X DC
3DSD-150X	4MMD-20X		6MUD-40X	6MM-30X DC
				6MT-35X DC
				6MU-40X DC

Note: *) Only released for standard 4 and 6 Cylinder Stream models – Please contact Emerson for further support; **) Demand cooling applicable only with R448A/R449A

Copeland Scroll Models available with R448A/R449A

Low Temperature Models			Medium Temperature Models		
ZF Models	ZF Vapor Injection and Digital Models	ZS*KA	ZB Models	Summit	ZB Digital
ZF06K4E	ZF13KVE	ZS09KAE	ZB15KCE	ZB66K5E	ZBD21KCE
ZF08K4E	ZFD13KVE	ZS11KAE	ZB19KCE	ZB76K5E	ZBD29KCE
ZF09K4E	ZF18KVE	ZS13KAE	ZB21KCE	ZB95K5E	ZBD38KCE
ZF11K4E	ZFD18KVE		ZB26KCE	ZB114K5E	ZBD45KCE
ZF13K4E	ZFD25KVE		ZB29KCE	ZB66KCE	ZBD57KCE
ZF15K4E	ZF25K5E		ZB28KCE	ZB76KCE	ZBD76KCE
ZF18K4E	ZF34K5E		ZB42KCE	ZB95KCE	
ZF25K5E	ZF42K5E		ZB45KCE	ZB114KCE	
ZF34K5E	ZF49K5E		ZB48KCE	ZB220KCE	
ZF41K5E			ZB57KCE		
ZF49K5E					



Copeland Scroll Models available with 450A/513A

ZB Models	Summit	ZB Digital
ZB15KCE	ZB66K5E	ZBD21KCE
ZB19KCE	ZB76K5E	ZBD29KCE
ZB21KCE	ZB95K5E	ZBD38KCE
ZB26KCE	ZB114K5E	ZBD45KCE
ZB29KCE	ZB66KCE	ZBD57KCE
ZB28KCE	ZB76KCE	ZBD76KCE
ZB42KCE	ZB95KCE	
ZB45KCE	ZB114KCE	
ZB48KCE	ZB220KCE	
ZB57KCE		

Note: All the detailed compressor performance data and envelopes for R448A/R449A, R450A and R513A are now available with the release of new select version 7.11 available [online](#).

EX2 Pulse Modulated Electronic Expansion Valve

EX2 Series is an electronically controlled expansion device. The capacity is defined through pulse width modulation. The primary application is for display cases and small cold rooms in commercial refrigeration such as supermarkets.

Features

- Pulse width modulated
- Utilizing standard coils ASC3-24VAC/ 50 Hz or ASC3-230VAC/ 50 Hz (to be ordered separately)
- Shut off function eliminates the necessity of a separate solenoid valve
- Dampened plunger reduces noise and effects of water hammer
- One valve body can be combined with 6 orifices to make 7 capacity ranges, up to 17.2 kW (R 448A)
- Available with ODF connections
- Long lifetime, high reliability



EX2 with ASC3

Selection table

Type	Part No.	Description	Capacity Q_n at 100% Open Valve [kW]*				
			R448A	R449A	R450A	R513A	R1234ze
EX2-M00	801091	Valve less orifice 10 mm x 12 mm	17.2	16.8	11.7	12.0	10.4
EX2-I00	801090	Valve less orifice 3/8"x / 1/2"					
EXO-004	801089	Orifice 4	10.9	10.6	7.4	7.6	6.6
EXO-003	801088	Orifice 3	7.2	7.0	4.9	5.0	4.4
EXO-002	801087	Orifice 2	4.3	4.2	2.9	3.0	2.6
EXO-001	801086	Orifice 1	3.2	3.1	2.2	2.2	1.9
EXO-000	801085	Orifice 0	1.6	1.6	1.1	1.1	1.0
EXO-00X	801084	Orifice X	0.9	0.9	0.6	0.6	0.5
ASC3-24V	801079	Coil ASC3 24 VAC / 50 Hz					
ASC3-230V	801077	Coil ASC3-230VAC / 50 HZ					

Note: *) Orifice should be selected at maximum 80% of Q_n to allow covering the load fluctuation.

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

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

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R448A, R449A	+4°C dew point	+38°C bubble / +43°C dew point	1K
R450A		+38°C bubble / +38.6°C dew point	
R513A, R1234ze		+38°C bubble / +38°C dew point	

For selection of other operating condition, please use quick selection tables on the next pages or Controls Navigator selection program.

EX2 Pulse Modulated Electronic Expansion Valve

EX2: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A													Valve/ orifice type
	Capacity [kW]													
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60 bubble/ 63.4 dew point	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.56	0.56	0.56	EXO-00X
	1.20	1.20	1.20	1.20	1.20	1.20	1.12	1.12	1.12	1.04	1.04	1.04	0.96	EXO-000
	2.32	2.32	2.40	2.40	2.32	2.32	2.32	2.24	2.24	2.16	2.08	2.00	2.00	EXO-001
	3.12	3.20	3.20	3.20	3.12	3.12	3.12	3.04	2.96	2.88	2.80	2.72	2.64	EXO-002
	5.28	5.28	5.36	5.28	5.28	5.20	5.12	5.04	4.96	4.88	4.72	4.56	4.48	EXO-003
	7.92	8.00	8.08	8.08	8.00	7.92	7.84	7.68	7.52	7.36	7.12	6.96	6.72	EXO-004
	12.56	12.64	12.72	12.72	12.64	12.48	12.32	12.08	11.84	11.60	11.28	10.96	10.64	EX2-M/I
50 bubble/ 54 dew point	0.64	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.64	0.64	0.64	0.64	EXO-00X
	1.20	1.20	1.20	1.28	1.28	1.28	1.28	1.20	1.20	1.20	1.20	1.12	1.12	EXO-000
	2.40	2.40	2.48	2.48	2.48	2.48	2.48	2.48	2.40	2.40	2.32	2.32	2.24	EXO-001
	3.20	3.28	3.28	3.36	3.36	3.36	3.36	3.28	3.28	3.20	3.12	3.12	3.04	EXO-002
	5.36	5.44	5.52	5.60	5.60	5.60	5.60	5.52	5.44	5.36	5.28	5.20	5.04	EXO-003
	8.08	8.24	8.40	8.48	8.56	8.48	8.48	8.40	8.24	8.16	8.00	7.84	7.60	EXO-004
	12.72	13.04	13.28	13.36	13.44	13.44	13.36	13.20	13.04	12.80	12.56	12.32	12.00	EX2-M/I
40 bubble/ 44.5 dew point	0.64	0.64	0.64	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.64	0.64	EXO-00X
	1.12	1.20	1.20	1.20	1.28	1.28	1.28	1.28	1.28	1.28	1.20	1.20	1.20	EXO-000
	2.24	2.32	2.40	2.48	2.48	2.56	2.56	2.56	2.48	2.48	2.48	2.40	2.40	EXO-001
	2.96	3.12	3.20	3.28	3.36	3.36	3.36	3.36	3.36	3.36	3.28	3.28	3.20	EXO-002
	4.96	5.20	5.44	5.52	5.60	5.68	5.68	5.68	5.68	5.60	5.52	5.44	5.36	EXO-003
	7.52	7.92	8.16	8.40	8.48	8.56	8.64	8.56	8.56	8.48	8.32	8.24	8.08	EXO-004
	11.92	12.48	12.88	13.20	13.44	13.52	13.60	13.60	13.44	13.36	13.20	12.96	12.72	EX2-M/I
30 bubble/ 34.5 dew point	0.48	0.56	0.64	0.64	0.64	0.64	0.72	0.72	0.72	0.72	0.72	0.72	0.64	EXO-00X
	0.96	1.04	1.12	1.12	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	EXO-000
	1.84	2.00	2.16	2.32	2.32	2.40	2.48	2.48	2.48	2.48	2.48	2.40	2.40	EXO-001
	2.48	2.72	2.96	3.04	3.20	3.28	3.28	3.28	3.28	3.28	3.28	3.28	3.20	EXO-002
	4.16	4.56	4.88	5.12	5.28	5.44	5.52	5.52	5.52	5.52	5.52	5.44	5.36	EXO-003
	6.32	6.96	7.44	7.76	8.00	8.24	8.32	8.40	8.40	8.40	8.32	8.24	8.16	EXO-004
	9.92	10.96	11.68	12.24	12.64	12.96	13.12	13.28	13.28	13.28	13.12	13.04	12.88	EX2-M/I
20 bubble/ 25.3 dew point		0.40	0.48	0.56	0.56	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	EXO-00X
		0.72	0.88	0.96	1.04	1.12	1.12	1.12	1.20	1.20	1.20	1.20	1.12	EXO-000
		1.52	1.76	1.92	2.08	2.16	2.24	2.32	2.32	2.32	2.32	2.32	2.32	EXO-001
		2.00	2.32	2.56	2.80	2.88	3.04	3.12	3.12	3.12	3.12	3.12	3.12	EXO-002
		3.36	3.92	4.32	4.64	4.88	5.04	5.12	5.20	5.28	5.28	5.28	5.20	EXO-003
		5.12	5.92	6.56	7.04	7.36	7.68	7.84	7.92	8.00	8.00	7.92	7.92	EXO-004
		8.00	9.44	10.40	11.12	11.68	12.08	12.32	12.48	12.56	12.56	12.56	12.48	EX2-M/I
10 bubble/ 15.5 dew point				0.40	0.48	0.48	0.56	0.56	0.56	0.56	0.64	0.64	0.64	EXO-00X
				0.64	0.80	0.88	0.96	1.04	1.04	1.04	1.04	1.04	1.04	EXO-000
				1.36	1.60	1.76	1.92	2.00	2.08	2.08	2.16	2.16	2.16	EXO-001
				1.76	2.16	2.40	2.56	2.72	2.80	2.80	2.88	2.88	2.88	EXO-002
				3.04	3.60	4.00	4.32	4.48	4.64	4.72	4.80	4.88	4.88	EXO-003
				4.56	5.44	6.08	6.48	6.80	7.04	7.20	7.28	7.36	7.36	EXO-004
				7.20	8.56	9.52	10.24	10.72	11.12	11.36	11.52	11.60	11.60	EX2-M/I
0 bubble/ 5.7 dew point						0.32	0.40	0.40	0.48	0.48	0.48	0.56	0.56	EXO-00X
						0.56	0.72	0.80	0.88	0.88	0.88	0.96	0.96	EXO-000
						1.12	1.36	1.52	1.68	1.76	1.84	1.84	1.92	EXO-001
						1.52	1.84	2.08	2.24	2.40	2.48	2.56	2.56	EXO-002
						2.48	3.12	3.52	3.76	4.00	4.16	4.24	4.24	EXO-003
						3.76	4.72	5.28	5.76	6.00	6.24	6.40	6.48	EXO-004
						6.00	7.36	8.40	9.04	9.52	9.84	10.08	10.24	EX2-M/I

EX2 Pulse Modulated Electronic Expansion Valve

EX2: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A Capacity [kW]													Valve/ orifice type
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	0.49	0.49	0.49	0.49	0.48	0.47	0.46	0.45	0.44	0.42	0.41	0.40	0.38	EXO-00X
	0.86	0.87	0.87	0.86	0.85	0.84	0.82	0.80	0.78	0.76	0.73	0.70	0.67	EXO-000
	1.73	1.74	1.74	1.73	1.71	1.68	1.64	1.60	1.56	1.51	1.46	1.41	1.35	EXO-001
	2.32	2.34	2.34	2.32	2.29	2.26	2.21	2.15	2.09	2.03	1.96	1.89	1.81	EXO-002
	3.89	3.92	3.91	3.89	3.84	3.78	3.70	3.61	3.51	3.40	3.28	3.16	3.04	EXO-003
	5.89	5.93	5.92	5.88	5.81	5.72	5.60	5.46	5.31	5.14	4.97	4.79	4.60	EXO-004
	9.30	9.36	9.35	9.28	9.17	9.02	8.83	8.62	8.38	8.12	7.84	7.55	7.25	EX2-M/I
50	0.45	0.47	0.47	0.48	0.48	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	EXO-00X
	0.81	0.83	0.84	0.85	0.85	0.85	0.84	0.82	0.81	0.79	0.77	0.75	0.72	EXO-000
	1.62	1.66	1.69	1.70	1.70	1.69	1.67	1.65	1.62	1.58	1.54	1.49	1.45	EXO-001
	2.17	2.23	2.27	2.29	2.29	2.27	2.25	2.21	2.17	2.12	2.07	2.01	1.95	EXO-002
	3.64	3.74	3.80	3.83	3.83	3.80	3.76	3.71	3.63	3.55	3.46	3.36	3.26	EXO-003
	5.51	5.66	5.75	5.79	5.79	5.76	5.70	5.61	5.50	5.38	5.24	5.09	4.93	EXO-004
	8.69	8.93	9.08	9.14	9.14	9.09	8.99	8.85	8.68	8.48	8.27	8.03	7.78	EX2-M/I
40	0.38	0.41	0.43	0.44	0.45	0.45	0.45	0.45	0.45	0.44	0.43	0.42	0.41	EXO-00X
	0.68	0.73	0.76	0.79	0.80	0.81	0.81	0.80	0.80	0.78	0.77	0.75	0.74	EXO-000
	1.37	1.46	1.53	1.57	1.60	1.61	1.62	1.61	1.59	1.57	1.54	1.51	1.47	EXO-001
	1.83	1.96	2.05	2.12	2.15	2.17	2.17	2.16	2.14	2.11	2.07	2.02	1.98	EXO-002
	3.07	3.29	3.44	3.54	3.60	3.63	3.63	3.62	3.58	3.53	3.46	3.39	3.31	EXO-003
	4.65	4.98	5.21	5.36	5.45	5.50	5.50	5.47	5.42	5.34	5.24	5.13	5.01	EXO-004
	7.34	7.86	8.22	8.46	8.61	8.68	8.68	8.64	8.55	8.43	8.27	8.10	7.90	EX2-M/I
30	0.25	0.31	0.35	0.37	0.39	0.41	0.41	0.42	0.42	0.42	0.41	0.41	0.40	EXO-00X
	0.44	0.55	0.62	0.66	0.70	0.72	0.74	0.74	0.74	0.74	0.73	0.72	0.71	EXO-000
	0.88	1.09	1.23	1.33	1.40	1.44	1.47	1.48	1.49	1.48	1.47	1.45	1.42	EXO-001
	1.19	1.47	1.65	1.79	1.88	1.94	1.98	1.99	2.00	1.99	1.97	1.94	1.91	EXO-002
	1.98	2.45	2.77	2.99	3.14	3.25	3.31	3.34	3.34	3.33	3.30	3.25	3.20	EXO-003
	3.00	3.72	4.19	4.53	4.76	4.91	5.01	5.05	5.06	5.04	4.99	4.93	4.84	EXO-004
	4.74	5.86	6.62	7.14	7.51	7.75	7.90	7.98	7.99	7.95	7.88	7.77	7.64	EX2-M/I
20			0.19	0.25	0.30	0.32	0.34	0.36	0.36	0.37	0.37	0.37	0.37	EXO-00X
			0.33	0.45	0.52	0.58	0.61	0.63	0.65	0.66	0.66	0.66	0.65	EXO-000
			0.66	0.90	1.05	1.15	1.22	1.27	1.30	1.31	1.32	1.31	1.30	EXO-001
			0.89	1.21	1.41	1.55	1.64	1.70	1.74	1.76	1.77	1.76	1.75	EXO-002
			1.49	2.02	2.36	2.59	2.75	2.85	2.92	2.95	2.96	2.95	2.92	EXO-003
			2.25	3.06	3.57	3.92	4.16	4.32	4.41	4.46	4.48	4.46	4.43	EXO-004
			3.56	4.83	5.64	6.18	6.56	6.81	6.96	7.05	7.07	7.05	6.99	EX2-M/I
10					0.07	0.18	0.23	0.26	0.28	0.29	0.30	0.31	0.31	EXO-00X
					0.13	0.31	0.40	0.46	0.50	0.52	0.54	0.55	0.55	EXO-000
					0.25	0.62	0.80	0.92	0.99	1.04	1.07	1.09	1.10	EXO-001
					0.34	0.84	1.08	1.23	1.33	1.40	1.44	1.47	1.48	EXO-002
					0.57	1.40	1.80	2.06	2.23	2.34	2.41	2.45	2.47	EXO-003
					0.87	2.12	2.73	3.12	3.38	3.55	3.65	3.71	3.74	EXO-004
					1.37	3.35	4.31	4.92	5.33	5.60	5.77	5.86	5.90	EX2-M/I

EX2 Pulse Modulated Electronic Expansion Valve

EX2: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A													Valve/ orifice type
	Capacity [kW]													
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	0.48	0.48	0.48	0.48	0.47	0.46	0.45	0.43	0.42	0.40	0.39	0.37	0.35	EXO-00X
	0.86	0.86	0.86	0.85	0.83	0.81	0.79	0.77	0.74	0.72	0.69	0.66	0.62	EXO-000
	1.71	1.72	1.71	1.69	1.66	1.63	1.59	1.54	1.49	1.43	1.37	1.31	1.25	EXO-001
	2.30	2.31	2.30	2.27	2.24	2.19	2.13	2.07	2.00	1.92	1.84	1.76	1.68	EXO-002
	3.86	3.87	3.85	3.81	3.75	3.67	3.57	3.46	3.35	3.22	3.09	2.95	2.81	EXO-003
	5.84	5.86	5.83	5.77	5.67	5.55	5.41	5.24	5.06	4.87	4.67	4.46	4.25	EXO-004
	9.21	9.24	9.20	9.10	8.95	8.76	8.53	8.27	7.99	7.69	7.37	7.04	6.70	EX2-M/I
50	0.46	0.48	0.48	0.49	0.48	0.48	0.47	0.46	0.45	0.44	0.43	0.41	0.40	EXO-00X
	0.83	0.85	0.86	0.86	0.86	0.85	0.84	0.82	0.81	0.78	0.76	0.73	0.71	EXO-000
	1.65	1.69	1.72	1.73	1.72	1.70	1.68	1.65	1.61	1.57	1.52	1.47	1.42	EXO-001
	2.22	2.28	2.31	2.32	2.31	2.29	2.26	2.22	2.16	2.11	2.04	1.97	1.90	EXO-002
	3.72	3.81	3.87	3.88	3.87	3.84	3.78	3.71	3.62	3.53	3.42	3.31	3.19	EXO-003
	5.63	5.77	5.85	5.88	5.86	5.81	5.72	5.62	5.49	5.34	5.18	5.01	4.82	EXO-004
	8.88	9.11	9.23	9.27	9.25	9.16	9.03	8.86	8.66	8.42	8.17	7.90	7.61	EX2-M/I
40	0.40	0.43	0.45	0.46	0.47	0.47	0.47	0.47	0.46	0.45	0.44	0.43	0.42	EXO-00X
	0.72	0.76	0.80	0.82	0.83	0.84	0.83	0.83	0.82	0.80	0.79	0.77	0.75	EXO-000
	1.43	1.53	1.60	1.64	1.66	1.67	1.67	1.66	1.64	1.61	1.57	1.54	1.49	EXO-001
	1.92	2.05	2.14	2.20	2.23	2.25	2.24	2.23	2.20	2.16	2.11	2.06	2.01	EXO-002
	3.22	3.44	3.59	3.69	3.74	3.76	3.76	3.73	3.68	3.62	3.54	3.45	3.36	EXO-003
	4.88	5.21	5.43	5.58	5.67	5.70	5.69	5.64	5.57	5.48	5.36	5.23	5.09	EXO-004
	7.70	8.22	8.58	8.81	8.94	8.99	8.98	8.91	8.79	8.64	8.46	8.25	8.03	EX2-M/I
30	0.27	0.33	0.37	0.40	0.42	0.43	0.44	0.44	0.44	0.44	0.43	0.43	0.42	EXO-00X
	0.49	0.59	0.66	0.71	0.74	0.77	0.78	0.78	0.78	0.78	0.77	0.76	0.74	EXO-000
	0.97	1.18	1.32	1.42	1.49	1.53	1.56	1.57	1.57	1.56	1.54	1.52	1.49	EXO-001
	1.31	1.59	1.78	1.91	2.00	2.06	2.09	2.11	2.11	2.09	2.07	2.04	2.00	EXO-002
	2.19	2.66	2.98	3.20	3.35	3.45	3.51	3.53	3.53	3.51	3.46	3.41	3.34	EXO-003
	3.31	4.02	4.51	4.84	5.07	5.22	5.31	5.34	5.34	5.31	5.25	5.16	5.06	EXO-004
	5.22	6.35	7.11	7.64	8.00	8.24	8.37	8.43	8.43	8.37	8.28	8.15	7.99	EX2-M/I
20		0.09	0.22	0.29	0.33	0.36	0.38	0.39	0.40	0.40	0.40	0.40	0.39	EXO-00X
		0.16	0.39	0.51	0.58	0.63	0.67	0.69	0.70	0.71	0.71	0.71	0.70	EXO-000
		0.33	0.79	1.02	1.17	1.27	1.34	1.38	1.41	1.42	1.42	1.41	1.40	EXO-001
		0.44	1.06	1.37	1.57	1.70	1.79	1.86	1.89	1.91	1.91	1.90	1.88	EXO-002
		0.74	1.78	2.29	2.62	2.85	3.00	3.11	3.17	3.20	3.20	3.18	3.15	EXO-003
		1.12	2.69	3.47	3.97	4.32	4.55	4.70	4.79	4.84	4.84	4.82	4.76	EXO-004
		1.77	4.25	5.47	6.27	6.81	7.18	7.42	7.56	7.63	7.64	7.60	7.52	EX2-M/I
10					0.14	0.22	0.27	0.30	0.32	0.33	0.34	0.34	0.35	EXO-00X
					0.26	0.40	0.48	0.53	0.57	0.59	0.61	0.61	0.62	EXO-000
					0.51	0.79	0.96	1.06	1.14	1.18	1.21	1.23	1.23	EXO-001
					0.69	1.07	1.28	1.43	1.53	1.59	1.63	1.65	1.65	EXO-002
					1.15	1.78	2.15	2.39	2.55	2.66	2.73	2.76	2.77	EXO-003
					1.75	2.70	3.26	3.62	3.87	4.03	4.13	4.18	4.19	EXO-004
					2.76	4.26	5.14	5.72	6.10	6.36	6.51	6.59	6.61	EX2-M/I

EX2 Pulse Modulated Electronic Expansion Valve

EX2: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze													Valve/ orifice type
	Capacity [kW]													
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	0.43	0.43	0.43	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.35	0.34	0.32	EXO-00X
	0.77	0.77	0.77	0.76	0.75	0.74	0.72	0.70	0.68	0.65	0.63	0.60	0.58	EXO-000
	1.53	1.54	1.54	1.52	1.50	1.47	1.44	1.40	1.35	1.31	1.26	1.21	1.15	EXO-001
	2.06	2.07	2.06	2.05	2.02	1.98	1.93	1.88	1.82	1.76	1.69	1.62	1.55	EXO-002
	3.45	3.47	3.46	3.43	3.38	3.31	3.23	3.15	3.05	2.94	2.83	2.71	2.60	EXO-003
	5.22	5.25	5.23	5.19	5.11	5.01	4.90	4.76	4.61	4.45	4.29	4.11	3.93	EXO-004
	8.24	8.28	8.26	8.18	8.07	7.91	7.73	7.51	7.28	7.03	6.76	6.49	6.20	EX2-M/I
50	0.40	0.41	0.42	0.42	0.42	0.41	0.41	0.40	0.39	0.38	0.37	0.36	0.35	EXO-00X
	0.71	0.73	0.74	0.74	0.74	0.74	0.73	0.71	0.70	0.68	0.66	0.64	0.62	EXO-000
	1.41	1.45	1.48	1.49	1.48	1.47	1.45	1.43	1.40	1.36	1.32	1.28	1.24	EXO-001
	1.90	1.95	1.98	2.00	1.99	1.98	1.95	1.92	1.88	1.83	1.78	1.72	1.66	EXO-002
	3.18	3.27	3.32	3.34	3.34	3.31	3.27	3.21	3.14	3.06	2.98	2.88	2.78	EXO-003
	4.81	4.95	5.03	5.06	5.06	5.02	4.95	4.87	4.76	4.64	4.51	4.36	4.21	EXO-004
	7.60	7.81	7.94	7.99	7.98	7.92	7.82	7.68	7.51	7.32	7.11	6.89	6.65	EX2-M/I
40	0.33	0.35	0.37	0.38	0.39	0.39	0.39	0.39	0.38	0.38	0.37	0.36	0.35	EXO-00X
	0.58	0.63	0.66	0.68	0.69	0.70	0.70	0.69	0.68	0.67	0.66	0.64	0.63	EXO-000
	1.16	1.25	1.31	1.36	1.38	1.39	1.39	1.38	1.37	1.34	1.32	1.29	1.25	EXO-001
	1.56	1.68	1.77	1.82	1.86	1.87	1.87	1.86	1.84	1.81	1.77	1.73	1.68	EXO-002
	2.61	2.82	2.96	3.05	3.11	3.13	3.13	3.11	3.08	3.03	2.96	2.89	2.82	EXO-003
	3.95	4.26	4.48	4.62	4.70	4.74	4.74	4.71	4.66	4.58	4.49	4.38	4.26	EXO-004
	6.23	6.73	7.07	7.29	7.42	7.48	7.48	7.43	7.35	7.23	7.08	6.91	6.73	EX2-M/I
30	0.18	0.25	0.29	0.31	0.33	0.34	0.35	0.35	0.35	0.35	0.35	0.34	0.34	EXO-00X
	0.33	0.44	0.51	0.56	0.59	0.61	0.62	0.63	0.63	0.63	0.62	0.61	0.60	EXO-000
	0.65	0.88	1.02	1.11	1.18	1.22	1.25	1.26	1.26	1.26	1.24	1.22	1.20	EXO-001
	0.88	1.18	1.37	1.49	1.58	1.64	1.68	1.69	1.70	1.69	1.67	1.64	1.61	EXO-002
	1.47	1.97	2.29	2.50	2.65	2.75	2.81	2.83	2.84	2.83	2.80	2.75	2.70	EXO-003
	2.23	2.98	3.46	3.79	4.01	4.16	4.25	4.29	4.30	4.28	4.23	4.17	4.09	EXO-004
	3.51	4.71	5.46	5.98	6.33	6.56	6.70	6.77	6.78	6.75	6.68	6.58	6.45	EX2-M/I
20			0.10	0.19	0.23	0.26	0.28	0.29	0.30	0.31	0.31	0.31	0.30	EXO-00X
			0.18	0.33	0.41	0.46	0.50	0.52	0.54	0.54	0.55	0.54	0.54	EXO-000
			0.37	0.66	0.82	0.93	1.00	1.04	1.07	1.09	1.09	1.09	1.08	EXO-001
			0.50	0.89	1.11	1.25	1.34	1.40	1.44	1.46	1.47	1.46	1.45	EXO-002
			0.83	1.49	1.85	2.09	2.25	2.35	2.41	2.45	2.46	2.45	2.43	EXO-003
			1.26	2.26	2.81	3.16	3.40	3.56	3.66	3.71	3.72	3.71	3.68	EXO-004
1015					0.15	0.20	0.23	0.25	0.26	0.27	0.28	0.28	0.28	EXO-00X
					0.26	0.35	0.41	0.44	0.47	0.48	0.49	0.50	0.50	EXO-000
					0.52	0.70	0.81	0.89	0.94	0.97	0.99	0.99	0.99	EXO-001
					0.70	0.94	1.09	1.19	1.26	1.30	1.32	1.33	1.33	EXO-002
					1.17	1.58	1.83	2.00	2.11	2.18	2.22	2.23	2.23	EXO-003
					1.76	2.39	2.77	3.03	3.20	3.30	3.36	3.38	3.38	EXO-004
				2.78	3.77	4.38	4.78	5.04	5.21	5.30	5.34	5.33	EX2-M/I	

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

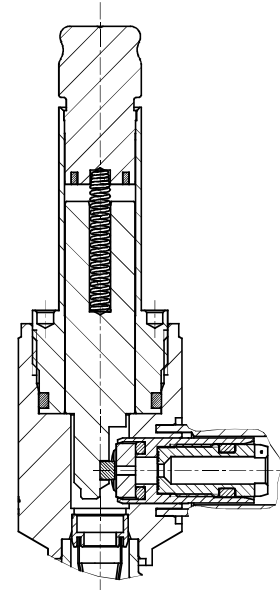
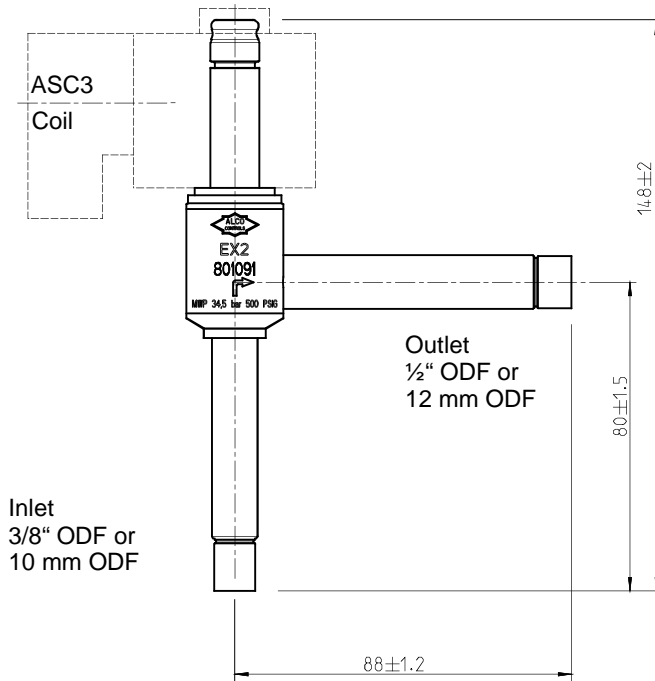
EX2 Pulse Modulated Electronic Expansion Valve

Technical data

MOPD (maximum operating pressure differential)	30 bar
Medium Temperature	-40...+50°C
Maximum Working Pressure PS	40 bar
Test Pressure PT	44 bar

Lifetime with EC2 (pulse cycle time 6 sec)	80 Million cycles life equivalent to 15 yr.
Seat leakage	< 4cc/min. Nitrogen with 10 bar differential pressure
Weight	0.25 kg

Dimensions [mm]



EX2 cross sectional view
(not to scale)

Electrical Control Valves EX4-8

EMERSON EX4-8 are stepper motor driven valves for precise control of refrigerant mass flow in air conditioning, refrigeration, heat pumps, close control and industrial process cooling applications. The Electrical Control Valves can be used as thermo-expansion duty, liquid injection duty, hot gas bypass, evaporator pressure regulator, crankcase pressure regulator, head pressure regulator or liquid level control.

Features

- Multifunction as expansion valves, hot gas bypass, suction gas throttling, head pressure, liquid level actuator etc.
- Fully hermetic design
- Stepper motor driven
- Short opening and closing time
- Very fast full stroke time
- High resolution and excellent repeatability
- Bi-flow versions with positive shut-off in both flow directions
- Positive shut-off function to eliminate the use of an additional solenoid valve
- Linear flow capacity
- Extremely wide capacity range (5...100%)
- Continuous modulation of mass flow, no stress (liquid hammering) in the refrigeration circuit
- Direct coupling of motor and valve for high reliability (no gear mechanism)
- Ceramic slide and port for accurate flow and minimal wear
- Balanced force design
- Corrosion resistant stainless steel body and connections
- Patented design




Selection table

Type	Part No.	Flow pattern	Nominal capacity range [kW]	Inlet connection	Outlet connection	Electrical connector
EX4-I21	800615	Uni-flow	5...100%	3/8" ODF	5/8" ODF	M12 plug
EX4-M21	800616			10 mm ODF	16 mm ODF	
EX5-U21	800618			5/8" (16 mm) ODF	7/8" (22 mm) ODF	
EX6-I21	800620			7/8" ODF	1-1/8" ODF	
EX6-M21	800621			22 mm ODF	28 mm ODF	
EX7-I21	800624			1-1/8" ODF	1-3/8" ODF	
EX7-M21	800625			28 mm ODF	35 mm ODF	
EX8-M21	800629			42 mm ODF	42 mm ODF	
EX8-U21	800630			1-3/8" (35 mm) ODF	1-3/8" (35 mm) ODF	
EX8-I21	800631			1-5/8" ODF	1-5/8" ODF	
EX4-U31	800617	Bi-flow (Heat pump)		5/8" (16 mm) ODF	5/8" (16 mm) ODF	
EX5-U31	800619			7/8" (22 mm) ODF	7/8" (22 mm) ODF	
EX6-I31	800622			1-1/8" ODF	1-1/8" ODF	
EX6-M31	800623			28 mm ODF	28 mm ODF	
EX7-U31	800626			1-3/8" (35 mm) ODF	1-3/8" (35 mm) ODF	

Note: The valves are delivered without cable/connector assembly (order separately).

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Cable and connector assembly

Type	Part No.	Temperature Range	Length	Connector type to valve	Connector type to driver board or controller	Illustration
EXV-M15	804663	-50...+80°C	1.5 m	M12	Loose wires	
EXV-M30	804664		3.0 m			
EXV-M60	804665		6.0 m			

Electrical Control Valves EX4-8

Nominal capacities...

... as expansion valves and liquid injection valves [kW] (5% ... 100%)

Valve type	R448A	R449A	R450A	R513A	R1234ze
EX4	16.5	16.1	11.3	11.5	10.0
EX5	50	49	34	35	30
EX6	120	117	82	84	73
EX7	329	321	225	230	199
EX8	877	857	600	614	532

Note 1: EX Bi-flow versions have identical capacity in both flow directions.

...as hot gas bypass regulator [kW]

Valve type	Kv [m ³ /h]	R448A	R449A	R450A	R513A	R1234ze
EX4	0.21	5.7	5.6	3.0	3.3	2.6
EX5	0.68	18.6	18.3	9.7	10.8	8.3
EX6	1.57	43.2	42.5	22.6	25.2	19.3
EX7	5.58	153.5	151.2	80.2	89.4	68.7
EX8	16.95	466.3	459.2	243.7	271.7	208.7

... as suction pressure regulator (evaporator or crankcase), [kW]

Valve type	Kv [m ³ /h]	R448A	R449A	R450A	R513A	R1234ze
EX6	1.57	3.9	3.8	2.8	3.0	2.5
EX7	5.58	13.8	13.6	9.9	10.6	9.0
EX8	16.95	42.0	41.4	30.1	32.2	27.4

... as condensing pressure regulator and liquid duty, [kW]

Valve type	Kv [m ³ /h]	R448A	R449A	R450A	R513A	R1234ze
EX4	0.21	5.4	5.2	5.3	5.1	5.1
EX5	0.68	17.4	17.0	17.2	16.5	16.6
EX6	1.57	40.4	39.6	40.1	38.3	38.7
EX7	5.58	143	140	142	136	137
EX8	16.95	430	422	428	408	413

... for hot gas flow such as heat reclaim application, [kW]

Valve type	Kv [m ³ /h]	R448A	R449A	R450A	R513A	R1234ze
EX6	1.57	9.9	11.8	11.6	8.5	8.8
EX7	5.58	35.4	41.8	41.2	30.1	31.2
EX8	16.95	106.7	126.9	125.2	91.4	94.9

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling	Pressure Drop (For suction duty)	Pressure drop (For liquid duty)	Pressure drop (For hot gas flow duty)	Isentropic efficiency (For hot gas flow duty)
R513A, R1234ze	+4°C dew point	+38°C bubble/ +38°C dew point	1K	0.15 bar	0.35 bar	0.5 bar	80%
R450A		+38°C bubble/ +38.6°C dew point					
R448A, R449A		+38°C bubble/ +42.6°C dew point					

For selection of other operating condition, please use quick selection tables in the next pages or Controls Navigator selection program.

Electrical Control Valves EX4-8

EX4-8: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A													Valve type
	Capacity [kW]													
	Evaporating temperature [°C]													
	10	5	0	-5	-10	-15	-20	-25	-30	-40	-50	-60	-70	
60 bubble/ 63.4 dew point	15.2	15.2	15.2	15.1	15.0	14.8	14.5	14.2	13.9	13.1	12.3	11.4	10.4	EX4
	46	46	46	46	45	45	44	43	42	40	37	35	32	EX5
	110	111	111	110	109	107	106	103	101	96	89	83	76	EX6
	304	305	305	303	300	296	291	285	278	263	246	228	209	EX7
	810	813	812	807	799	788	775	759	741	701	656	607	557	EX8
50 bubble/ 54 dew point	15.7	15.9	16.1	16.1	16.1	16.0	15.9	15.6	15.4	14.8	14.1	13.2	12.4	EX4
	47	48	49	49	49	49	48	47	47	45	43	40	38	EX5
	114	116	117	117	117	116	115	114	112	108	102	96	90	EX6
	313	318	321	322	322	320	317	313	308	296	281	265	248	EX7
	835	849	857	860	859	854	846	835	821	788	750	707	661	EX8
40 bubble/ 44.5 dew point	15.0	15.5	15.9	16.1	16.2	16.3	16.3	16.2	16.0	15.6	15.0	14.3	13.5	EX4
	45	47	48	49	49	49	49	49	49	47	45	43	41	EX5
	109	113	115	117	118	118	118	118	116	113	109	104	98	EX6
	299	310	317	322	325	326	325	323	320	311	299	285	270	EX7
	798	826	846	859	866	869	867	862	854	830	798	761	721	EX8
30 bubble/ 34.9 dew point	13.1	14.0	14.7	15.2	15.5	15.8	15.9	15.9	15.9	15.6	15.2	14.6	14.0	EX4
	40	42	45	46	47	48	48	48	48	47	46	44	42	EX5
	95	102	107	111	113	115	116	116	115	114	110	106	102	EX6
	262	280	294	304	311	315	318	318	318	312	304	292	280	EX7
	699	748	784	810	829	841	847	849	847	833	810	780	746	EX8
20 bubble/ 25.3 dew point	9.6	11.3	12.5	13.3	14.0	14.5	14.8	15.0	15.1	15.1	14.8	14.4	13.9	EX4
	29	34	38	40	42	44	45	45	46	46	45	44	42	EX5
	70	82	91	97	102	105	107	109	110	109	108	105	101	EX6
	192	225	249	267	280	289	296	300	302	301	296	287	277	EX7
	513	601	665	712	746	771	788	799	804	803	789	767	739	EX8
10 bubble/ 15.5 dew point			8.6	10.3	11.4	12.3	12.9	13.3	13.6	13.9	13.8	13.6	13.2	EX4
			26	31	35	37	39	40	41	42	42	41	40	EX5
			63	75	83	89	94	97	99	101	101	99	96	EX6
			172	205	229	246	258	267	272	278	277	272	264	EX7
			460	548	610	655	688	711	726	740	738	724	704	EX8
0 bubble/ 5.7 dew point					7.2	8.9	10.0	10.8	11.4	12.1	12.3	12.3	12.0	EX4
					22	27	30	33	35	37	37	37	36	EX5
					52	65	73	79	83	88	90	89	88	EX6
					143	177	201	217	229	242	247	246	241	EX7
					382	473	535	578	609	645	657	655	642	EX8
-10 bubble/ -4.2 dew point							5.1	7.0	8.2	9.6	10.2	10.4	10.4	EX4
							15	21	25	29	31	32	31	EX5
							37	51	59	70	74	76	75	EX6
							101	140	164	191	204	208	208	EX7
							270	372	436	510	544	556	554	EX8
-20 bubble/ -14.1 dew point										5.7	7.2	7.9	8.1	EX4
										17	22	24	25	EX5
										41	52	57	59	EX6
										113	144	157	162	EX7
										302	384	420	432	EX8

Electrical Control Valves EX4-8

EX4-8: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A Capacity [kW]													Valve type
	Evaporating temperature [°C]													
	50	40	30	20	15	10	5	0	-5	-10	-15	-20	-30	
80	10	10	11	10	10	10	10	9	9	9	8	8	7	EX4
	30	31	32	32	31	30	30	29	28	27	25	24	22	EX5
	71	76	77	76	75	73	71	69	67	64	61	58	52	EX6
	195	208	211	209	205	201	196	190	183	176	168	160	143	EX7
	520	554	564	556	548	536	522	506	488	469	448	426	380	EX8
70	9	10	11	11	11	11	11	11	10	10	10	9	9	EX4
	27	31	33	34	34	33	33	32	32	31	30	29	27	EX5
	64	74	79	81	81	80	79	78	76	74	71	69	64	EX6
	177	204	218	222	222	220	217	213	208	203	197	190	175	EX7
	471	545	581	593	592	587	579	569	556	541	524	506	467	EX8
60	6	9	10	11	11	11	11	11	11	11	11	10	10	EX4
	18	27	31	33	34	34	34	34	33	33	32	31	30	EX5
	43	64	75	80	81	82	82	81	80	79	77	75	71	EX6
	119	177	205	220	223	224	224	223	220	216	212	207	195	EX7
	317	471	548	586	594	598	598	594	587	577	565	551	519	EX8
50		5	9	10	10	11	11	11	11	11	11	11	10	EX4
		17	26	30	32	32	33	33	33	33	33	32	31	EX5
		40	62	73	76	78	79	80	80	79	78	77	74	EX6
		109	170	200	208	214	218	219	219	218	216	212	203	EX7
		291	455	533	556	571	581	585	585	581	575	566	543	EX8
40			5	8	9	9	10	10	10	10	10	10	10	EX4
			14	24	27	29	30	31	31	32	32	31	31	EX5
			34	58	64	69	72	74	75	76	76	75	73	EX6
			93	158	176	188	197	203	206	208	208	207	202	EX7
			248	423	469	502	526	541	550	555	555	552	539	EX8
30				3	6	7	8	9	9	9	9	10	10	EX4
				10	17	21	24	26	27	28	29	29	29	EX5
				24	41	51	58	62	65	68	69	70	69	EX6
				67	114	141	159	171	180	186	190	191	191	EX7
				178	303	375	423	457	480	496	505	510	509	EX8
20							4	6	7	7	8	8	8	EX4
							13	18	20	22	24	25	26	EX5
							31	42	49	54	57	59	61	EX6
							85	116	135	148	157	163	169	EX7
							228	309	361	396	419	435	451	EX8
10									2	4	5	6	7	EX4
									5	12	16	18	20	EX5
									12	29	38	43	49	EX6
									33	80	103	118	134	EX7
									88	214	276	315	358	EX8

Electrical Control Valves EX4-8

EX4-8: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A													Valve type
	Capacity [kW]													
	Evaporating temperature [°C]													
	50	40	30	20	15	10	5	0	-5	-10	-15	-20	-30	
80	9	9	9	9	9	9	8	8	8	7	7	6	5	EX4
	27	28	29	28	27	26	25	24	23	22	20	19	16	EX5
	64	68	69	67	65	63	60	58	55	52	48	45	38	EX6
	177	187	189	183	179	173	166	159	151	142	133	124	104	EX7
	473	500	503	489	476	461	444	424	403	380	356	330	278	EX8
70	9	10	10	11	11	10	10	10	10	9	9	8	8	EX4
	26	30	32	32	32	31	31	30	29	28	27	26	23	EX5
	62	72	76	77	76	75	74	72	70	67	65	62	56	EX6
	171	197	209	211	210	207	203	198	192	185	178	170	153	EX7
	455	525	557	564	560	553	542	528	512	494	474	453	408	EX8
60	6	9	10	11	11	11	11	11	11	11	10	10	9	EX4
	18	27	31	33	33	34	33	33	33	32	31	30	28	EX5
	43	64	75	79	80	81	80	79	78	76	74	72	67	EX6
	119	177	205	218	221	222	221	218	215	210	205	198	184	EX7
	318	472	547	582	589	591	588	582	572	560	546	529	492	EX8
50		6	9	10	11	11	11	11	11	11	11	11	10	EX4
		17	27	31	32	33	34	34	34	33	33	32	31	EX5
		41	64	74	77	79	81	81	81	80	79	77	73	EX6
		113	175	205	213	218	221	222	222	220	217	212	202	EX7
		302	468	546	568	583	590	593	591	586	578	567	539	EX8
40			5	8	9	10	10	11	11	11	11	11	10	EX4
			15	25	28	30	31	32	32	33	33	32	31	EX5
			37	61	67	72	75	77	78	78	78	78	75	EX6
			101	167	185	197	206	211	214	216	215	214	207	EX7
			268	445	492	526	548	563	572	575	574	570	553	EX8
30				4	6	8	9	9	10	10	10	10	10	EX4
				12	19	23	26	28	29	30	30	31	30	EX5
				29	46	55	62	67	70	72	73	74	73	EX6
				80	125	152	171	183	192	198	201	202	201	EX7
				212	334	406	455	488	512	527	536	539	536	EX8
20						2	5	7	8	8	9	9	9	EX4
						6	15	20	23	25	26	27	28	EX5
						15	37	48	55	59	63	65	67	EX6
						42	102	131	150	163	172	178	183	EX7
						113	271	350	401	435	459	475	488	EX8
10									3	5	6	7	8	EX4
									10	15	19	21	23	EX5
									24	37	45	50	55	EX6
									66	102	123	137	152	EX7
									176	273	329	366	407	EX8

Electrical Control Valves EX4-8

EX4-8: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze													Valve type
	Capacity [kW]													
	Evaporating temperature [°C]													
	50	40	30	20	15	10	5	0	-5	-10	-15	-20	-30	
80	9	10	10	9	9	9	9	8	8	8	7	7	6	EX4
	27	29	29	29	28	27	27	26	25	24	22	21	19	EX5
	65	69	70	69	68	66	64	62	59	57	54	51	45	EX6
	180	191	193	189	186	181	176	170	163	156	148	140	123	EX7
	479	509	515	505	495	483	469	452	434	415	395	374	329	EX8
70	8	9	10	10	10	10	10	9	9	9	9	8	8	EX4
	24	28	30	30	30	30	29	29	28	27	26	25	23	EX5
	58	67	71	73	72	71	70	69	67	65	63	60	55	EX6
	158	184	196	200	199	197	193	189	184	179	173	166	152	EX7
	422	491	523	532	530	524	516	505	492	477	460	442	404	EX8
60	5	8	9	10	10	10	10	10	10	9	9	9	8	EX4
	15	23	28	30	30	30	30	30	29	29	28	27	26	EX5
	35	56	66	71	72	72	72	71	70	69	67	66	61	EX6
	97	155	182	195	198	199	198	196	193	190	185	180	169	EX7
	258	413	485	519	527	529	528	523	516	506	494	481	450	EX8
50		4	7	9	9	9	10	10	10	9	9	9	9	EX4
		13	22	26	28	28	29	29	29	29	28	28	27	EX5
		30	53	63	66	68	69	70	70	69	68	67	64	EX6
		83	146	174	182	187	190	192	191	190	187	184	176	EX7
		222	390	465	486	500	508	511	510	506	500	491	468	EX8
40			3	7	7	8	8	9	9	9	9	9	9	EX4
			9	20	23	24	26	26	27	27	27	27	26	EX5
			22	48	54	59	62	64	65	65	65	65	63	EX6
			62	132	149	161	169	175	178	179	179	178	173	EX7
			164	353	399	430	452	466	475	479	479	475	462	EX8
30				0	4	6	7	7	8	8	8	8	8	EX4
				1	13	17	20	22	23	24	24	25	25	EX5
				3	31	41	48	52	55	57	58	59	59	EX6
				9	84	113	131	143	152	157	161	162	162	EX7
				23	225	301	349	382	405	420	429	433	432	EX8
20							2	4	5	6	6	7	7	EX4
							7	13	16	18	20	20	21	EX5
							17	31	39	44	47	49	51	EX6
							48	86	106	120	129	135	140	EX7
							127	228	283	319	343	359	374	EX8
10										2	4	4	5	EX4
										6	11	13	16	EX5
										14	26	32	38	EX6
										39	71	87	105	EX7
										104	188	233	280	EX8

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Electrical Control Valves EX4-8

Quick selection: Suction line throttling (evaporator capacity control or crankcase pressure regulator)

Condensing temperature [°C]	Capacity [kW]												Valve type
	R448A						R449A						
	Evaporating temperature [°C]						Evaporating temperature [°C]						
	-20	-10	-5	0	5	10	-20	-10	-5	0	5	10	
30 bubble/ 34.9 dew point	26.5	33.7	37.7	41.9	46.4	51.2	26.1	33.3	37.2	41.4	45.8	50.6	EX8
	8.7	11.1	12.4	13.8	15.3	16.9	8.6	11.0	12.3	13.6	15.1	16.6	EX7
	2.5	3.1	3.5	3.9	4.3	4.7	2.4	3.1	3.4	3.8	4.2	4.7	EX6
40 bubble/ 44.5 dew point	23.7	30.3	33.9	37.8	41.9	46.3	23.3	29.8	33.4	37.2	41.3	45.6	EX8
	7.8	10.0	11.2	12.4	13.8	15.2	7.7	9.8	11.0	12.3	13.6	15.0	EX7
	2.2	2.8	3.1	3.5	3.9	4.3	2.2	2.8	3.1	3.5	3.8	4.2	EX6
50 bubble/ 54 dew point	20.7	26.6	29.9	33.4	37.1	41.1	20.3	26.2	29.4	32.8	36.5	40.4	EX8
	6.8	8.8	9.8	11.0	12.2	13.5	6.7	8.6	9.7	10.8	12.0	13.3	EX7
	1.9	2.5	2.8	3.1	3.4	3.8	1.9	2.4	2.7	3.0	3.4	3.7	EX6
60 bubble/ 63.4 dew point	17.4	22.6	25.5	28.6	31.9	35.4	17.1	22.2	25.0	28.1	31.3	34.7	EX8
	5.7	7.5	8.4	9.4	10.5	11.6	5.6	7.3	8.2	9.2	10.3	11.4	EX7
	1.6	2.1	2.4	2.6	3.0	3.3	1.6	2.1	2.3	2.6	2.9	3.2	EX6

Note: above capacities are at 0.15 bar pressure drop. For other desired pressure drop, use the correction table below.

Pressure drop [bar]	0.1	0.15	0.2	0.3
Correction factor	0.82	1	1.15	1.41

Condensing temperature [°C]	Capacity [kW]												Valve type
	R450A						R513A						
	Evaporating temperature [°C]						Evaporating temperature [°C]						
	-20	-10	-5	0	5	10	-20	-10	-5	0	5	10	
30	16.9	22.9	26.1	29.6	33.3	37.2	18.9	25.0	28.4	32.0	35.8	39.9	EX8
	5.6	7.5	8.6	9.7	11.0	12.2	6.2	8.2	9.3	10.5	11.8	13.1	EX7
	1.6	2.1	2.4	2.7	3.1	3.4	1.8	2.3	2.6	3.0	3.3	3.7	EX6
40	15.2	20.6	23.6	26.8	30.2	33.8	16.8	22.3	25.4	28.7	32.2	36.0	EX8
	5.0	6.8	7.8	8.8	9.9	11.1	5.5	7.3	8.4	9.4	10.6	11.8	EX7
	1.4	1.9	2.2	2.5	2.8	3.1	1.6	2.1	2.4	2.7	3.0	3.3	EX6
50	13.4	18.3	21.0	23.9	27.0	30.4	14.5	19.5	22.2	25.2	28.4	31.9	EX8
	4.4	6.0	6.9	7.9	8.9	10.0	4.8	6.4	7.3	8.3	9.4	10.5	EX7
	1.2	1.7	1.9	2.2	2.5	2.8	1.3	1.8	2.1	2.3	2.6	3.0	EX6
60	11.5	15.9	18.3	21.0	23.8	26.8	12.1	16.5	18.9	21.5	24.4	27.5	EX8
	3.8	5.2	6.0	6.9	7.8	8.8	4.0	5.4	6.2	7.1	8.0	9.0	EX7
	1.1	1.5	1.7	1.9	2.2	2.5	1.1	1.5	1.8	2.0	2.3	2.5	EX6

Note: above capacities are at 0.15 bar pressure drop. For other desired pressure drop, use the correction table below.

Pressure drop [bar]	0.1	0.15	0.2	0.3
Correction factor	0.82	1	1.15	1.41

Electrical Control Valves EX4-8

Quick selection: Suction line throttling (evaporator capacity control or crankcase pressure regulator)

Condensing temperature [°C]	R1234ze Capacity [kW]						Valve type
	Evaporating temperature [°C]						
	-20	-10	-5	0	5	10	
30	14.9	20.5	23.6	26.8	30.3	34.0	EX8
	4.9	6.8	7.8	8.8	10.0	11.2	EX7
	1.4	1.9	2.2	2.5	2.8	3.1	EX6
40	13.4	18.5	21.3	24.3	27.5	30.9	EX8
	4.4	6.1	7.0	8.0	9.1	10.2	EX7
	1.2	1.7	2.0	2.3	2.5	2.9	EX6
50	11.8	16.4	19.0	21.7	24.6	27.8	EX8
	3.9	5.4	6.2	7.1	8.1	9.1	EX7
	1.1	1.5	1.8	2.0	2.3	2.6	EX6
60	10.1	14.3	16.5	19.0	21.7	24.5	EX8
	3.3	4.7	5.4	6.3	7.1	8.1	EX7
	0.9	1.3	1.5	1.8	2.0	2.3	EX6

Note: above capacities are at 0.15 bar pressure drop. For other desired pressure drop, use the correction table below.

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Pressure drop [bar]	0.1	0.15	0.2	0.3
Correction factor	0.82	1	1.15	1.41

Quick selection: Hot gas bypass

Condensing temperature [°C]	Capacity [kW]					Valve type
	R448A	R449A	R450A	R513A	R1234ze	
60 °C	7.9	7.7	4.4	4.7	3.8	EX4
	25.5	25.0	14.3	15.3	12.2	EX5
	59.3	58.2	33.2	35.5	28.4	EX6
	210.7	207.0	117.8	126.3	101.1	EX7
	640.0	628.8	358.0	383.7	307.1	EX8
50°C	6.9	6.8	3.7	4.1	3.2	EX4
	22.4	22.1	12.1	13.3	10.4	EX5
	52.2	51.3	28.2	30.9	24.1	EX6
	185.4	182.4	100.2	109.7	85.8	EX7
	563.2	553.9	304.4	333.2	260.7	EX8
40°C	5.9	5.8	3.1	3.5	2.7	EX4
	19.2	18.9	10.1	11.2	8.6	EX5
	44.7	44.0	23.5	26.1	20.1	EX6
	158.8	156.4	83.5	92.7	71.4	EX7
	482.4	474.9	253.6	281.7	217.0	EX8
30°C	5.0	4.9	2.5	2.9	2.2	EX4
	16.1	15.8	8.2	9.3	7.1	EX5
	37.4	36.9	19.2	21.6	16.4	EX6
	132.9	131.0	68.1	76.7	58.4	EX7
	403.7	398.0	207.0	232.9	177.3	EX8

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Electrical Control Valves EX4-8

Quick selection: Heat reclaim /hot gas flow

Condensing temperature [°C]	Pressure drop [bar]	Capacity [kW]							Valve type
		R448A/R449A		Evaporating temperature [°C]			R448A/R449A		
		-40	-30	-20	-10	0	5	10	
30 bubble/ 34.9 dew point	0.1	4.0	4.2	4.4	4.7	4.9	5.0	5.1	EX6
		14.0	15.0	16.0	17.0	17.0	18.0	18.0	EX7
		43.0	45.0	48.0	50.0	53.0	54.0	55.0	EX8
	0.5	8.7	9.2	9.8	10.3	10.8	11.0	11.2	EX6
		31.0	33.0	35.0	37.0	38.0	39.0	40.0	EX7
		94.0	100.0	105.0	111.0	116.0	119.0	121.0	EX8
	1.0	12.0	12.8	13.5	14.2	14.9	15.2	15.6	EX6
		43.0	45.0	48.0	51.0	53.0	54.0	55.0	EX7
		130.0	138.0	146.0	154.0	161.0	165.0	168.0	EX8
40 bubble/ 44.5 dew point	0.1	4.0	4.3	4.5	4.8	5.1	5.2	5.3	EX6
		14.0	15.0	16.0	17.0	18.0	18.0	19.0	EX7
		43.0	46.0	49.0	52.0	55.0	56.0	57.0	EX8
	0.5	8.8	9.4	10.0	10.6	11.1	11.4	11.7	EX6
		31.0	33.0	36.0	38.0	40.0	41.0	41.0	EX7
		95.0	102.0	108.0	114.0	120.0	123.0	126.0	EX8
	1.0	12.2	13.1	13.9	14.7	15.5	15.9	16.2	EX6
		43.0	46.0	49.0	52.0	55.0	56.0	58.0	EX7
		132.0	141.0	150.0	159.0	167.0	171.0	175.0	EX8
50 bubble/ 54 dew point	0.1	3.9	4.2	4.5	4.8	5.1	5.2	5.3	EX6
		14.0	15.0	16.0	17.0	18.0	19.0	19.0	EX7
		42.0	45.0	48.0	52.0	55.0	56.0	58.0	EX8
	0.5	8.6	9.3	9.9	10.6	11.2	11.5	11.8	EX6
		30.0	33.0	35.0	38.0	40.0	41.0	42.0	EX7
		93.0	100.0	107.0	114.0	121.0	124.0	127.0	EX8
	1.0	12.0	12.9	13.8	14.7	15.6	16.0	16.4	EX6
		43.0	46.0	49.0	52.0	55.0	57.0	58.0	EX7
		129.0	139.0	149.0	159.0	169.0	173.0	178.0	EX8
60 bubble/ 63.4 dew point	0.1	3.6	3.9	4.2	4.6	4.9	5.0	5.2	EX6
		13.0	14.0	15.0	16.0	17.0	18.0	18.0	EX7
		39.0	42.0	46.0	49.0	53.0	54.0	56.0	EX8
	0.5	7.9	8.7	9.4	10.1	10.8	11.2	11.5	EX6
		28.0	31.0	33.0	36.0	38.0	40.0	41.0	EX7
		86.0	94.0	102.0	109.0	117.0	121.0	124.0	EX8
	1.0	11.1	12.1	13.2	14.2	15.1	15.6	16.1	EX6
		39.0	43.0	47.0	50.0	54.0	55.0	57.0	EX7
		120.0	131.0	142.0	153.0	163.0	168.0	173.0	EX8

Electrical Control Valves EX4-8

Quick selection: Heat reclaim /hot gas flow

Condensing temperature [°C]	Pressure drop [bar]	R450A/R513A							Valve type
		Capacity [kW]							
		Evaporating temperature [°C]							
		-40	-30	-20	-10	0	5	10	
30	0.1	2.8	3.0	3.2	3.4	3.5	3.6	3.7	EX6
		10.0	10.6	11.3	11.9	12.6	12.9	13.2	EX7
		30.2	32.3	34.3	36.2	38.1	39.0	40.0	EX8
	0.5	6.1	6.5	6.9	7.2	7.6	7.8	8.0	EX6
		21.5	23.0	24.4	25.8	27.1	27.8	28.4	EX7
		65.4	69.8	74.1	78.3	82.3	84.3	86.3	EX8
	1.0	8.2	8.7	9.3	9.8	10.3	10.5	10.8	EX6
		29.1	31.0	32.9	34.8	36.6	37.5	38.3	EX7
		88.4	94.3	100.0	105.7	111.2	113.9	116.5	EX8
40	0.1	2.9	3.1	3.3	3.5	3.7	3.8	3.9	EX6
		10.2	11.0	11.7	12.5	13.2	13.6	13.9	EX7
		31.0	33.4	35.7	37.9	40.2	41.2	42.3	EX8
	0.5	6.3	6.7	7.2	7.6	8.1	8.3	8.5	EX6
		22.2	23.9	25.6	27.2	28.8	29.5	30.3	EX7
		67.6	72.6	77.7	82.6	87.4	89.7	92.0	EX8
	1.0	8.6	9.2	9.8	10.4	11.0	11.3	11.6	EX6
		30.4	32.7	34.9	37.1	39.2	40.3	41.3	EX7
		92.3	99.2	106.0	112.7	119.2	122.4	125.5	EX8
50	0.1	2.9	3.1	3.4	3.6	3.8	3.9	4.1	EX6
		10.2	11.1	11.9	12.8	13.6	14.0	14.4	EX7
		30.9	33.6	36.2	38.8	41.4	42.6	43.9	EX8
	0.5	6.3	6.8	7.3	7.9	8.4	8.6	8.9	EX6
		22.3	24.2	26.1	28.0	29.8	30.7	31.6	EX7
		67.6	73.5	79.3	85.0	90.5	93.2	95.9	EX8
	1.0	8.6	9.4	10.1	10.8	11.5	11.9	12.2	EX6
		30.6	33.3	35.9	38.4	40.9	42.2	43.4	EX7
		93.0	101.0	109.0	116.8	124.4	128.1	131.7	EX8
60	0.1	2.7	3.0	3.3	3.6	3.9	4.0	4.1	EX6
		9.7	10.8	11.8	12.7	13.7	14.2	14.7	EX7
		29.6	32.7	35.7	38.7	41.6	43.1	44.5	EX8
	0.5	6.0	6.6	7.3	7.9	8.5	8.8	9.0	EX6
		21.4	23.6	25.8	28.0	30.1	31.1	32.1	EX7
		65.0	71.7	78.4	84.9	91.4	94.5	97.6	EX8
	1.0	8.3	9.2	10.0	10.9	11.7	12.1	12.5	EX6
		29.6	32.6	35.6	38.6	41.5	42.9	44.3	EX7
		89.9	99.1	108.3	117.3	126.1	130.4	134.7	EX8

Electrical Control Valves EX4-8

Quick selection: Heat reclaim /hot gas flow

Condensing temperature [°C]	Pressure drop [bar]	R1234ze Capacity [kW]							R1234ze	Valve type
		Evaporating temperature [°C]								
		-40	-30	-20	-10	0	5	10		
30	0.1	2.5	2.7	2.9	3.0	3.2	3.3	3.4	EX6	
		9.0	9.6	10.2	10.8	11.4	11.6	11.9	EX7	
		27.4	29.2	31.0	32.7	34.5	35.4	36.2	EX8	
	0.5	5.4	5.8	6.2	6.5	6.9	7.0	7.2	EX6	
		19.3	20.7	21.9	23.1	24.4	25.0	25.6	EX7	
		58.7	62.7	66.5	70.3	74.1	75.9	77.8	EX8	
	1.0	7.3	7.8	8.2	8.7	9.2	9.4	9.6	EX6	
		25.9	27.7	29.3	31.0	32.6	33.5	34.3	EX7	
		78.7	84.0	89.1	94.1	99.2	101.7	104.1	EX8	
40	0.1	2.6	2.8	3.0	3.2	3.4	3.5	3.6	EX6	
		9.2	9.9	10.6	11.3	12.0	12.3	12.6	EX7	
		28.0	30.2	32.2	34.3	36.3	37.4	38.4	EX8	
	0.5	5.6	6.1	6.5	6.9	7.3	7.5	7.7	EX6	
		20.0	21.5	23.0	24.5	25.9	26.6	27.4	EX7	
		60.7	65.4	69.8	74.3	78.7	80.9	83.1	EX8	
	1.0	7.6	8.2	8.8	9.3	9.9	10.2	10.4	EX6	
		27.1	29.2	31.2	33.2	35.2	36.1	37.1	EX7	
		82.4	88.7	94.7	100.8	106.8	109.8	112.7	EX8	
50	0.1	2.6	2.8	3.0	3.3	3.5	3.6	3.7	EX6	
		9.2	10.0	10.8	11.6	12.3	12.7	13.1	EX7	
		27.9	30.3	32.7	35.1	37.5	38.7	39.8	EX8	
	0.5	5.6	6.1	6.6	7.1	7.6	7.8	8.0	EX6	
		20.0	21.8	23.5	25.2	26.9	27.7	28.6	EX7	
		60.8	66.2	71.3	76.5	81.7	84.3	86.8	EX8	
	1.0	7.7	8.4	9.0	9.7	10.4	10.7	11.0	EX6	
		27.4	29.8	32.1	34.5	36.8	37.9	39.1	EX7	
		83.2	90.5	97.6	104.7	111.7	115.3	118.7	EX8	
60	0.1	2.5	2.7	3.0	3.2	3.5	3.6	3.7	EX6	
		8.8	9.7	10.6	11.5	12.4	12.9	13.3	EX7	
		26.6	29.5	32.2	35.0	37.7	39.1	40.5	EX8	
	0.5	5.4	6.0	6.5	7.1	7.6	7.9	8.2	EX6	
		19.2	21.3	23.2	25.2	27.2	28.2	29.1	EX7	
		58.4	64.6	70.6	76.6	82.6	85.6	88.5	EX8	
	1.0	7.4	8.2	9.0	9.8	10.5	10.9	11.3	EX6	
		26.5	29.3	32.0	34.7	37.4	38.7	40.1	EX7	
		80.4	88.9	97.1	105.3	113.6	117.7	121.7	EX8	

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Technical data EX4-8 valves

MOPD (maximum operating pressure differential)	EX4-6: 40 bar EX7: 35 bar EX8: 30 bar
Max. allowable working pressure PS	EX4-7: 60 bar EX8: 56 bar (UL-Approval: 45 bar)
Evaporating temperature	-100...+55°C
Ambient temperature	-40...+55°C
Storage temperature	-40...+70°C
Medium inlet temperature	
Bi-flow version:	TS: -40...+80°C
Uni-flow version:	TS: -50*...+100°C
Medium outlet temperature:	-100*...+100°C
	*) UL-Approval based on ≥ - 40°C
Vibration for non-connected and fastened valve	4g (0...1000 Hz, 1 octave /min.)

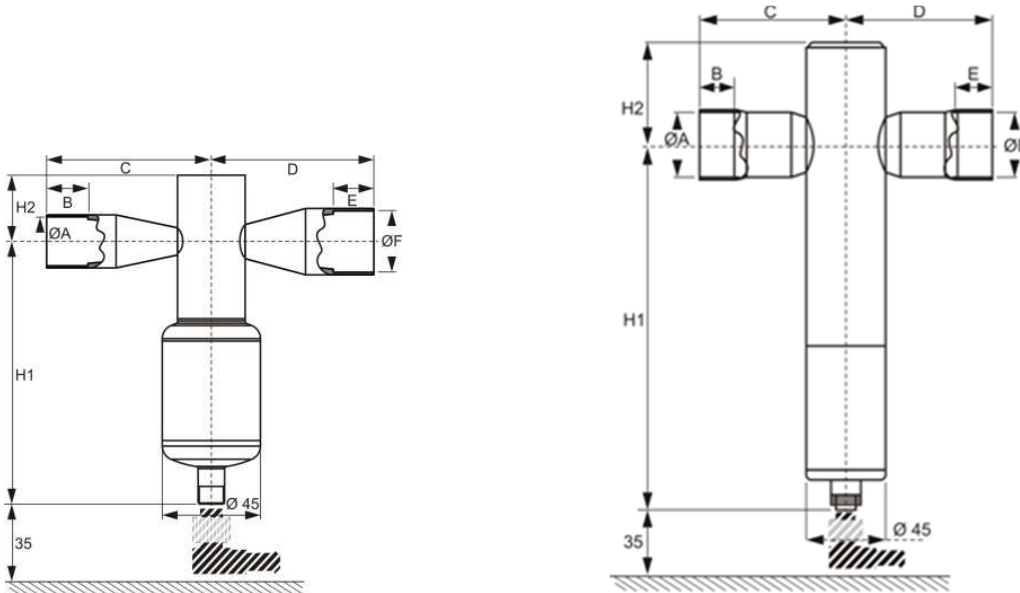
Protection accordance to IEC 529, DIN 40050	IP67 with EMERSON supplied cable connector assembly
Connections/Material	ODF stainless steel fittings
Humidity	5...95% r.H.
Shock	20g at 11 ms 80g at 1 ms
Seat leakage	Positive shut-off better than solenoid valves
Net weight (kg)	0.5 kg (EX4), 0.52 kg (EX5), 0.60 kg (EX6), 1.1 kg (EX7), 1.5 kg (EX8)
Marking	CE (only EX7 & EX8), ERAC , c RU us
Package/delivery (individual)	without electrical connector

Electrical Control Valves EX4-8

Electrical data EX4-8 valves

Stepper motor type	Bi-polar, phase current by chopper control (constant current)	Step mode	2 phase full step, half step or microstep
Electrical connection	4 pin terminal via plug	Step angle	1.8° per step ± 8%
Nominal supply voltage to the valve U:	24 VDC	Stepping rate	500 Hz
Driver supply voltage range	18...36 VDC	Total number of steps	EX4-6: 750 full steps EX7: 1600 full steps EX8: 2600 full steps
Phase current, operating	EX4-6: 500 mA EX7: 750 mA EX8: 800 mA ±10%	Winding resistance per phase	EX4-6: 13 Ohm ±10% EX7: 8 Ohm ±10% EX8: 6 Ohm ±10%
Holding current	EX4-6: 100 mA EX7: 250 mA EX8: 500 mA	Full travel time	EX4-6: 1.5 seconds EX7: 3.2 seconds EX8: 5.2 seconds
Nominal input power per phase	EX4/EX5/EX6: 3.5 W EX7/EX8: 5 W	Reference position	Mechanical stop at fully closed position

Dimensions [mm]



Type	Flow pattern	Part No.	Ø A x Ø F(ODF)	B	C	D	E	H1	H2
EX4-I21	Uni-flow	800615	3/8" x 5/8"	8	45	55	11	113	25
EX4-M21		800616	10 x 16 mm	8	45	55	11	113	25
EX5-U21		800618	5/8" x 7/8" (16 x 22 mm)	11	55	65	16	113	25
EX6-I21		800620	7/8" x 1-1/8"	16	65	75	19	113	25
EX6-M21		800621	22 x 28 mm	16	65	75	19	113	25
EX7-I21		800624	1-1/8" x 1-3/8"	20	78	83	20	158	42
EX7-M21		800625	28 x 35 mm	20	78	83	20	158	42
EX8-M21		800629	42 x 42 mm	20	80	80	20	200	56
EX8-U21		800630	1-3/8" (35 mm) x 1-3/8" (35 mm)	20	80	80	20	200	56
EX8-I21		800631	1-5/8" x 1-5/8"	20	80	80	20	200	56
EX4-U31	Bi-flow	800617	5/8" x 5/8" (16 x 16 mm)	11	55	55	11	113	25
EX5-U31		800619	7/8" x 7/8" (22 x 22 mm)	16	65	65	16	113	25
EX6-I31		800622	1-1/8" x 1-1/8"	19	75	75	19	113	25
EX6-M31		800623	28 x 28 mm	19	75	75	19	113	25
EX7-U31		800626	1-1/8"(35 mm) x 1-1/8" (35 mm)	23	83	83	23	158	42

Electronic Expansion Valves FX Series

Emerson FX are stepper motor driven electronic expansion valves for precise control of refrigerant mass flow in air conditioning, heat pumps, close control and industrial process cooling applications.

Features

- Flexibility by configuration of outlet connection in 4 directions
- Stepper motor driven
- High resolution and excellent repeatability
- Linear flow capacity
- Extremely wide capacity range (10...100%)
- Continuous modulation of mass flow, no stress (liquid hammering) in the refrigeration circuit
- Direct coupling of motor and valve for high reliability (no gear mechanism)




FX7

Selection table

Type	Part No.	Inlet connection ODF	Outlet connection ODF	Electric connection
FX5-U07	801336	7/8"	7/8"	Suitable for M12 plug (order separately)
FX6-I09	801337	1-1/8"	1-1/8"	
FX6-M28	801338	28 mm	28 mm	
FX6.5-I09	801339	1-1/8"	1-1/8"	
FX6.5-M28	801340	28 mm	28 mm	
FX7-U11	801341	1-3/8"	1-3/8"	
FX7.5-U11		1-3/8"	1-3/8"	
FX8-I13		1-5/8"	1-5/8"	
FX8-M42		42 mm	42 mm	
FX9-U17	801345	2-1/8"	2-1/8"	

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Cable and connector assembly

Type	Part No.	Temperature Range	Length	Connector type to valve	Connector type to driver board or controller	Illustration
EXV-M15	804663	-50...+80°C	1.5 m	M12	Loose wires	
EXV-M30	804664		3.0 m			
EXV-M60	804665		6.0 m			

Nominal capacities [kW]

Valve Type	R450A	R513A	R1234ze
FX5	27.3	27.9	31.3
FX6	65	66	74
FX6.5	99	101	113
FX7	211	216	242
FX7.5	314	321	360
FX8	498	510	571
FX9	1159	1187	1329

Note: Nominal capacity of FX7.5, FX8 and FX9 might be modified. Please contact local sales office for confirmation.

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R513A, R1234ze	+4°C	+38°C bubble/ +38°C dew point	1K
R450A	+4°C dew point	+38°C bubble/ +38.6°C dew point	

For selection of other operating condition, please use quick selection tables in the next pages or Controls Navigator selection program.

Electronic Expansion Valves FX Series

FX: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A													Valve type	
	Capacity [kW]														
	Evaporating temperature [°C]														
	50	40	30	20	15	10	5	0	-5	-10	-15	-20	-30		
80	24	25	26	25	25	24	24	23	22	21	20	19	17	FX5	
	56	60	61	60	59	58	56	55	53	51	48	46	41	FX6	
	86	91	93	92	90	88	86	83	80	77	74	70	63	FX6.5	
	183	195	199	196	193	189	184	178	172	165	158	150	134	FX7	
	272	290	295	291	286	280	273	264	255	245	234	223	199	FX7.5	
	431	460	468	462	454	445	433	420	405	389	372	354	316	FX8	
	1005	1070	1089	1075	1058	1035	1008	977	943	906	866	824	735	FX9	
70	21	25	26	27	27	27	26	26	25	25	24	23	21	FX5	
	51	59	63	64	64	63	63	61	60	58	57	55	50	FX6	
	78	90	96	98	98	97	95	94	92	89	86	83	77	FX6.5	
	166	192	205	209	209	207	204	200	196	190	185	178	164	FX7	
	246	285	304	310	309	307	303	297	290	283	274	265	244	FX7.5	
	391	452	482	492	491	487	481	472	461	449	435	420	387	FX8	
	910	1053	1123	1146	1144	1134	1119	1098	1073	1045	1012	978	901	FX9	
60	14	21	25	27	27	27	27	27	27	26	26	25	24	FX5	
	34	51	59	63	64	65	65	64	63	62	61	59	56	FX6	
	52	78	90	96	98	99	99	98	97	95	93	91	86	FX6.5	
	112	166	193	206	209	211	211	209	207	203	199	194	183	FX7	
	165	246	286	306	311	313	313	310	307	302	295	288	271	FX7.5	
	263	391	455	486	493	496	496	493	487	479	469	457	431	FX8	
	611	910	1058	1131	1148	1156	1155	1147	1133	1114	1091	1065	1003	FX9	
50		13	21	24	25	26	26	27	27	26	26	26	25	FX5	
		31	49	58	60	62	63	63	63	63	62	61	59	FX6	
		48	75	88	92	94	96	96	96	96	95	93	89	FX6.5	
		103	160	188	196	201	205	206	206	206	205	203	199	191	FX7
		152	238	279	291	299	303	306	306	304	301	296	284	284	FX7.5
		242	377	442	461	474	482	485	485	482	477	470	450	450	FX8
		563	878	1030	1074	1104	1122	1130	1130	1123	1111	1094	1048	1048	FX9
40			11	19	21	23	24	25	25	25	25	25	24	FX5	
			27	46	51	54	57	58	59	60	60	60	58	FX6	
			41	70	77	83	87	89	91	91	92	91	89	FX6.5	
			87	149	165	177	185	191	194	195	196	195	190	FX7	
			130	221	245	263	275	283	288	290	290	289	282	FX7.5	
			206	351	389	417	436	449	457	460	461	458	447	FX8	
			479	816	907	971	1015	1045	1063	1072	1073	1067	1041	FX9	
30				8	14	17	19	21	22	23	23	23	23	FX5	
				19	33	40	46	49	52	54	55	55	55	FX6	
				29	50	62	70	75	79	82	83	84	84	FX6.5	
				63	107	132	149	161	169	175	178	180	179	FX7	
				93	159	196	221	239	251	259	264	267	266	FX7.5	
				148	252	311	351	379	398	411	419	423	422	FX8	
				344	586	724	818	883	928	958	976	985	983	FX9	
20							10	14	16	18	19	20	20	FX5	
							25	33	39	43	45	47	49	FX6	
							37	51	59	65	69	72	74	FX6.5	
							80	109	127	139	148	153	159	FX7	
							119	162	188	207	219	228	236	FX7.5	
							189	256	299	328	348	361	374	FX8	
							440	597	697	764	810	841	870	FX9	

Electronic Expansion Valves FX Series

FX: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A Capacity [kW]													Valve type
	Evaporating temperature [°C]													
	50	40	30	20	15	10	5	0	-5	-10	-15	-20	-30	
80	21	23	23	22	22	21	20	19	18	17	16	15	13	FX5
	51	54	54	53	51	50	48	46	43	41	38	36	30	FX6
	78	82	83	80	78	76	73	70	66	63	59	54	46	FX6.5
	166	176	177	172	168	162	156	149	142	134	125	116	98	FX7
	247	261	263	255	249	241	232	222	210	198	186	173	145	FX7.5
	392	415	417	405	395	383	368	352	334	315	295	274	231	FX8
	913	965	972	944	920	891	857	819	778	734	687	638	537	FX9
70	21	24	25	26	25	25	25	24	23	22	22	21	19	FX5
	49	57	60	61	60	60	58	57	55	53	51	49	44	FX6
	75	87	92	93	92	91	89	87	84	81	78	75	67	FX6.5
	160	185	196	199	197	195	191	186	180	174	167	160	144	FX7
	238	275	291	295	293	289	283	276	268	258	248	237	213	FX7.5
	378	436	462	468	465	458	449	438	425	410	393	376	338	FX8
	880	1015	1077	1089	1082	1067	1046	1020	989	954	916	875	788	FX9
60	14	21	25	26	27	27	27	26	26	25	25	24	22	FX5
	34	51	59	63	64	64	64	63	62	60	59	57	53	FX6
	52	78	90	96	97	97	97	96	94	92	90	87	81	FX6.5
	112	166	193	205	208	208	207	205	202	197	192	186	173	FX7
	166	247	286	304	308	309	308	304	299	293	285	277	257	FX7.5
	263	392	454	483	489	490	488	483	475	465	453	439	408	FX8
	613	912	1057	1124	1138	1142	1136	1124	1106	1082	1054	1022	950	FX9
50		14	21	25	26	26	27	27	27	27	26	26	24	FX5
		33	50	59	61	63	64	64	64	63	62	61	58	FX6
		50	77	90	94	96	97	98	97	97	95	93	89	FX6.5
		106	165	192	200	205	208	209	208	206	203	200	190	FX7
		158	244	285	297	305	309	310	309	306	302	296	282	FX7.5
		251	388	453	471	483	490	492	491	486	479	470	447	FX8
		584	903	1055	1098	1125	1141	1146	1143	1132	1116	1095	1041	FX9
40			12	20	22	24	25	26	26	26	26	26	25	FX5
			29	48	53	57	59	61	62	62	62	61	60	FX6
			44	73	81	87	90	93	94	95	95	94	91	FX6.5
			95	157	173	185	193	198	201	203	202	201	195	FX7
			140	233	257	275	287	294	299	301	300	298	289	FX7.5
			223	369	408	436	455	467	474	477	476	472	458	FX8
			518	860	951	1015	1059	1088	1104	1111	1109	1100	1067	FX9
30				10	15	18	21	22	23	24	24	25	24	FX5
				23	36	44	49	53	55	57	58	58	58	FX6
				35	55	67	75	80	84	87	88	89	88	FX6.5
				75	118	143	160	172	180	186	189	190	189	FX7
				111	175	212	238	255	267	275	280	282	280	FX7.5
				176	277	337	377	405	424	437	444	447	444	FX8
				410	645	784	878	944	988	1018	1035	1042	1035	FX9
20						5	12	16	18	20	21	22	22	FX5
						12	29	38	43	47	50	51	53	FX6
						19	45	58	66	72	76	78	80	FX6.5
						40	96	123	141	153	162	167	172	FX7
						59	142	183	210	228	240	248	255	FX7.5
						94	225	290	332	361	381	394	405	FX8
						219	524	676	774	841	887	917	943	FX9

Electronic Expansion Valves FX Series

FX: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze													Valve type	
	Capacity [kW]														
	Evaporating temperature [°C]														
	50	40	30	20	15	10	5	0	-5	-10	-15	-20	-30		
80	28	30	30	30	29	28	28	27	26	24	23	22	19	FX5	
	67	71	72	71	69	67	65	63	61	58	55	52	46	FX6	
	102	108	110	108	106	103	100	96	93	88	84	80	70	FX6.5	
	218	232	235	230	226	220	214	206	198	189	180	170	150	FX7	
	324	344	348	341	335	327	317	306	294	281	267	253	222	FX7.5	
	514	546	552	542	531	518	503	485	466	446	424	401	353	FX8	
	1197	1271	1287	1262	1237	1207	1171	1130	1086	1037	987	933	821	FX9	
70	25	29	31	31	31	31	30	30	29	28	27	26	24	FX5	
	59	69	73	74	74	73	72	70	69	67	64	62	56	FX6	
	90	105	112	113	113	112	110	108	105	102	98	94	86	FX6.5	
	192	224	238	242	241	239	235	230	224	217	210	202	184	FX7	
	285	332	354	360	358	354	349	341	332	322	311	299	273	FX7.5	
	453	527	562	571	568	562	553	541	527	511	494	475	434	FX8	
	1055	1228	1308	1329	1324	1310	1288	1261	1228	1191	1150	1106	1010	FX9	
60	15	24	29	31	31	31	31	31	30	30	29	28	26	FX5	
	36	58	68	73	74	74	74	73	72	71	69	67	63	FX6	
	55	88	103	111	112	113	113	112	110	108	105	102	96	FX6.5	
	118	188	221	237	240	241	241	238	235	231	225	219	205	FX7	
	175	279	328	351	356	358	357	354	349	342	334	325	304	FX7.5	
	277	443	521	557	565	568	567	562	553	543	530	516	482	FX8	
	645	1032	1213	1297	1316	1323	1319	1308	1289	1264	1234	1201	1123	FX9	
50		13	23	27	29	29	30	30	30	30	29	29	28	FX5	
		31	54	65	68	70	71	71	71	71	70	69	65	FX6	
		47	83	99	104	106	108	109	109	108	107	105	100	FX6.5	
		101	178	212	221	228	231	233	232	231	228	224	213	FX7	
		150	264	314	328	338	343	345	345	342	338	332	317	FX7.5	
		239	418	498	521	536	545	548	547	543	536	527	502	FX8	
		556	974	1161	1214	1248	1268	1276	1275	1265	1249	1227	1170	FX9	
40			10	21	23	25	27	27	28	28	28	28	27	FX5	
			23	49	56	60	63	65	66	67	67	66	65	FX6	
			35	75	85	92	96	99	101	102	102	101	98	FX6.5	
			75	161	182	196	206	212	216	218	218	217	211	FX7	
			111	239	269	291	306	315	321	323	324	321	312	FX7.5	
			176	379	428	462	485	500	509	513	513	510	496	FX8	
30					1	13	18	21	22	24	25	25	25	FX5	
					3	31	42	49	53	57	59	60	60	FX6	
					5	48	64	74	81	86	89	91	92	FX6.5	
					10	102	137	159	174	184	191	195	197	FX7	
					15	152	203	236	259	274	284	290	293	292	FX7.5
					25	241	323	375	410	434	450	460	465	463	FX8
20														FX9	
														FX5	
														FX6	
														FX6.5	
														FX7	
														FX7.5	
20														FX8	
														FX9	
														FX5	
														FX6	
														FX6.5	
														FX7	
20														FX7.5	
														FX8	
														FX9	
														FX5	
														FX6	
														FX6.5	
20														FX7	
														FX7.5	
														FX8	
														FX9	
														FX5	
														FX6	

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Electronic Expansion Valves FX Series

Bi-flow application

FX valves are able to be operated in Bi-flow direction such as reversible heat pump with following consideration:

Type	Max. Operating differential [bar]	
	Normal flow direction	Reverse flow direction
FX5	40	30
FX6	35	30
FX6.5	35	30

Note: Identical flow capacity in normal and reverse flow direction.

Technical data

CE marking FX5/6/6.5: FX7/7.5/8/9:	not required required, Cat I, Module A	Protection accordance to IEC 529, DIN 40050	IP67 with EMERSON EXV-Mxx plug and cable assembly
MOPD (maximum operating pressure differential)	FX5: 40 bar FX6-8: 35 bar FX9: 28 bar	Humidity	5...95% r.H.
Max. working pressure PS	FX5-8: 46 bar FX9: 35 bar	Connections	ODF Copper
Ambient temperature Storage temperature	-40...+55°C -40...+70°C	Vibration resistance	4g at 10...200Hz
Medium inlet temperature	TS: -35...+75°C	Evaporating temperature	-35...+40°C
Approval	UL (pending) EAC (pending)	Package and delivery (individual)	without electrical connector

Electrical data

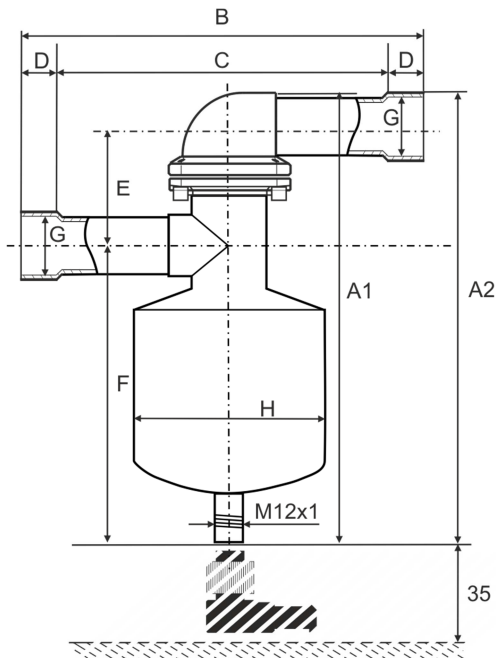
Stepper motor type	Bi-polar, phase current (constant current)	Total number of steps	FX5-7: 2400 full steps FX7.5: 2500 full steps FX8: 2600 full steps FX9: 3200 full steps
Electrical connection	4 pin terminal via plug	Step mode	Full step, half step or micro step
Supply Voltage	24 VDC (nominal)	Stepping rate	330 Hz
Driver supply voltage range	18...36 VDC	Winding resistance per phase	3.4 Ohm ±10%
Phase current, operating	FX5-9: 800 mA	Reference position	Mechanical stop at fully close position
Holding current	FX5/6/6.5: 500 mA FX7/7.5: 250 mA FX8/9: 500 mA	Full travel time	FX5-7: 7.3 sec. FX7.5: 7.6 sec. FX8: 7.9 sec. FX9: 9.7 sec.

Electronic Expansion Valves FX Series

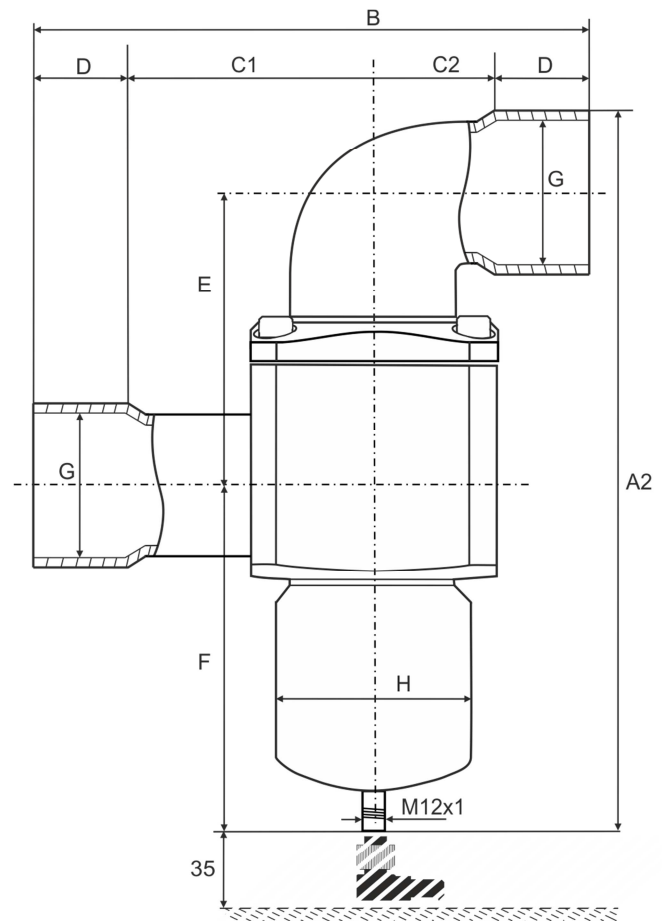
Dimensions [mm]

Type	Part No.	A		B	C	D	E	F	G (Ø)	H
		A1	A2							
FX5-U07	801336	156	-	164	132	16	42	102	22 mm / 7/8" ODF	60
FX6-M28	801338	-	159	164	126	19	42	102	28 mm ODF	60
FX6-I09	801337	-	159	164	126	19	42	102	1-1/8" ODF	60
FX6.5-M28	801340	-	159	164	126	19	42	102	28 mm ODF	60
FX6.5-I09	801339	-	159	164	126	19	42	102	1-1/8" ODF	60
FX7-U11	801341	-	167	177	129	24	45	103	35 mm / 1-3/8" ODF	60
FX7.5-U11		191	-	177	129	24	67	104	35 mm / 1-3/8" ODF	60
FX8-M42		228	-	208	152	28	86	118	42 mm	60
FX8-I13		228	-	208	152	28	86	118	1-5/8" ODF	60
FX9-U17	801345	-	270	189	C1: 86 C2: 35	34	116	125	54 mm / 2-1/8" ODF	60

FX5/FX6/FX6.5/FX7/FX7.5/FX8



FX9



EC3-X32 / -X33 Superheat Controller with or without TCP/IP Communication Capability

EC3-X32/ -X33 are stand-alone universal superheat controllers for air conditioning, refrigeration and industrial applications such as chillers, industrial process cooling, rooftops, heat pumps, package unit, close control, cold room, food process and air driers.

EC3-X32 offers remote access with built-in TCP/IP Ethernet communications and WebServer functionality. Any standard WebBrowser can be used for monitoring or parameter setting.

EC3-X33 has no network communication.

Features

- Superheat control in conjunction with EMERSON stepper motor driven Electrical Control Valves EX4...EX8 and FX5...FX9
- Limitation of evaporating pressure (MOP)
- Low superheat alarm
- Feed through of 4...20 mA signal from evaporator pressure sensor to analogue output. This may also be connected to pressure input of any other controller to avoid need for multiple pressure sensors
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Intelligent alarm management in order to protect the compressor i.e. fail safe operation
- Integral rechargeable battery to close Electrical Control Valve in case of power loss
- Electrical connection via plug-in type screw terminals
- Aluminum housing for DIN rail mounting

Additional Features EC3-X32 only

- High superheat alarm
- Low pressure switch function/alarm
- Freeze protection function/alarm
- Pump down function



EXD3-X32



EC3-X33 with ECD-002

Selection Table - Controllers and Display Unit

Description	Type	Part No.
Superheat Controller	EC3-X33	807783
Terminal kit EC3-X33	K03-X33	807645
Superheat Controller	EC3-X32	807782
Terminal kit EC3-X32	K03-X32	807644
Display/keypad unit (opt.)	ECD-002	807657
Connection cable EC3 to ECD-002 (1.0m length)	ECC-N10	807860
Connection cable EC3 to ECD-002 (3.0m length)	ECC-N30	807861
Connection cable EC3 to ECD-002 (5.0m length)	ECC-N50	807862

Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

For further technical detail see Technical Bulletin.

EXD-SH1/2 Controller with ModBus Communication Capability

EXD-SH1/2 are stand-alone universal superheat and/or temperature controllers for air conditioning units or refrigeration systems.

Features

- EXD-SH1: Control of one valve
- EXD-SH2: Control of two valves in two independent circuits
- Main function:

	Circuit 1	Circuit 2
EXD-SH1	Superheat or temperature control	
EXD-SH2	Superheat or temperature control	Superheat Control
- Other functions: Limitation of evaporating pressure (MOP), Low pressure switch, freeze protection and manual positioning of valve(s)
- Self-adapting superheat control function in conjunction with EMERSON FX5-9, EX4-8 and CX4-7 series
- Modbus (RTU) communication
- Integrated keyboard with two lines display
- Monitoring of sensors and detection of sensor (ECN/PT5/6) / stepper motor wiring failures
- Optional upload/download key (accessory) for transmission of parameter settings among controllers with the same setting
- Low/high superheat alarm as well as other function alarms
- Electrical connection via plug-in type screw terminals included with controller and Micro Molex EXD-M03 (must be ordered separately)
- DIN rail mounting housing



EXD-SH2



EXD-M03

Selection table

Type	Description	Part No.	
		Multipack	Single pack
Controllers			
EXD-SH1	Controller for single refrigeration circuit	-	807855
EXD-SH2	Controller for two independent refrigeration circuits	-	807856
EXD-M03	Molex terminal with 3 meter wires	-	807865
ECN-N30	Temperature sensor with 3 meter cable	-	804496
ECN-N60	Temperature sensor with 6 meter cable	-	804497
ECN-Z60	Ultralow Temperature sensor with 6 meter cable	-	807826
Pressure transmitters: PT5/PT6 (7/16-20UNF connection)			
PT5-07M	Sensing pressure range -0.8 to 7 bar	802350M*	802350
PT5-18M	Sensing pressure range 0 to 18 bar	802351M*	802351
PT5-30M	Sensing pressure range 0 to 30 bar	802352M*	802352
PT5-50M	Sensing pressure range 0 to 50 bar	802353M*	802353
PT5-150D	Sensing pressure range 0 to 150 bar (1/4 NPTF)	-	802379
PT6-18M	Sensing pressure range 0 to 18 bar	802361M*	-
PT6-30M	Sensing pressure range 0 to 30 bar	802362M*	-
PT6-50M	Sensing pressure range 0 to 50 bar	802363M*	-
Pressure transmitters: PT5 (Brazing connection)			
PT5-07T	Sensing pressure range -0.8 to 7 bar	802380M**	802380
PT5-18T	Sensing pressure range 0 to 18 bar	802381M**	802381
PT5-30T	Sensing pressure range 0 to 30 bar	802382M**	802382
PT5-50T	Sensing pressure range 0 to 50 bar	802383M**	802383

Note: *) PT5-xxM Multipack = 20pcs, **) PT5-xxT Multipack = 10 pcs

Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

EXD-SH1/2 Controller with ModBus Communication Capability

Accessories

Type	Description	Part No.	
		Multipack (20 pieces)	Single pack
M12 Plug and cable for pressure transmitters PT5/PT6			
PT4-M15	1.5 m	804803M	804803
PT4-M30	3.0 m	804804M	804804
PT4-M60	6.0 m	804805M	804805
Uninterruptible Power supply			
ECP-024	Backup battery with two outputs for two controllers	-	804558
K09-P00	Electrical Terminal Kit for ECP-024	-	804560
EXD-PM	Super cap for only EXD-SH1 (two pieces of EXD-PM required for one EXD-SH2)	-	807854

Superheat control of evaporators or economizers

This function requires the connection of temperature sensor(s) as well as pressure transmitters(s). The other functions are:

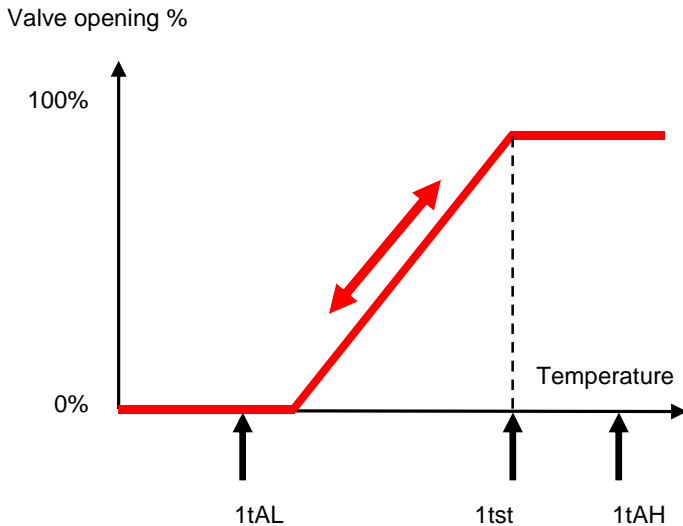
- MOP control: enables the limitation of saturated temperature of suction line (outlet of evaporator/economizer)
- Low pressure behaves similar to low pressure switch including alarm conditions
- Freeze protection is based on saturated temperature from converting measuring suction pressure. It provides alarm condition below certain adjusted temperature.

Temperature controller

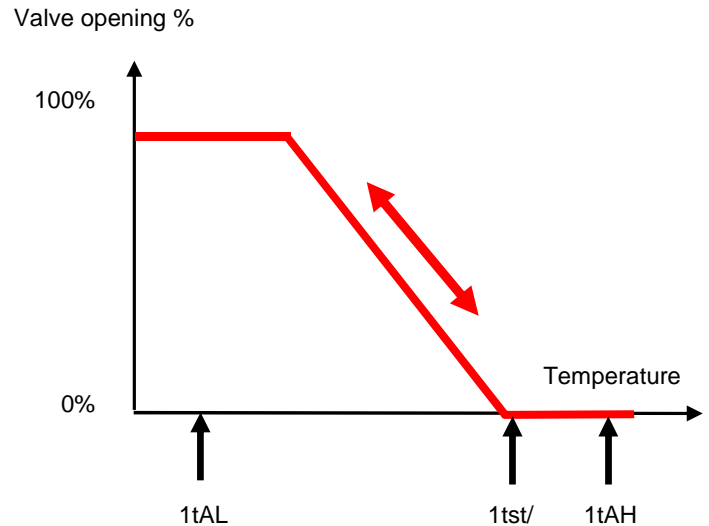
The function is to maintain desired temperature by modulating refrigerant mass flow. If the controller is operated as temperature controller, the connection of pressure transmitter is not required.

In order to fulfill varieties of the applications, the refrigerant mass flow variation can be set according temperature increase or decrease.

**Temperature control in normal sense
(A: Mass flow increases if temperature rises)**



**Temperature control in reverse sense
(B: Mass flow decreases if temperature rises)**

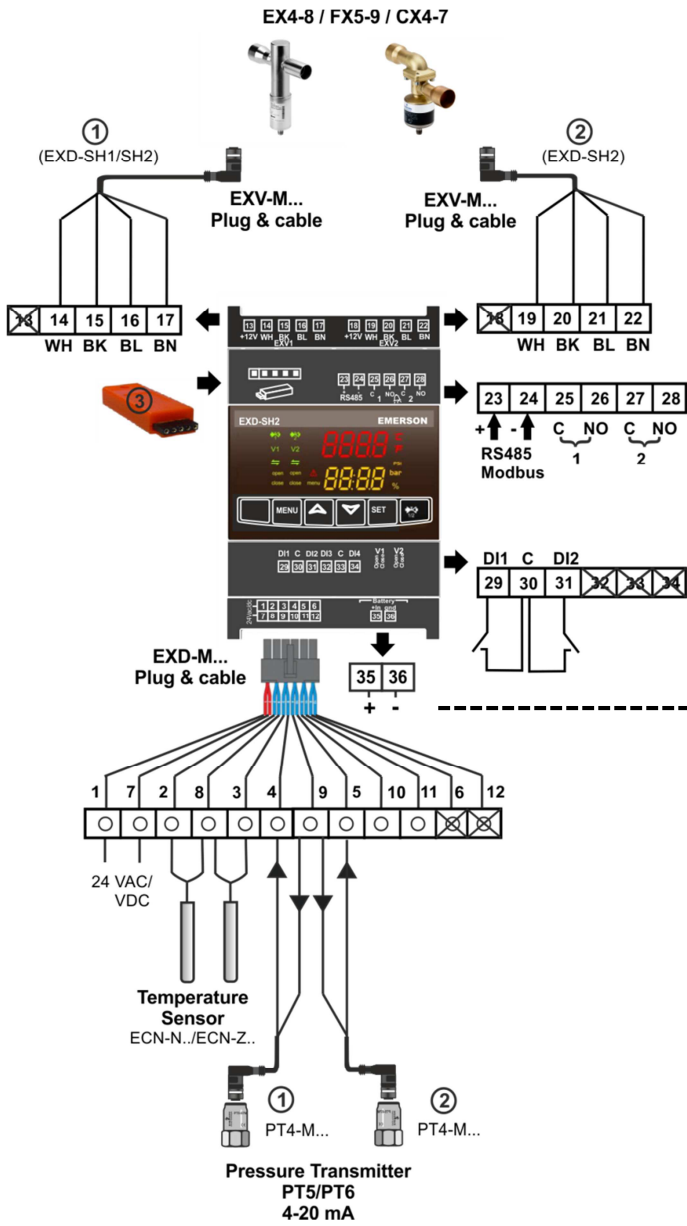


Examples of applications:

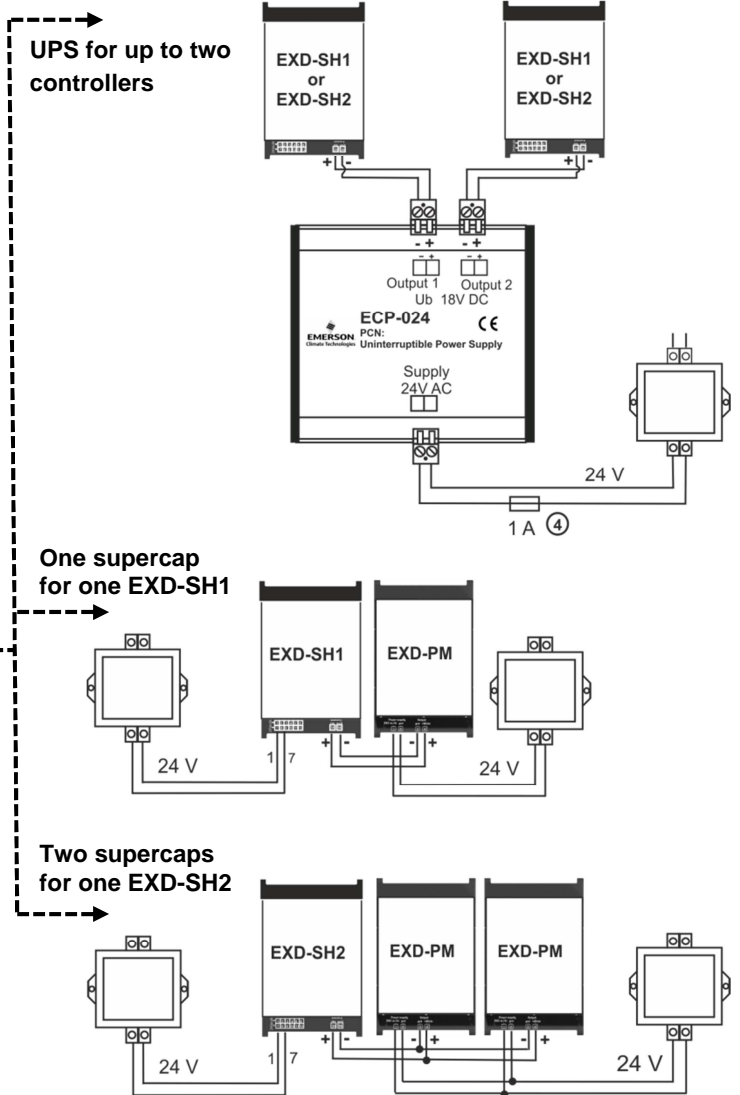
- Temperature control by throttling suction mass flow (normal sense, A)
- Temperature control by modulating hot gas into inlet or outlet of evaporators (reverse sense, B)
- Discharge temperature control by injecting liquid (normal sense, A)
- Head pressure control by means of temperature control (normal sense, A)

EXD-SH1/2 Controller with ModBus Communication Capability

Wiring



Wiring options: UPS (ECP-024) /Supercap (EXD-PM)



①	Circuit 1 (EXD-SH1/SH2)	14-17	Electronic expansion valve circuit 1 EXV-M... Electrical plug: wire colors
②	Circuit 2 (EXD-SH2)	19-22	Electronic expansion valve circuit 2 EXV-M... Electrical plug: wire colors <i>WH</i> -white <i>BK</i> -black <i>BL</i> -blue <i>BN</i> -brown
③	Download/upload key		
1 and 7	Supply voltage 24VAC/DC		
2 and 8	Temperature sensor circuit 1	23 and 24	RS485 (+/--terminal)
3 and 8	Temperature sensor circuit 2	25 and 26	Alarm relay circuit 1 (C, NO) – Suitable for 24VAC/DC
4 and 5	PT5/PT6 circuit 1 & circuit 2 (white wire: 4 to 20 mA signal)	27 and 28	Alarm relay circuit 2 (C, NO) – Suitable for 24VAC/DC
9	+ 12VDC Voltage input for PT5/PT6 (brown wire)	29 and 30	Digital input circuit1 (DI1) – Dry contact, potential free
Alternative ratiometric third Party Pressure Transmitter:		31 and 30	Digital input circuit 2 (DI2) – Dry contact, potential free
4 and 5	Pressure transmitter circuit 1 & circuit 2 (0.5 to 4.5V signal)	35 and 36	Battery/Super capacitor connection terminal
11	+ 5VDC voltage input	④	Fuse
10	GND Ground	6,12,13, 18,32-34	Not used (Terminals on EXD-SH12)

For further technical detail see Technical Bulletin.

Pressure Transmitter PT5

Features

- Thin-film stainless steel piezo sensor with output signal 4...20 mA and 2-wire connection for the precise operation of superheat, compressor or fan control systems
- Specially calibrated pressure ranges with $\pm 1\%$ accuracy performance to fulfill demands of today's refrigeration and HVAC applications
- Fully hermetic
- PT5-xxM with 7/16"-20UNF pressure connection and Schrader valve opener
- PT5-xxT with 6x40 mm stainless steel tube and integrated brazing neck for easy mounting in applications requiring a fully hermetic system solution
- Vibration, shock and pulsation resistant
- Protection class IP65 / IP67 (type-specific)



PT5-xxM with
PT4-Mxx Cable Assembly



PT5-07M



PT5-xx T

Selection table

Type	Part No.		Pressure range for signal output [bar]*	Output signal [mA]	Medium Temp. Range at pressure connection [°C]	Max. working pressure PS [bar]*	Test pressure PT [bar]*	Pressure Connection
	Single pack	Multi-pack**						
PT5-07M	802350	802350M	-0.8...7	4...20	-40...+100	27	30	7/16" – 20 UNF (with Schrader valve opener)
PT5-18M	802351	802351M	0...18			50	63	
PT5-30M	802352	802352M	0...30			60	100	
PT5-50M	802353	802353M	0...50			75	120	
PT5-07T	802380	802380M	-0.8...7			27	30	
PT5-18T	802381	802381M	0...18		50	63		
PT5-30T	802382	802382M	0...30		60	100		
PT5-50T	802383	802383M	0...50		75	120		

Note: *) Sealed gauge pressure **) PT5-xxM: 20 pcs, PT5-xxT: 10 pcs

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

For further technical detail see Technical Bulletin.

Selection Plug/Cable Assemblies: assembly fits all models

Type	Part No.		Cable length [m]	Weight/pc [g]	Temperature Range [°C]
	Single pack	Multipack 20 pcs			
PT4-M15	804803	804803M	1.5	50	-50...+80°C static application -25...+80°C mobile application
PT4-M30	804804	804804M	3.0	80	
PT4-M60	804805	804805M	6.0	140	

FSE Fan Speed Control Module

Electronic Fan Speed Control Modules FSE generates a 0...10 V signal, which is used to control the speed of condenser fan motors in commercial refrigeration and air-conditioning systems. Ideal for use with high efficient EC-motors, but be also used with phase cut controllers for induction motors.

Features

- Energy saving due to improved cooling efficiency
- Pressure for minimum speed adjustable
- Small proportional band and large hysteresis to minimize cycling at small pressure changes
- Reduced fan noise level during low ambient temperature conditions
- Improved overall performance of cooling system
- Easy installation with cables for power supply and motor connection factory wired
- IP65 protection for outdoor mounting



FSE Control Module + PS3-Nxx

Standards:

- UL certification File No.: E355325

FSY Fan Speed Controller Series

Electronic Fan Speed Controllers FSY controls the speed of conventional type AC fan motors depending on pressure.

Features

- Pressure actuated fan speed control
- Adjustable pressure for cut-off
- High Voltage Triac (800 Volts)
- Integrated Protection circuit against voltage and current peaks
- Compact design
- Protection IP65
- Easy mounting and adjustment
- Easy retrofit in existing systems
- No additional gasket required (complete molded into plug)
- Multi-position Plug with EMC filter incl. 1.5 m (opt. 3 and 6 m) cable for flexible installation



FSY Controller + FSF-Nxx

Standards:

- per EC 89/336/EC (together with FSF cable)
- UL certification File No.: E183816

Selection table FSE

Type	Part No.	Refrigerants	Adjustment Range Z [bar]	Factory set point Z [bar]	P-Band [bar]	Hysteresis [bar]	Test Pressure [bar]	Weight [g]
FSE-01S	804701	R450A/R513A/ R1234ze	4...12.5	~ 7.0	~ 2.3	~ 1.3	30 bar	125
FSE-02S	804706	R448A/R449A	10...21	~ 14.5	~ 3,6	~ 1.3	36 bar	125

Selection table FSY

Type	Part No.	Operational Current [A]	Pressure range [bar]	Factory setting [bar]	Max. operating Pressure PS [bar]	Test Pressure PT [bar]	Pressure connection
FSY-41S	0715533	0.1...4	4.0...12.5	8.0	27	30	7/16"-20 UNF female
FSY-42S	0715534		9.2...21.2	15	32	36	7/16"-20 UNF female

Cable Assemblies with Plug

Type	Part No.	Temperature Range [°C]	Cable length [m]
FSE	PS3-N15 804580	-25...+80°C	1.5
	PS3-N30 804581		3.0
	PS3-N60 804582		6.0
FSY	FSF-N15 804640	-50...+80°C	1.5
	FSF-N30 804641		3.0
	FSF-N60 804642		6.0

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

For further technical detail see Technical Bulletin/ Datasheet.

Introduction

Superheat

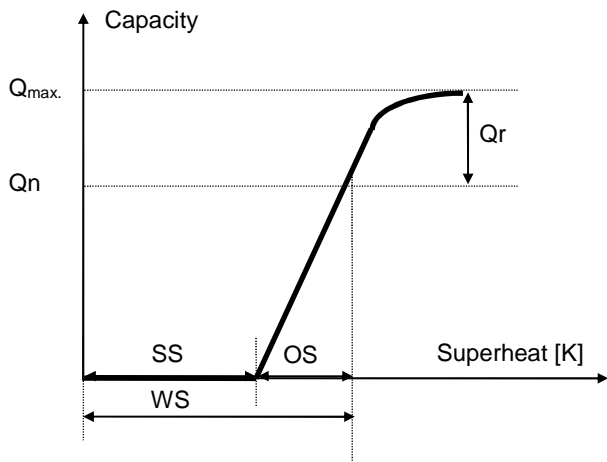
The factory setting of a TI is made with the valve pin just starting to move away from the seat. The superheat increment necessary to get the pin ready to move is called static superheat (SS). An increase of superheat over and beyond the static superheat (factory setting) is necessary for the valve pin to open to its rated capacity. This additional superheat is known as gradient or opening superheat (OS).

The working superheat (WS), which can be measured in the field, is the sum of static superheat and opening superheat.

The opening superheat of TXV varies if the selected valve operates at higher or lower capacities than the rated capacity. It is highly recommended to select the valve according to the rated capacity. Using reserve capacity leads to larger opening superheat and longer pull down time during start-up or after defrost.

Selecting a larger valve than required in a system may lead to smaller opening superheat and/or hunting of TXV.

EMERSON Thermo™-Expansion Valves are factory pre-set for optimum superheat settings. This setting should be modified only if absolutely necessary. The readjustment should be at the **lowest** expected evaporating temperature.



$Q_r = 0$ for TIO-00X and TIO-000
 $Q_r \approx 15\%$ of Q_n for all other orifices
 SS: Static superheat
 OS: Opening superheat
 WS: Working superheat

Subcooling

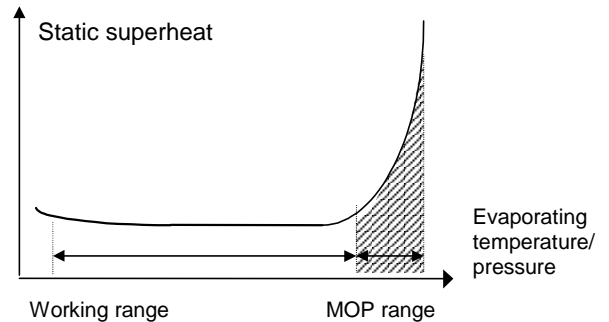
Subcooling generally increases the capacity of a refrigeration system and may be accounted for when dimensioning an expansion valve by applying the correction factor K_t . The capacity corrections for evaporating temperature, condensing temperature and subcooling are all incorporated in K_t . These are in particular the liquid density upstream from the expansion valve, the different enthalpies of liquid and vapor phase refrigerants as well as certain part of flash gas after expansion. The percentage of flash gas differs with various refrigerants and depends on system conditions.

MOP (Maximum Operating Pressure)

MOP functionality is somewhat similar to the application of a crankcase pressure regulator. Evaporator pressures are limited to a maximum value to protect the compressor from overload conditions.

MOP selection should be within maximum allowed suction pressure rating of the compressor and at approximately 3 K above maximum evaporating temperature.

Performance of TXV with MOP function with gas charge



Valve operates as superheat control in normal working range and operates as pressure regulator within MOP range.

Cross ambient

The cross ambient effect occurs on TXV with a gas charge when the temperature at the bulb is higher than temperature at the valve head. The construction of TXV with interchangeable orifice from liquid inlet connection leads that the warmer liquid enters into the bottom of valve and cold refrigerant leaves the valve near the valve head. Therefore the valve head becomes cold.

The chance of cross ambient effect is very great if the total superheat is/becomes large. In many applications gas charges are not suitable for the valve with interchangeable orifice construction unless the valve head is wrapped by an electric strip heater. The adsorption charge with similar MOP function is another solution.

Heavy subcooling results in very small flash gas amounts and therefore **increases expansion valve capacities**. These conditions are not covered. Likewise, small flash gas amounts lead to reduced evaporator capacities and may result in substantial discrepancies between the capacities of the Thermo™-Expansion Valve and the evaporator. These effects must be considered during component selection when designing refrigeration circuits.

Quick selection tables are for very small amount of subcooling. For larger subcooling than 5K, please use Controls navigator selection program.

TI Series - Thermo™-Expansion Valves

EMERSON TI series of Thermo™-Expansion Valves with interchangeable orifices are designed for refrigeration applications such as display cases in supermarkets, walk-in/reach-in coolers, freezers, soft ice cream/ice maker machines, milk tank coolers, transport refrigeration as well as for air conditioning and heat pump systems. TI provides flexibility in selection of capacity and is ideal for those applications requiring compact size with stable and accurate control over wide load and evaporating range.

Features

- Eight interchangeable orifice assemblies provide a capacity range from 0.5...19.4 kW based on R448A
- 45 bar maximum working pressure allows the use of high pressure refrigerants
- Three styles of connections:
 - TILE: Stainless steel brazed fittings eliminate the need of wet rags during brazing
 - TIS(E): Copper brazed fittings (valve requires wet rag during brazing)
 - TI(E): Flare
- Cleanable / exchangeable inlet strainer in orifice assembly
- Constant superheat across a wide application range
- Large diaphragm eliminates disturbances to the valve and provides smoother and consistent valve control
- Laser welded stainless steel power element
- Internal or external equalizer
- Inlet brazing adapter
- Adjustable static superheat
- Special setting upon request an minimum 100 pieces order quantity



TISE



TIE



TILE

Selection table: Orifice assembly (with strainer)

Orifice type	Part No.	Nominal capacity [kW]				
		R448A	R449A	R450A	R513A	R1234ze
TIO-00X	800532	0.50	0.49	0.20	0.21	0.23
TIO-000	800533	1.30	1.27	0.55	0.56	0.63
TIO-001	800534	3.19	3.12	1.30	1.33	1.49
TIO-002	800535	5.28	5.16	2.11	2.16	2.42
TIO-003	800536	8.48	8.28	3.41	3.49	3.91
TIO-004	800537	13.86	13.54	5.66	5.79	6.49
TIO-005	800538	16.85	16.46	6.89	7.05	7.90
TIO-006	800539	19.44	19.00	7.98	8.17	9.15

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use TI quick selection tables in the next pages or Controls Navigator selection program.

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R513A, R1234ze	+4°C dew point	+38°C bubble/ +38°C dew point	1K
R450A		+38°C bubble/ +38.6°C dew point	
R448A, R449A		+38°C bubble/ +42.6°C dew point	

TI Series - Thermo™-Expansion Valves

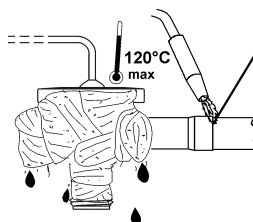
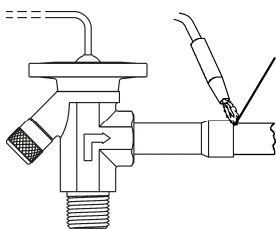
Selection table: Valve bodies without orifice and nuts in single packaging

Refrigerant	Connection	Valves with factory setting and/or new charges					Valve for field setting	
		Type	Part No.	Equalizer	Charge	MOP	Type	Part No.
R448A/ R449A	Braze stainless steel fittings *	TILE-BW (12 mm)		External	Liquid	No	TILE-SW (12 mm)	802465
		TILE-BW (1/2")			Liquid	No	TILE-SW (1/2")	802466
	Braze copper fittings **	TISE-BW (12 mm)			Liquid	No	TISE-SW (12 mm)	802462
		TISE-BW (1/2")			Liquid	No	TISE-SW (1/2")	802464
		TISE-BW30 (1/2")			Vapor	Yes		-
		TISE-BW70 (1/2")			Vapor	Yes	TISE-SW75 (1/2")	802472
		TIS-BW (12 mm)		Internal	Liquid	No	TIS-SW (12 mm)	802461
	TIS-BW (1/2")		Liquid		No	TIS-SW (1/2")	802463	
	Flare fittings	TIE-BW		External	Liquid	No	TIE-SW	802460
		TIE-BW70			Vapor	Yes	TIE-SW75	802470
		TI-BW		Internal	Liquid	No	TI-SW	802459
	R450A	Braze stainless steel fittings *	TILE-DW (12 mm)		External	Liquid	No	TILE-MW (12 mm)
TILE-DW (1/2")				Liquid		No	TILE-MW (1/2")	802452
Braze copper fittings **		TISE-DW (12 mm)		Liquid		No	TISE-MW (12 mm)	802448
		TISE-DW (1/2")		Liquid		No	TISE-MW (1/2")	802450
		TISE-DW55 (12 mm)		Vapor		Yes	TISE-MW55 (12 mm)	802457
		TISE-DW55 (1/2")		Vapor		Yes	TISE-MW55 (1/2")	802458
		TIS-DW (12 mm)		Internal	Liquid	No	TIS-MW (12 mm)	802447
TIS-DW (1/2")			Liquid		No	TIS-MW (1/2")	802449	
Flare fittings		TIE-DW		External	Liquid	No	TIE-MW	802446
		TI-DW		Internal	Liquid	No	TI-MW	802445
R513A	Braze stainless steel fittings *	TILE-CW (12 mm)		External	Liquid	No	TILE-MW (12 mm)	802451
		TILE-CW (1/2")			Liquid	No	TILE-MW (1/2")	802452
	Braze copper fittings **	TISE-CW (12 mm)			Liquid	No	TISE-MW (12 mm)	802448
		TISE-CW (1/2")			Liquid	No	TISE-MW (1/2")	802450
		TISE-CW55 (12 mm)			Vapor	Yes	TISE-MW55 (12 mm)	802457
		TISE-CW55 (1/2")			Vapor	Yes	TISE-MW55 (1/2")	802458
		TIS-CW (12 mm)		Internal	Liquid	No	TIS-MW (12 mm)	802447
	TIS-CW (1/2")		Liquid		No	TIS-MW (1/2")	802449	
	Flare fittings	TIE-CW		External	Liquid	No	TIE-MW	802446
		TI-CW		Internal	Liquid	No	TI-MW	802445
R1234ze	Braze copper fittings **	TISE-EW (12 mm)		External	Liquid	No	TISE-MW (12 mm)	802448
		TISE-EW (1/2")			Liquid	No	TISE-MW (1/2")	802450
		TISE-EW55 (12 mm)			Vapor	Yes	TISE-MW55 (12 mm)	802457
		TISE-EW55 (1/2")			Vapor	Yes	TISE-MW55 (1/2")	802458
		TIS-EW (12 mm)			Liquid	No	TIS-MW (12 mm)	802447
		TIS-EW (1/2")			Liquid	No	TIS-MW (1/2")	802449
	Flare fittings	TIE-EW		Internal	Liquid	No	TIE-MW	802446
		TI-EW			Liquid	No	TI-MW	802445

Note: Please see table on the next page for readjustment in order to be used with HFO/HFO blends.

*) TILE Braze without wet rag

***) TISE Braze with wet rag



TI Series - Thermo™-Expansion Valves

Connections

Body	Inlet connection		Outlet	External equalizer *
	Brazing with adapter	Flare		
TI(E) Flare connections	-	5/8"-18UNF Flare suitable for 6 mm, 8 mm, 10 mm, 1/4", 5/16", 3/8" tubes	3/4"-16UNF Flare: for 12 mm, 1/2" tubes	7/16"-20UNF Flare: for 6 mm, 1/4" tubes
TIS(E) / TILE Brazing connections	TIA-M06 (6 mm ODF) TIA-M10 (10 mm ODF)		12 mm ODF	6 mm ODF
	TIA-014 (1/4" ODF) TIA-038 (3/8" ODF)		1/2" ODF	1/4" ODF

Note: *) TI and TIS with internal equalizer

MOP value, gas charge

Code	MOP [bar]
MW55	3.8
SW75	5.2
BW30	1.6
BW70	4.3

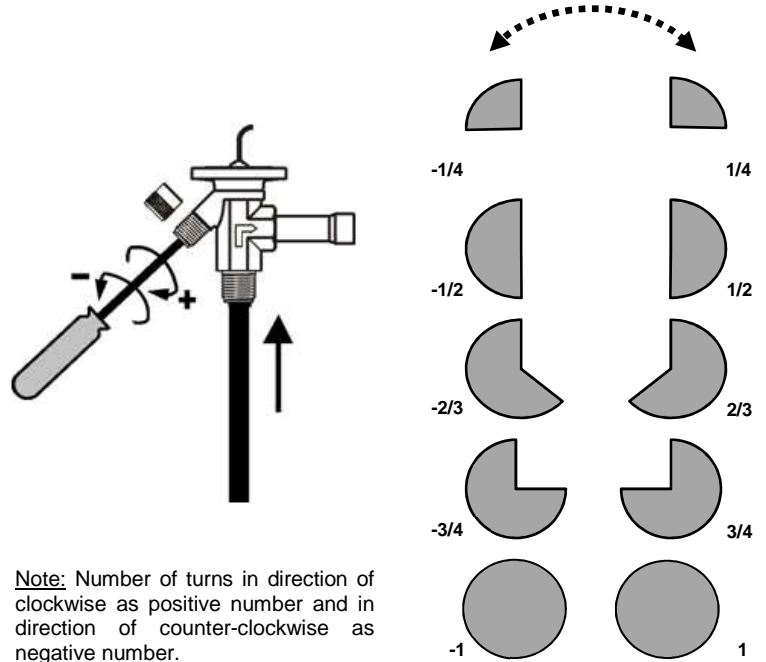


Accessories

Description	Type	Part No.	Connection size
Braze adapter	TIA-M06	802500	6 mm
	TIA-M10	802501	10 mm
	TIA-014	802502	1/4"
	TIA-038	802503	3/8"

The following table/graphic is a guideline for readjustment:

Evaporating temperature [°C]	Number of turn			
	TI...-MW...		TI...-SW...	
	System refrigerant			
	R450A	R513A	R1234ze	R448A R449A
-40	1/3	-1/3	2/3	1-2/3
-35	1/2	-1/2	1	2
-30	2/3	-1/2	1	2-1/4
-25	3/4	-2/3	1-1/3	2-1/2
-20	1	-2/3	1-3/4	3
-15	1-1/4	-1	2-1/3	3-1/2
-10	1-1/2	-1	2-1/2	3-3/4
-5	1-2/3	-1-1/4	3-1/3	4-1/4
0	2	-1-1/3	3-1/2	4-3/4
5	2-1/3	-1,5	4-1/2	5
10	2-2/3	-1-2/3	5-1/4	5-2/3



Note: Number of turns in direction of clockwise as positive number and in direction of counter-clockwise as negative number.

TI Series - Thermo™-Expansion Valves

TI: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A													Orifice type
	Capacity [kW]													
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60 bubble/ 63.4 dew point	0.46	0.46	0.46	0.46	0.46	0.45	0.40	0.34	0.28	0.23	0.18	0.15	0.12	TIO-00x
	1.18	1.20	1.20	1.20	1.19	1.18	1.04	0.88	0.72	0.59	0.47	0.38	0.31	TIO-000
	2.9	2.9	3.0	3.0	2.9	2.9	2.6	2.2	1.8	1.44	1.16	0.94	0.76	TIO-001
	4.8	4.9	4.9	4.9	4.9	4.8	4.3	3.6	3.0	2.4	1.9	1.6	1.3	TIO-002
	7.7	7.8	7.9	7.8	7.8	7.7	6.8	5.8	4.7	3.8	3.1	2.5	2.0	TIO-003
	12.7	12.8	12.8	12.8	12.8	12.6	11.2	9.4	7.7	6.3	5.0	4.1	3.3	TIO-004
	15.4	15.5	15.6	15.6	15.5	15.3	13.6	11.5	9.4	7.6	6.1	4.9	4.0	TIO-005
	17.8	17.9	18.0	18.0	17.9	17.7	15.7	13.2	10.9	8.8	7.1	5.7	4.6	TIO-006
50 bubble/ 54 dew point	0.46	0.47	0.48	0.49	0.49	0.49	0.43	0.37	0.31	0.25	0.20	0.16	0.13	TIO-00x
	1.20	1.23	1.25	1.27	1.27	1.27	1.13	0.96	0.80	0.65	0.53	0.43	0.35	TIO-000
	3.0	3.0	3.1	3.1	3.1	3.1	2.8	2.4	2.0	1.60	1.30	1.05	0.86	TIO-001
	4.9	5.0	5.1	5.2	5.2	5.2	4.6	3.9	3.2	2.6	2.1	1.7	1.4	TIO-002
	7.9	8.1	8.2	8.3	8.3	8.3	7.4	6.3	5.2	4.2	3.4	2.8	2.3	TIO-003
	12.9	13.2	13.4	13.5	13.6	13.6	12.1	10.3	8.5	6.9	5.6	4.6	3.7	TIO-004
	15.6	16.0	16.3	16.5	16.5	16.5	14.7	12.5	10.3	8.4	6.8	5.6	4.5	TIO-005
	18.0	18.5	18.8	19.0	19.1	19.0	17.0	14.4	11.9	9.7	7.9	6.4	5.2	TIO-006
40 bubble/ 44.5 dew point	0.43	0.45	0.47	0.48	0.49	0.49	0.44	0.38	0.32	0.26	0.21	0.17	0.14	TIO-00x
	1.12	1.18	1.22	1.25	1.27	1.28	1.15	0.99	0.82	0.67	0.55	0.45	0.37	TIO-000
	2.8	2.9	3.0	3.1	3.1	3.2	2.8	2.4	2.0	1.66	1.36	1.11	0.91	TIO-001
	4.6	4.8	5.0	5.1	5.2	5.2	4.7	4.0	3.4	2.7	2.2	1.8	1.5	TIO-002
	7.3	7.7	8.0	8.2	8.3	8.4	7.5	6.5	5.4	4.4	3.6	2.9	2.4	TIO-003
	12.0	12.6	13.1	13.4	13.6	13.7	12.3	10.6	8.8	7.2	5.9	4.8	4.0	TIO-004
	14.6	15.3	15.9	16.2	16.5	16.6	15.0	12.8	10.7	8.8	7.2	5.9	4.8	TIO-005
	16.9	17.7	18.3	18.7	19.0	19.2	17.3	14.8	12.3	10.1	8.3	6.8	5.5	TIO-006
30 bubble/ 34.5 dew point	0.36	0.40	0.42	0.45	0.46	0.47	0.43	0.37	0.31	0.26	0.21	0.17	0.14	TIO-00x
	0.94	1.03	1.10	1.16	1.20	1.22	1.11	0.96	0.81	0.67	0.55	0.45	0.37	TIO-000
	2.3	2.5	2.7	2.9	2.9	3.0	2.7	2.4	2.0	1.65	1.35	1.11	0.92	TIO-001
	3.8	4.2	4.5	4.7	4.9	5.0	4.5	3.9	3.3	2.7	2.2	1.8	1.5	TIO-002
	6.1	6.8	7.2	7.6	7.8	8.0	7.3	6.3	5.3	4.4	3.6	3.0	2.4	TIO-003
	10.0	11.0	11.8	12.4	12.8	13.1	11.9	10.3	8.7	7.2	5.9	4.8	4.0	TIO-004
	12.2	13.4	14.4	15.1	15.6	15.9	14.5	12.5	10.5	8.7	7.1	5.9	4.9	TIO-005
	14.0	15.5	16.6	17.4	18.0	18.4	16.7	14.5	12.1	10.0	8.2	6.8	5.6	TIO-006
20 bubble/ 25.3 dew point	0.29	0.34	0.38	0.40	0.42	0.39	0.35	0.29	0.24	0.20	0.17	0.14	TIO-00x	
	0.76	0.89	0.98	1.05	1.10	1.02	0.90	0.76	0.64	0.53	0.44	0.36	TIO-000	
	1.9	2.2	2.4	2.6	2.7	2.5	2.2	1.9	1.56	1.29	1.07	0.89	TIO-001	
	3.1	3.6	4.0	4.3	4.5	4.2	3.7	3.1	2.6	2.1	1.8	1.5	TIO-002	
	5.0	5.8	6.4	6.9	7.2	6.7	5.9	5.0	4.2	3.4	2.8	2.4	TIO-003	
	8.1	9.5	10.5	11.2	11.8	10.9	9.6	8.1	6.8	5.6	4.7	3.9	TIO-004	
	9.9	11.5	12.8	13.7	14.3	13.3	11.7	9.9	8.3	6.8	5.7	4.7	TIO-005	
	11.4	13.3	14.7	15.8	16.5	15.3	13.5	11.4	9.5	7.9	6.5	5.4	TIO-006	
10 bubble/ 15.5 dew point	0.26	0.31	0.35	0.33	0.30	0.26	0.22	0.18	0.15	0.13	TIO-00x			
	0.68	0.81	0.90	0.87	0.78	0.68	0.57	0.48	0.40	0.34	TIO-000			
	1.7	2.0	2.2	2.1	1.9	1.7	1.41	1.18	0.99	0.83	TIO-001			
	2.8	3.3	3.7	3.5	3.2	2.8	2.3	2.0	1.6	1.4	TIO-002			
	4.4	5.3	5.9	5.7	5.1	4.4	3.8	3.1	2.6	2.2	TIO-003			
	7.3	8.7	9.6	9.3	8.4	7.3	6.1	5.1	4.3	3.6	TIO-004			
	8.8	10.5	11.7	11.3	10.2	8.8	7.5	6.2	5.2	4.4	TIO-005			
	10.2	12.1	13.5	13.0	11.7	10.2	8.6	7.2	6.0	5.0	TIO-006			

TI Series - Thermo™-Expansion Valves

TI: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A Capacity [kW]											Orifice type
	Evaporating temperature [°C]											
	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
60	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,17	0,14	0,11	0,09	TIO-00x
	0,53	0,54	0,54	0,54	0,54	0,53	0,52	0,47	0,39	0,31	0,24	TIO-000
	1,26	1,28	1,29	1,29	1,28	1,27	1,25	1,11	0,92	0,73	0,57	TIO-001
	2,06	2,09	2,11	2,11	2,09	2,07	2,03	1,81	1,49	1,19	0,92	TIO-002
	3,33	3,38	3,40	3,40	3,37	3,33	3,28	2,91	2,41	1,91	1,49	TIO-003
	5,52	5,61	5,64	5,64	5,60	5,53	5,44	4,83	4,00	3,17	2,47	TIO-004
	6,72	6,82	6,87	6,86	6,81	6,73	6,62	5,88	4,87	3,86	3,01	TIO-005
	7,79	7,90	7,95	7,95	7,89	7,80	7,67	6,81	5,64	4,47	3,49	TIO-006
50	0,18	0,19	0,19	0,20	0,20	0,20	0,20	0,18	0,15	0,12	0,09	TIO-00x
	0,48	0,51	0,52	0,53	0,53	0,53	0,53	0,47	0,40	0,32	0,25	TIO-000
	1,15	1,20	1,23	1,25	1,26	1,26	1,26	1,13	0,94	0,75	0,59	TIO-001
	1,88	1,96	2,01	2,05	2,06	2,06	2,05	1,84	1,53	1,23	0,97	TIO-002
	3,03	3,16	3,25	3,30	3,32	3,32	3,30	2,96	2,47	1,98	1,56	TIO-003
	5,03	5,24	5,39	5,48	5,52	5,52	5,48	4,92	4,11	3,29	2,58	TIO-004
	6,12	6,38	6,56	6,66	6,71	6,71	6,67	5,98	5,00	4,00	3,15	TIO-005
	7,09	7,39	7,60	7,72	7,77	7,77	7,73	6,93	5,79	4,64	3,64	TIO-006
40	0,14	0,16	0,17	0,18	0,18	0,19	0,19	0,17	0,14	0,12	0,09	TIO-00x
	0,38	0,43	0,46	0,48	0,49	0,50	0,50	0,46	0,39	0,31	0,25	TIO-000
	0,91	1,01	1,08	1,13	1,17	1,19	1,20	1,09	0,92	0,74	0,59	TIO-001
	1,49	1,65	1,77	1,85	1,91	1,94	1,95	1,77	1,50	1,21	0,96	TIO-002
	2,40	2,67	2,85	2,99	3,07	3,13	3,15	2,86	2,41	1,95	1,55	TIO-003
	3,99	4,43	4,74	4,96	5,10	5,19	5,23	4,75	4,01	3,24	2,57	TIO-004
	4,85	5,39	5,77	6,03	6,21	6,32	6,37	5,78	4,88	3,94	3,12	TIO-005
	5,62	6,24	6,68	6,99	7,19	7,32	7,38	6,70	5,65	4,57	3,62	TIO-006
30		0,10	0,13	0,14	0,16	0,16	0,17	0,16	0,13	0,11	0,09	TIO-00x
		0,28	0,34	0,38	0,42	0,44	0,45	0,42	0,36	0,29	0,23	TIO-000
		0,65	0,81	0,91	0,99	1,04	1,07	0,99	0,85	0,69	0,55	TIO-001
		1,07	1,32	1,49	1,61	1,69	1,75	1,61	1,38	1,13	0,91	TIO-002
		1,72	2,13	2,40	2,60	2,73	2,82	2,60	2,23	1,82	1,46	TIO-003
		2,86	3,54	3,99	4,31	4,53	4,68	4,32	3,70	3,03	2,42	TIO-004
		3,48	4,30	4,86	5,24	5,51	5,69	5,26	4,50	3,68	2,95	TIO-005
		4,03	4,99	5,63	6,07	6,38	6,59	6,09	5,22	4,27	3,42	TIO-006
20				0,08	0,11	0,12	0,13	0,13	0,11	0,10	0,08	TIO-00x
				0,21	0,28	0,33	0,36	0,35	0,30	0,25	0,21	TIO-000
				0,49	0,67	0,78	0,85	0,82	0,72	0,60	0,49	TIO-001
				0,80	1,09	1,27	1,39	1,34	1,18	0,99	0,80	TIO-002
				1,29	1,76	2,05	2,25	2,16	1,90	1,59	1,29	TIO-003
				2,15	2,92	3,40	3,73	3,59	3,16	2,64	2,15	TIO-004
				2,61	3,55	4,14	4,54	4,37	3,84	3,21	2,61	TIO-005
				3,02	4,11	4,79	5,26	5,06	4,45	3,72	3,03	TIO-006
10								0,09	0,08	0,07	0,06	TIO-00x
								0,23	0,22	0,19	0,16	TIO-000
								0,54	0,52	0,46	0,39	TIO-001
								0,88	0,85	0,75	0,64	TIO-002
								1,42	1,38	1,22	1,03	TIO-003
								2,36	2,28	2,02	1,70	TIO-004
								2,87	2,78	2,45	2,07	TIO-005
								3,32	3,22	2,84	2,40	TIO-006

TI Series - Thermo™-Expansion Valves

TI: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A Capacity [kW]											Orifice type
	Evaporating temperature [°C]											
	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
60	0,19	0,20	0,20	0,20	0,19	0,19	0,19	0,17	0,14	0,11	0,09	TIO-00x
	0,52	0,52	0,52	0,52	0,52	0,51	0,50	0,44	0,37	0,29	0,23	TIO-000
	1,23	1,24	1,25	1,24	1,23	1,21	1,18	1,05	0,87	0,70	0,55	TIO-001
	2,00	2,03	2,03	2,02	2,00	1,97	1,93	1,72	1,43	1,14	0,89	TIO-002
	3,23	3,27	3,28	3,27	3,23	3,18	3,11	2,77	2,30	1,84	1,44	TIO-003
	5,36	5,43	5,44	5,42	5,36	5,27	5,16	4,59	3,82	3,05	2,39	TIO-004
	6,52	6,60	6,63	6,60	6,52	6,42	6,28	5,59	4,65	3,71	2,91	TIO-005
	7,56	7,65	7,67	7,64	7,56	7,43	7,27	6,47	5,39	4,30	3,37	TIO-006
50	0,18	0,19	0,19	0,20	0,20	0,20	0,20	0,18	0,15	0,12	0,09	TIO-00x
	0,48	0,50	0,52	0,52	0,53	0,53	0,52	0,47	0,39	0,32	0,25	TIO-000
	1,15	1,20	1,23	1,25	1,25	1,25	1,24	1,11	0,94	0,76	0,60	TIO-001
	1,88	1,96	2,00	2,03	2,04	2,04	2,02	1,82	1,53	1,23	0,98	TIO-002
	3,03	3,15	3,23	3,28	3,29	3,28	3,25	2,93	2,46	1,99	1,58	TIO-003
	5,03	5,24	5,37	5,44	5,46	5,45	5,40	4,86	4,09	3,31	2,62	TIO-004
	6,12	6,37	6,53	6,62	6,65	6,63	6,57	5,92	4,98	4,02	3,19	TIO-005
	7,09	7,38	7,57	7,67	7,70	7,68	7,61	6,85	5,77	4,66	3,69	TIO-006
40	0,15	0,16	0,18	0,18	0,19	0,19	0,19	0,17	0,15	0,12	0,10	TIO-00x
	0,40	0,44	0,47	0,49	0,50	0,51	0,51	0,47	0,40	0,32	0,26	TIO-000
	0,94	1,04	1,11	1,16	1,19	1,21	1,21	1,11	0,94	0,77	0,62	TIO-001
	1,53	1,69	1,81	1,89	1,94	1,97	1,98	1,80	1,54	1,25	1,00	TIO-002
	2,47	2,73	2,92	3,04	3,13	3,17	3,19	2,91	2,48	2,02	1,62	TIO-003
	4,10	4,54	4,84	5,05	5,19	5,27	5,30	4,83	4,11	3,36	2,69	TIO-004
	4,99	5,52	5,89	6,15	6,31	6,41	6,45	5,88	5,00	4,09	3,27	TIO-005
	5,78	6,40	6,83	7,12	7,32	7,43	7,47	6,81	5,80	4,73	3,79	TIO-006
30		0,11	0,14	0,15	0,16	0,17	0,18	0,16	0,14	0,12	0,09	TIO-00x
		0,30	0,36	0,40	0,43	0,45	0,47	0,43	0,38	0,31	0,25	TIO-000
		0,70	0,86	0,96	1,03	1,08	1,11	1,03	0,89	0,74	0,60	TIO-001
		1,15	1,40	1,56	1,68	1,76	1,81	1,68	1,45	1,20	0,97	TIO-002
		1,85	2,25	2,52	2,71	2,84	2,92	2,72	2,35	1,94	1,57	TIO-003
		3,08	3,74	4,19	4,50	4,71	4,85	4,51	3,89	3,22	2,61	TIO-004
		3,74	4,55	5,10	5,48	5,74	5,91	5,49	4,74	3,92	3,17	TIO-005
		4,34	5,27	5,91	6,34	6,64	6,84	6,36	5,49	4,54	3,67	TIO-006
20				0,09	0,12	0,13	0,15	0,14	0,12	0,10	0,09	TIO-00x
				0,24	0,31	0,36	0,39	0,37	0,33	0,28	0,23	TIO-000
				0,57	0,74	0,85	0,92	0,88	0,78	0,66	0,54	TIO-001
				0,93	1,20	1,38	1,50	1,44	1,28	1,08	0,89	TIO-002
				1,51	1,94	2,22	2,42	2,33	2,06	1,74	1,43	TIO-003
				2,50	3,22	3,69	4,01	3,86	3,43	2,89	2,37	TIO-004
				3,04	3,92	4,49	4,88	4,70	4,17	3,52	2,89	TIO-005
				3,53	4,55	5,21	5,66	5,45	4,83	4,07	3,35	TIO-006
10								0,10	0,10	0,08	0,07	TIO-00x
								0,27	0,25	0,22	0,19	TIO-000
								0,63	0,60	0,53	0,45	TIO-001
								1,03	0,99	0,87	0,74	TIO-002
								1,67	1,59	1,40	1,19	TIO-003
								2,77	2,64	2,33	1,98	TIO-004
								3,37	3,21	2,84	2,41	TIO-005
								3,90	3,72	3,29	2,79	TIO-006

TI Series - Thermo™-Expansion Valves

TI: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze											Orifice type
	Capacity [kW]											
	Evaporating temperature [°C]											
	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
60	0,23	0,23	0,23	0,23	0,23	0,23	0,22	0,20	0,16	0,13	0,10	TIO-00x
	0,61	0,62	0,62	0,62	0,62	0,61	0,59	0,53	0,44	0,34	0,27	TIO-000
	1,5	1,5	1,5	1,5	1,5	1,4	1,4	1,3	1,0	0,8	0,63	TIO-001
	2,4	2,4	2,4	2,4	2,4	2,4	2,3	2,0	1,7	1,3	1,0	TIO-002
	3,8	3,9	3,9	3,9	3,8	3,8	3,7	3,3	2,7	2,2	1,7	TIO-003
	6,3	6,4	6,5	6,4	6,4	6,3	6,2	5,5	4,5	3,6	2,8	TIO-004
	7,7	7,8	7,9	7,8	7,8	7,7	7,5	6,7	5,5	4,4	3,4	TIO-005
	8,9	9,1	9,1	9,1	9,0	8,9	8,7	7,7	6,4	5,0	3,9	TIO-006
50	0,20	0,21	0,22	0,22	0,23	0,22	0,22	0,20	0,17	0,13	0,10	TIO-00x
	0,55	0,57	0,59	0,60	0,60	0,60	0,60	0,53	0,45	0,36	0,28	TIO-000
	1,3	1,4	1,4	1,4	1,4	1,4	1,4	1,3	1,1	0,8	0,66	TIO-001
	2,1	2,2	2,3	2,3	2,3	2,3	2,3	2,1	1,7	1,4	1,1	TIO-002
	3,4	3,6	3,7	3,7	3,8	3,7	3,7	3,3	2,8	2,2	1,7	TIO-003
	5,7	5,9	6,1	6,2	6,2	6,2	6,2	5,5	4,6	3,7	2,9	TIO-004
	6,9	7,2	7,4	7,5	7,6	7,6	7,5	6,7	5,6	4,5	3,5	TIO-005
	8,0	8,4	8,6	8,7	8,8	8,8	8,7	7,8	6,5	5,2	4,1	TIO-006
40	0,16	0,18	0,19	0,20	0,21	0,21	0,21	0,19	0,16	0,13	0,10	TIO-00x
	0,41	0,47	0,51	0,53	0,55	0,56	0,56	0,51	0,43	0,35	0,27	TIO-000
	1,0	1,1	1,2	1,3	1,3	1,3	1,3	1,2	1,0	0,8	0,65	TIO-001
	1,6	1,8	2,0	2,1	2,1	2,2	2,2	2,0	1,7	1,3	1,1	TIO-002
	2,6	2,9	3,2	3,3	3,4	3,5	3,5	3,2	2,7	2,2	1,7	TIO-003
	4,3	4,9	5,2	5,5	5,7	5,8	5,8	5,3	4,5	3,6	2,8	TIO-004
	5,2	5,9	6,4	6,7	6,9	7,0	7,1	6,5	5,5	4,4	3,5	TIO-005
	6,1	6,9	7,4	7,8	8,0	8,2	8,2	7,5	6,3	5,1	4,0	TIO-006
30		0,10	0,13	0,15	0,17	0,18	0,19	0,17	0,15	0,12	0,10	TIO-00x
		0,26	0,35	0,41	0,45	0,48	0,49	0,46	0,39	0,32	0,26	TIO-000
		0,6	0,8	1,0	1,1	1,1	1,2	1,1	0,9	0,8	0,61	TIO-001
		1,0	1,4	1,6	1,7	1,8	1,9	1,8	1,5	1,2	1,0	TIO-002
		1,7	2,2	2,6	2,8	3,0	3,1	2,9	2,5	2,0	1,6	TIO-003
		2,7	3,7	4,3	4,7	4,9	5,1	4,8	4,1	3,3	2,7	TIO-004
		3,3	4,5	5,2	5,7	6,0	6,2	5,8	5,0	4,1	3,2	TIO-005
		3,9	5,2	6,0	6,6	7,0	7,2	6,7	5,8	4,7	3,7	TIO-006
20					0,10	0,12	0,14	0,14	0,12	0,10	0,08	TIO-00x
					0,27	0,33	0,38	0,37	0,33	0,27	0,22	TIO-000
					0,6	0,8	0,9	0,9	0,8	0,6	0,53	TIO-001
					1,0	1,3	1,5	1,4	1,3	1,1	0,9	TIO-002
					1,7	2,1	2,3	2,3	2,0	1,7	1,4	TIO-003
					2,8	3,5	3,9	3,8	3,4	2,8	2,3	TIO-004
					3,4	4,2	4,7	4,6	4,1	3,4	2,8	TIO-005
					3,9	4,9	5,5	5,4	4,8	4,0	3,2	TIO-006
10									0,08	0,07	0,06	TIO-00x
									0,21	0,19	0,17	TIO-000
									0,5	0,5	0,39	TIO-001
									0,8	0,8	0,6	TIO-002
									1,3	1,2	1,0	TIO-003
									2,2	2,0	1,7	TIO-004
									2,7	2,4	2,1	TIO-005
									3,1	2,8	2,4	TIO-006

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

EMERSON Take-apart Thermo™-Expansion Valves are designed for air conditioning, chillers, rooftops, close control, A/C transportation, heat pumps, industrial cooling process, refrigeration and numerous special applications. The take-apart expansion valves are ideal for those applications requiring flexibility in selection of capacity and excellent stable superheat control under varying operating conditions such as high and low head pressure, wide load variation and partial load down to 10%. Valves with XB power elements can be applied in systems with Copeland Digital Scroll™ Compressors.

Features

- Take-apart design consists of power element, cage and flange
- Large diaphragm eliminates disturbances to the valve and provides smoother and consistent valve control over wide range of operation
- Constant superheat across a wide application range
- ZZ-Series: expansion valves for evaporating temperature down to -100°C
- L / 935-Series: desuperheating of two stage compressors or hot gas bypass applications



Selection table T-Series

Series	Capacity R448A/R449A		Capacity R450A		Capacity R513A		Capacity R1234ze		Orifice Type	Power Element
	Type	[kW]	Type	[kW]	Type	[kW]	Type	[kW]		
TCLE-	25BW	1.9	20DW	1.3	20CW	1.3	20EW	1.1	X22440-B1B	XB1019...1B
	100BW	3.7	50DW	2.5	50CW	2.6	50EW	2.2	X22440-B2B	
	200BW	7.9	100DW	5.4	100CW	5.5	120EW	4.8	X22440-B3B	
	250BW	11.9	150DW	8.1	150CW	8.3	150EW	7.2	X22440-B3.5B	
	300BW	17.3	200DW	11.8	200CW	12.1	200EW	10.5	X22440-B4B	
	500BW	22.1	250DW	15.1	250CW	15.5	300EW	13.4	X22440-B5B	
	800BW	30.3	400DW	20.7	400CW	21.2	450EW	18.4	X22440-B6B	
	1100BW	41.0	500DW	28.0	500CW	28.7	600EW	24.8	X22440-B7B	
TJRE-	15BW	58	8DW	40	8CW	40	9EW	35	X11873-B4B	XB1019...1B
	18BW	74	9DW	50	9CW	52	10EW	45	X11873-B5B	
TERE	23BW	91	11DW	62	11CW	64	13EW	55	X9117-B6B	XC726...2B
	26BW	104	13DW	71	13CW	73	15EW	63	X9117-B7B	
	35BW	143	17DW	98	17CW	100	20EW	86	X9117-B8B	
	44BW	174	22DW	119	22CW	121	24EW	105	X9117-B9B	
TIRE-	60BW	222	31DW	152	31CW	156	35EW	135	X9166-B10B	XC726...2B
THRE-	78BW	252	38DW	173	38CW	177	43EW	153	X9144-B11B	
	98BW	301	47DW	206	47CW	211	53EW	183	X9144-B13B	

Note 1: For detailed information see flange table and connections sizes at the end of T-, L-, 935-, & ZZ Series chapter.

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use quick selection tables in the next pages or Controls Navigator selection program.

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R448A, R449A	+4°C dew point	+38°C bubble / +43°C dew point	1K
R450A		+38°C bubble / +38.6°C dew point	
R513A, R1234ze		+38°C bubble / +38°C dew point	

Important consideration

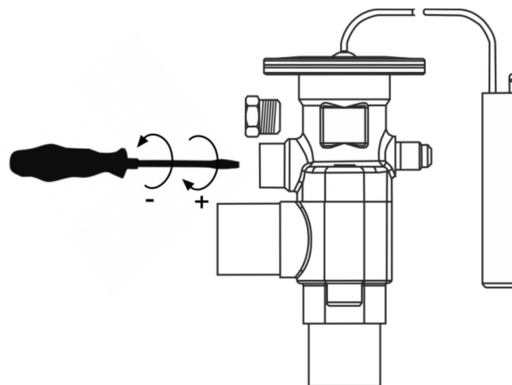
In general, take a part valves are based on three different major parts i.e. power element, cage assembly and flange. It is important to consider the combination of power element with cage assembly as follows:

Valve series	Power element		Cage assembly type	Readjustment of cage assembly
	Type	Charge code		
T-series	XB-1019-...	BW, DW, CW, EW	X22440-B1B...B8B and X11873-B4B...B5B	Factory setting
		SW, MW		Filed setting is required
	XC-726-...	BW, DW, CW, EW	X9117-B6B...B13B	Factory setting
		SW, MW		Filed setting is required
ZZ-series	XC-726-...	BW, SW	X10-B1B...B7B	Filed setting is required
LL-series	XB-1019-...	CL, GL, UL	X22440-B1B...B8B and X11873-B4B...B5B	Factory setting
	XC726-...		X9117-B6B...B10B	
935-series	XB-1019-...	UL, KL, YL, JL, LL	X10-A/B/C01 A/B/C07	Factory setting

Note: BW, DW, CW, EW charges upon request and minimum 100 pieces order quantity.

The following table/graphic is a guideline for readjustment

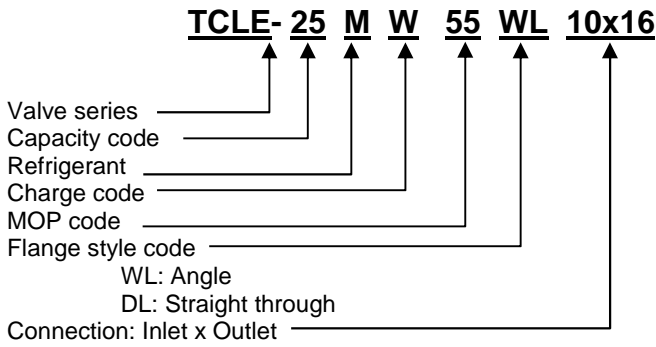
Evaporating temperature [°C]	HFO Power element							
	XB-1019-MW...		XB-1019-SW...		XC726-MW...		XC726-SW...	
	System refrigerant							
	R450A	R513A	R1234ze	R448A/ R449A	R450A	R513A	R1234ze	R448A/ R449A
Number of turn				Number of turn				
-40	1.5	-1.5	3	6.5	2	-2	3.5	8.5
-35	2	-2	3.5	8	2.5	-2.5	5	10
-30	2.5	-2	4.5	9	3	-3	6	12
-25	3	-3	5.5	10.5	4	-3.5	7.5	13.5
-20	4	-3	7	12	5	-4	9.5	15.5
-15	4.5	-3.5	8.5	13.5	6	-5	11.5	18
-10	5.5	-4	10	15	7.5	-5.5	13.5	20
-5	6.5	-5	12.5	17	9	-6.5	16.5	-
0	8	-5.5	15	19	10.5	-7	-	-
5	9.5	-6	18	-	12.5	-8	-	-
10	11	-6.5	-	-	14.5	-9	-	-



Note: Number of turns in direction of clockwise as positive number and in direction of counterclockwise as negative number.

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

Type designation T-Series



Selection table ZZ Series

Series	R448A/ R449A		Orifice	Connection Standard-Flange, Angle Solder/ODF		Power Element
	Type	Nominal Capacity [kW]		[mm]	[inch]	
ZZCE	1BW	1.7	X 10-B01	C501 – 5 mm 10 X 16	C501 - 5 3/8" X 5/8"	XC726 ... 2B
	2BW	3.7	X 10-B02			
	3BW	6.2	X 10-B03			
	5BW	9.8	X 10-B04	C501 – 7 mm 12 X 16	C501 - 7 1/2" X 5/8"	
	6BW	14.8	X 10-B05			
	10BW	19.8	X 10-B06	A 576 mm 16 X 22 (22 X 28 ODM)	A 576 5/8" X 7/8" (7/8" X 1 1/8" ODM)	
	12BW	24.7	X 10-B07			

Note 1: To withstand stress at extremely low temperatures, ZZ-Series valves feature bronze bolts

Note 2: See flange table and connection sizes at the end of T-, L-, 935-, & ZZ Series chapter.

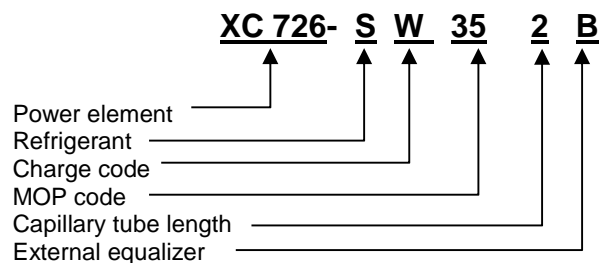
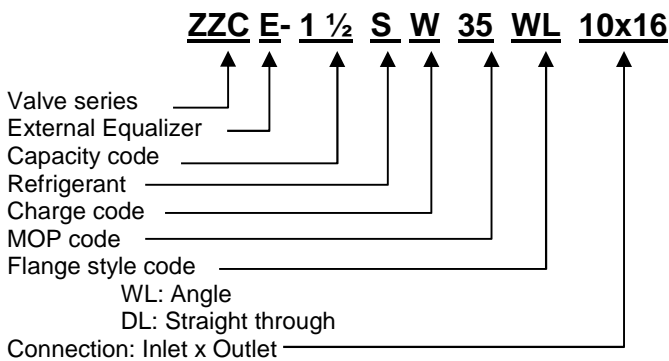
Note 3: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R448A, R449A	-40°C dew point	+25°C bubble / +30°C dew point	1K

For selection of other operating condition, please use quick selection tables in the next pages or Controls Navigator selection program.

Type designation ZZ-Series



Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TCLE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A												Cage assembly type	
	Capacity [kW]													
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60 bubble/ 63.4 dew point	1.7	1.7	1.8	1.8	1.7	1.7	1.5	1.3	1.1	0.9	0.7	0.6	0.5	X22440-B1B
	3.4	3.4	3.4	3.4	3.4	3.4	3.0	2.5	2.1	1.7	1.3	1.1	0.9	X22440-B2B
	7.2	7.3	7.3	7.3	7.2	7.2	6.3	5.4	4.4	3.6	2.9	2.3	1.9	X22440-B3B
	10.8	10.9	11.0	11.0	10.9	10.8	9.6	8.1	6.6	5.4	4.3	3.5	2.8	X22440-B3.5B
	15.7	15.9	16.0	16.0	15.9	15.7	13.9	11.7	9.6	7.8	6.3	5.1	4.1	X22440-B4B
	20.2	20.4	20.5	20.5	20.4	20.2	17.8	15.1	12.4	10.0	8.1	6.5	5.3	X22440-B5B
	27.7	28.0	28.1	28.1	27.9	27.6	24.4	20.6	16.9	13.7	11.0	8.9	7.2	X22440-B6B
	37.4	37.8	38.0	37.9	37.7	37.3	33.0	27.9	22.9	18.5	14.9	12.0	9.7	X22440-B7B
	43.5	44.0	44.2	44.1	43.9	43.4	38.4	32.4	26.6	21.5	17.3	14.0	11.3	X22440-B8B
50 bubble/ 54 dew point	1.8	1.8	1.8	1.8	1.9	1.9	1.7	1.4	1.2	0.9	0.8	0.6	0.5	X22440-B1B
	3.4	3.5	3.6	3.6	3.6	3.6	3.2	2.7	2.3	1.8	1.5	1.2	1.0	X22440-B2B
	7.3	7.5	7.6	7.7	7.7	7.7	6.9	5.9	4.8	3.9	3.2	2.6	2.1	X22440-B3B
	11.0	11.3	11.5	11.6	11.6	11.6	10.3	8.8	7.3	5.9	4.8	3.9	3.2	X22440-B3.5B
	16.0	16.4	16.7	16.8	16.9	16.9	15.0	12.8	10.6	8.6	7.0	5.7	4.6	X22440-B4B
	20.5	21.1	21.4	21.6	21.7	21.7	19.3	16.4	13.6	11.1	9.0	7.3	6.0	X22440-B5B
	28.1	28.8	29.3	29.6	29.7	29.7	26.4	22.5	18.6	15.2	12.3	10.0	8.2	X22440-B6B
	38.0	39.0	39.6	40.0	40.2	40.1	35.7	30.4	25.2	20.5	16.6	13.5	11.0	X22440-B7B
	44.2	45.3	46.1	46.5	46.7	46.6	41.6	35.4	29.3	23.9	19.4	15.7	12.8	X22440-B8B
40 bubble/ 44.5 dew point	1.6	1.7	1.8	1.8	1.9	1.9	1.7	1.4	1.2	1.0	0.8	0.7	0.5	X22440-B1B
	3.2	3.4	3.5	3.6	3.6	3.6	3.3	2.8	2.3	1.9	1.6	1.3	1.1	X22440-B2B
	6.8	7.2	7.4	7.6	7.7	7.8	7.0	6.0	5.0	4.1	3.3	2.7	2.2	X22440-B3B
	10.3	10.8	11.2	11.4	11.6	11.7	10.5	9.0	7.5	6.2	5.0	4.1	3.4	X22440-B3.5B
	15.0	15.7	16.2	16.6	16.9	17.0	15.3	13.1	10.9	9.0	7.3	6.0	4.9	X22440-B4B
	19.2	20.1	20.8	21.3	21.7	21.9	19.6	16.9	14.0	11.5	9.4	7.7	6.3	X22440-B5B
	26.3	27.6	28.5	29.2	29.7	29.9	26.9	23.1	19.2	15.8	12.9	10.5	8.6	X22440-B6B
	35.5	37.3	38.6	39.5	40.1	40.5	36.4	31.2	26.0	21.3	17.4	14.2	11.7	X22440-B7B
	41.3	43.4	44.9	46.0	46.7	47.1	42.3	36.3	30.2	24.8	20.2	16.6	13.6	X22440-B8B
30 bubble/ 33.5 dew point	1.4	1.5	1.6	1.7	1.7	1.8	1.6	1.4	1.2	1.0	0.8	0.7	0.5	X22440-B1B
	2.7	2.9	3.1	3.3	3.4	3.5	3.2	2.7	2.3	1.9	1.6	1.3	1.1	X22440-B2B
	5.7	6.3	6.7	7.0	7.3	7.4	6.8	5.9	4.9	4.1	3.3	2.7	2.3	X22440-B3B
	8.6	9.5	10.1	10.6	11.0	11.2	10.2	8.8	7.4	6.1	5.0	4.1	3.4	X22440-B3.5B
	12.5	13.7	14.7	15.4	15.9	16.3	14.8	12.8	10.8	8.9	7.3	6.0	5.0	X22440-B4B
	16.0	17.6	18.9	19.8	20.4	20.9	19.0	16.5	13.8	11.4	9.4	7.7	6.4	X22440-B5B
	21.9	24.2	25.8	27.1	28.0	28.6	26.0	22.6	18.9	15.6	12.9	10.6	8.7	X22440-B6B
	29.6	32.7	34.9	36.6	37.9	38.7	35.2	30.5	25.6	21.2	17.4	14.3	11.8	X22440-B7B
	34.4	38.0	40.6	42.6	44.0	45.0	40.9	35.5	29.8	24.6	20.2	16.6	13.7	X22440-B8B
20 bubble/ 25.3 dew point	1.1	1.3	1.4	1.5	1.5	1.6	1.5	1.3	1.1	0.9	0.8	0.6	0.5	X22440-B1B
	2.2	2.5	2.8	3.0	3.1	3.1	2.9	2.6	2.2	1.8	1.5	1.2	1.0	X22440-B2B
	4.6	5.4	6.0	6.4	6.7	6.7	6.2	5.5	4.6	3.9	3.2	2.6	2.2	X22440-B3B
	6.9	8.1	9.0	9.6	10.1	9.3	8.2	7.0	5.8	4.8	4.0	3.3	2.8	X22440-B3.5B
	10.1	11.8	13.1	14.0	14.7	13.6	11.9	10.1	8.5	7.0	5.8	4.8	4.0	X22440-B4B
	12.9	15.2	16.8	18.0	18.8	17.4	15.3	13.0	10.8	9.0	7.4	6.2	5.0	X22440-B5B
	17.7	20.8	23.0	24.6	25.8	23.9	21.0	17.8	14.9	12.3	10.2	8.5	7.0	X22440-B6B
	24.0	28.1	31.1	33.2	34.9	32.3	28.4	24.1	20.1	16.6	13.8	11.4	9.5	X22440-B7B
	27.9	32.7	36.1	38.7	40.5	37.5	33.0	28.0	23.4	19.3	16.0	13.3	11.0	X22440-B8B

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TJRE/TERE/TIRE/THRE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A													Cage assembly type
	Capacity [kW]													
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60 bubble/ 63.4 dew point	53	53	54	54	53	53	47	39	32	26	21	17	14	X11873-B4B
	67	68	68	68	68	67	59	50	41	33	27	22	18	X11873-B5B
	83	84	84	84	83	83	73	62	51	41	33	27	22	X9117-B6B
	95	96	96	96	95	94	84	71	58	47	38	30	25	X9117-B7B
	130	132	132	132	131	130	115	97	80	64	52	42	34	X9117-B8B
	158	160	161	161	160	158	140	118	97	78	63	51	41	X9117-B9B
	203	205	206	206	205	203	179	151	124	100	81	65	53	X9166-B10B
	230	233	234	233	232	230	203	172	141	114	92	74	60	X9144-B11B
	275	278	279	279	277	274	242	205	168	136	110	88	72	X9144-B13B
50 bubble/ 54 dew point	54	55	56	56	57	57	50	43	36	29	23	19	16	X11873-B4B
	68	70	71	72	72	72	64	55	45	37	30	24	20	X11873-B5B
	84	86	88	89	89	89	79	67	56	45	37	30	24	X9117-B6B
	96	99	100	101	102	101	90	77	64	52	42	34	28	X9117-B7B
	132	136	138	139	140	140	124	106	88	71	58	47	38	X9117-B8B
	161	165	168	169	170	170	151	129	107	87	70	57	47	X9117-B9B
	206	212	215	217	218	218	194	165	137	111	90	73	60	X9166-B10B
	234	240	244	246	247	247	220	187	155	126	102	83	68	X9144-B11B
	279	286	291	294	295	295	263	224	185	151	122	99	81	X9144-B13B
40 bubble/ 44.5 dew point	50	53	54	56	57	57	51	44	37	30	25	20	16	X11873-B4B
	64	67	69	71	72	73	65	56	47	38	31	26	21	X11873-B5B
	79	83	85	87	89	90	81	69	58	47	39	32	26	X9117-B6B
	90	94	98	100	102	102	92	79	66	54	44	36	30	X9117-B7B
	124	130	134	137	140	141	127	109	90	74	61	50	41	X9117-B8B
	150	158	163	167	170	171	154	132	110	90	74	60	49	X9117-B9B
	193	202	209	214	218	220	197	169	141	116	94	77	63	X9166-B10B
	219	230	238	243	247	249	224	192	160	131	107	88	72	X9144-B11B
	261	274	284	290	295	297	267	229	191	157	128	105	86	X9144-B13B
30 bubble/ 33.5 dew point	42	46	49	52	53	55	50	43	36	30	25	20	17	X11873-B4B
	53	59	63	66	68	70	63	55	46	38	31	26	21	X11873-B5B
	66	72	77	81	84	86	78	68	57	47	38	32	26	X9117-B6B
	75	83	88	93	96	98	89	77	65	54	44	36	30	X9117-B7B
	103	114	122	127	132	135	122	106	89	74	60	50	41	X9117-B8B
	125	138	148	155	160	164	149	129	108	90	74	60	50	X9117-B9B
	161	177	189	199	205	210	191	166	139	115	94	78	64	X9166-B10B
	182	201	215	225	233	238	217	188	158	130	107	88	73	X9144-B11B
	218	240	257	269	278	284	259	224	188	155	128	105	87	X9144-B13B
20 bubble/ 25.3 dew point		34	40	44	47	49	46	40	34	28	23	19	16	X11873-B4B
		43	51	56	60	63	58	51	43	36	30	25	21	X11873-B5B
		53	62	69	74	77	71	63	53	44	37	30	25	X9117-B6B
		61	71	79	84	88	82	72	61	51	42	35	29	X9117-B7B
		83	98	108	116	121	112	99	84	70	58	48	40	X9117-B8B
		101	119	131	141	148	137	120	102	85	70	58	48	X9117-B9B
		130	152	168	180	189	175	154	131	109	90	75	62	X9166-B10B
		148	173	191	205	215	199	175	148	124	102	85	70	X9144-B11B
	176	206	228	244	256	237	209	177	148	122	101	84	X9144-B13B	
10 bubble/ 15.5 dew point				30	36	40	39	35	30	26	21	18	15	X11873-B4B
				39	46	51	49	45	39	33	27	23	19	X11873-B5B
				48	57	63	61	55	47	40	34	28	24	X9117-B6B
				54	65	72	69	63	54	46	38	32	27	X9117-B7B
				75	89	99	95	86	75	63	53	44	37	X9117-B8B
				91	108	121	116	105	91	77	64	54	45	X9117-B9B
				117	139	155	149	134	116	98	82	69	58	X9166-B10B
				132	158	175	169	152	132	112	94	78	65	X9144-B11B
			158	188	209	202	182	158	133	112	93	78	X9144-B13B	

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TCLE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A Capacity [kW]													Cage assembly type
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.0	0.8	0.7	0.5	X22440-B1B
	2.4	2.5	2.5	2.5	2.5	2.4	2.4	2.3	2.3	2.0	1.6	1.3	1.0	X22440-B2B
	5.2	5.3	5.3	5.3	5.3	5.2	5.1	5.0	4.9	4.3	3.5	2.7	2.1	X22440-B3B
	7.9	8.0	8.0	8.0	7.9	7.8	7.7	7.5	7.3	6.4	5.3	4.1	3.2	X22440-B3.5B
	11.4	11.6	11.7	11.6	11.5	11.4	11.2	10.9	10.6	9.3	7.7	6.0	4.6	X22440-B4B
	14.7	14.9	15.0	14.9	14.8	14.6	14.3	14.0	13.6	12.0	9.8	7.7	5.9	X22440-B5B
	20.1	20.4	20.5	20.4	20.3	20.0	19.6	19.2	18.7	16.4	13.4	10.6	8.1	X22440-B6B
	27.2	27.5	27.7	27.6	27.4	27.1	26.6	26.0	25.3	22.2	18.2	14.3	11.0	X22440-B7B
	31.6	32.0	32.2	32.2	31.9	31.5	30.9	30.2	29.4	25.8	21.1	16.6	12.8	X22440-B8B
60	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.1	0.9	0.7	0.6	X22440-B1B
	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.2	1.8	1.4	1.1	X22440-B2B
	4.9	5.1	5.3	5.3	5.4	5.4	5.3	5.3	5.2	4.6	3.8	3.0	2.4	X22440-B3B
	7.4	7.7	7.9	8.0	8.1	8.1	8.0	7.9	7.8	6.9	5.7	4.5	3.5	X22440-B3.5B
	10.8	11.2	11.5	11.7	11.8	11.8	11.7	11.5	11.3	10.1	8.3	6.6	5.2	X22440-B4B
	13.8	14.4	14.8	15.0	15.1	15.1	15.0	14.8	14.6	12.9	10.7	8.5	6.6	X22440-B5B
	18.9	19.7	20.2	20.5	20.7	20.7	20.5	20.3	19.9	17.7	14.6	11.6	9.1	X22440-B6B
	25.6	26.6	27.3	27.8	27.9	27.9	27.7	27.4	26.9	23.9	19.8	15.7	12.2	X22440-B7B
	29.8	31.0	31.8	32.3	32.5	32.5	32.3	31.9	31.3	27.8	23.0	18.3	14.2	X22440-B8B
50	1.0	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.1	0.9	0.8	0.6	X22440-B1B
	1.9	2.1	2.2	2.3	2.4	2.4	2.5	2.5	2.4	2.2	1.8	1.5	1.2	X22440-B2B
	4.1	4.5	4.8	5.0	5.1	5.2	5.2	5.2	5.2	4.7	3.9	3.1	2.5	X22440-B3B
	6.1	6.8	7.2	7.5	7.7	7.9	7.9	7.9	7.9	7.1	5.9	4.7	3.7	X22440-B3.5B
	8.9	9.8	10.5	10.9	11.2	11.4	11.5	11.5	11.4	10.3	8.6	6.9	5.4	X22440-B4B
	11.5	12.6	13.4	14.0	14.4	14.6	14.8	14.8	14.7	13.2	11.0	8.8	6.9	X22440-B5B
	15.7	17.3	18.4	19.2	19.7	20.1	20.2	20.2	20.1	18.0	15.0	12.0	9.5	X22440-B6B
	21.2	23.4	24.9	26.0	26.7	27.1	27.3	27.3	27.1	24.4	20.3	16.3	12.8	X22440-B7B
	24.7	27.2	29.0	30.2	31.0	31.5	31.8	31.8	31.6	28.3	23.7	18.9	14.9	X22440-B8B
40	0.5	0.8	0.9	1.0	1.1	1.1	1.2	1.2	1.2	1.1	0.9	0.7	0.6	X22440-B1B
	1.0	1.5	1.8	2.0	2.1	2.2	2.3	2.3	2.3	2.1	1.8	1.4	1.1	X22440-B2B
	2.2	3.2	3.8	4.2	4.5	4.7	4.9	4.9	5.0	4.5	3.8	3.1	2.4	X22440-B3B
	3.4	4.8	5.7	6.3	6.8	7.1	7.3	7.4	7.5	6.8	5.7	4.6	3.7	X22440-B3.5B
	4.9	7.0	8.3	9.2	9.9	10.3	10.6	10.8	10.9	9.9	8.4	6.8	5.4	X22440-B4B
	6.3	9.0	10.7	11.8	12.7	13.3	13.6	13.9	14.0	12.7	10.7	8.7	6.9	X22440-B5B
	8.6	12.3	14.6	16.2	17.4	18.2	18.7	19.0	19.2	17.4	14.7	11.9	9.4	X22440-B6B
	11.6	16.6	19.7	21.9	23.5	24.5	25.3	25.7	25.9	23.5	19.8	16.0	12.7	X22440-B7B
	13.5	19.3	23.0	25.5	27.3	28.5	29.4	29.9	30.1	27.4	23.1	18.7	14.8	X22440-B8B
30				0.7	0.8	0.9	1.0	1.0	1.1	1.0	0.8	0.7	0.6	X22440-B1B
				1.3	1.6	1.8	1.9	2.0	2.1	1.9	1.6	1.3	1.1	X22440-B2B
				2.7	3.4	3.8	4.1	4.3	4.5	4.1	3.5	2.9	2.3	X22440-B3B
				4.1	5.1	5.7	6.2	6.5	6.7	6.2	5.3	4.3	3.5	X22440-B3.5B
				6.0	7.4	8.3	9.0	9.4	9.7	9.0	7.7	6.3	5.1	X22440-B4B
				7.6	9.5	10.7	11.5	12.1	12.5	11.6	9.9	8.1	6.5	X22440-B5B
				10.5	13.0	14.6	15.8	16.6	17.1	15.8	13.6	11.1	8.9	X22440-B6B
				14.2	17.5	19.8	21.3	22.4	23.2	21.4	18.3	15.0	12.0	X22440-B7B
				16.5	20.4	23.0	24.8	26.1	26.9	24.9	21.3	17.4	14.0	X22440-B8B

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TCLE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A Capacity [kW]													Cage assembly type
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	0.9	0.8	0.6	0.5	X22440-B1B
	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.1	1.8	1.5	1.2	0.9	X22440-B2B
	5.0	5.1	5.1	5.0	5.0	4.9	4.7	4.6	4.4	3.9	3.2	2.5	1.9	X22440-B3B
	7.5	7.6	7.6	7.6	7.5	7.3	7.1	6.9	6.7	5.9	4.8	3.8	2.9	X22440-B3.5B
	11.0	11.1	11.1	11.0	10.9	10.6	10.4	10.1	9.7	8.5	7.0	5.5	4.2	X22440-B4B
	14.1	14.2	14.2	14.1	13.9	13.7	13.3	12.9	12.5	10.9	9.0	7.0	5.4	X22440-B5B
	19.3	19.5	19.5	19.3	19.1	18.7	18.2	17.7	17.1	15.0	12.3	9.7	7.4	X22440-B6B
	26.0	26.3	26.3	26.2	25.8	25.3	24.7	23.9	23.1	20.2	16.6	13.0	10.1	X22440-B7B
	30.3	30.6	30.6	30.4	30.0	29.4	28.7	27.8	26.8	23.5	19.3	15.2	11.7	X22440-B8B
60	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.1	0.9	0.7	0.6	X22440-B1B
	2.3	2.4	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.1	1.7	1.4	1.1	X22440-B2B
	4.9	5.1	5.2	5.3	5.3	5.3	5.2	5.1	5.0	4.5	3.7	3.0	2.3	X22440-B3B
	7.4	7.7	7.9	8.0	8.0	8.0	7.9	7.7	7.6	6.7	5.6	4.5	3.5	X22440-B3.5B
	10.8	11.2	11.4	11.6	11.6	11.6	11.4	11.3	11.0	9.8	8.2	6.5	5.1	X22440-B4B
	13.8	14.3	14.7	14.9	14.9	14.8	14.7	14.4	14.1	12.6	10.5	8.4	6.6	X22440-B5B
	18.9	19.6	20.1	20.4	20.4	20.3	20.1	19.8	19.3	17.2	14.3	11.4	9.0	X22440-B6B
	25.6	26.6	27.2	27.5	27.6	27.5	27.2	26.7	26.2	23.3	19.4	15.5	12.1	X22440-B7B
	29.7	30.9	31.6	32.0	32.1	32.0	31.6	31.1	30.4	27.1	22.5	18.0	14.1	X22440-B8B
50	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.1	1.0	0.8	0.6	X22440-B1B
	2.0	2.2	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.2	1.9	1.5	1.2	X22440-B2B
	4.2	4.6	4.9	5.1	5.2	5.3	5.3	5.3	5.3	4.7	4.0	3.2	2.6	X22440-B3B
	6.3	6.9	7.4	7.7	7.9	8.0	8.0	8.0	7.9	7.1	6.0	4.9	3.8	X22440-B3.5B
	9.2	10.1	10.7	11.2	11.5	11.6	11.7	11.6	11.5	10.4	8.7	7.1	5.6	X22440-B4B
	11.8	13.0	13.8	14.3	14.7	14.9	15.0	14.9	14.8	13.3	11.2	9.1	7.2	X22440-B5B
	16.2	17.7	18.9	19.6	20.1	20.4	20.5	20.4	20.2	18.2	15.3	12.4	9.8	X22440-B6B
	21.8	24.0	25.5	26.5	27.2	27.6	27.7	27.6	27.4	24.6	20.7	16.8	13.3	X22440-B7B
	25.4	27.9	29.7	30.9	31.6	32.1	32.2	32.1	31.8	28.7	24.1	19.5	15.5	X22440-B8B
40	0.6	0.8	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.1	1.0	0.8	0.6	X22440-B1B
	1.1	1.6	1.9	2.1	2.2	2.3	2.4	2.4	2.4	2.2	1.9	1.5	1.2	X22440-B2B
	2.4	3.4	4.0	4.4	4.7	4.9	5.1	5.1	5.2	4.7	4.0	3.3	2.6	X22440-B3B
	3.6	5.1	6.0	6.7	7.1	7.4	7.6	7.7	7.8	7.1	6.0	4.9	3.9	X22440-B3.5B
	5.3	7.4	8.7	9.7	10.3	10.8	11.1	11.2	11.3	10.3	8.8	7.2	5.7	X22440-B4B
	6.8	9.5	11.2	12.4	13.3	13.8	14.2	14.4	14.5	13.2	11.3	9.2	7.4	X22440-B5B
	9.3	13.0	15.4	17.0	18.2	18.9	19.5	19.8	19.9	18.1	15.4	12.6	10.1	X22440-B6B
	12.5	17.6	20.8	23.0	24.5	25.6	26.3	26.7	26.9	24.5	20.8	17.0	13.6	X22440-B7B
	14.6	20.4	24.2	26.7	28.6	29.8	30.6	31.1	31.2	28.5	24.2	19.8	15.8	X22440-B8B
30				0.7	0.9	1.0	1.1	1.1	1.1	1.1	0.9	0.8	0.6	X22440-B1B
				1.4	1.7	1.9	2.1	2.2	2.2	2.1	1.8	1.5	1.2	X22440-B2B
				3.0	3.6	4.1	4.4	4.6	4.7	4.4	3.8	3.1	2.5	X22440-B3B
				4.5	5.5	6.1	6.6	6.9	7.1	6.6	5.7	4.7	3.8	X22440-B3.5B
				6.6	8.0	8.9	9.6	10.1	10.4	9.6	8.3	6.9	5.6	X22440-B4B
				8.4	10.2	11.5	12.3	12.9	13.3	12.3	10.7	8.8	7.1	X22440-B5B
				11.5	14.0	15.7	16.9	17.7	18.2	16.9	14.6	12.1	9.8	X22440-B6B
				15.6	19.0	21.2	22.8	23.9	24.6	22.9	19.7	16.3	13.2	X22440-B7B
				18.1	22.1	24.7	26.5	27.8	28.6	26.6	23.0	19.0	15.4	X22440-B8B

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TJRE/TERE/TIRE/THRE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A													Cage assembly type
	Capacity [kW]													
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	38	39	39	39	39	38	37	37	36	31	26	20	16	X11873-B4B
	49	50	50	50	49	49	48	47	45	40	33	26	20	X11873-B5B
	60	61	61	61	61	60	59	57	56	49	40	32	24	X9117-B6B
	69	70	70	70	69	68	67	66	64	56	46	36	28	X9117-B7B
	94	96	96	96	95	94	92	90	88	77	63	50	38	X9117-B8B
	115	117	117	117	116	115	112	110	107	94	77	60	47	X9117-B9B
	147	149	150	150	149	147	144	141	137	120	99	77	60	X9166-B10B
	167	170	170	170	169	167	163	160	155	137	112	88	68	X9144-B11B
	200	202	204	203	202	199	195	191	186	163	134	105	81	X9144-B13B
60	36	38	39	39	39	39	39	39	38	34	28	22	17	X11873-B4B
	46	48	49	50	50	50	50	49	49	43	36	28	22	X11873-B5B
	57	59	61	61	62	62	61	61	60	53	44	35	27	X9117-B6B
	65	67	69	70	71	71	70	69	68	61	50	40	31	X9117-B7B
	89	93	95	97	97	97	96	95	94	83	69	55	43	X9117-B8B
	108	113	116	118	118	118	117	116	114	101	84	67	52	X9117-B9B
	139	145	148	151	152	151	150	149	146	130	107	85	66	X9166-B10B
	158	164	168	171	172	172	171	169	166	147	122	97	75	X9144-B11B
	188	196	201	204	205	205	204	201	198	176	145	115	90	X9144-B13B
50	30	33	35	37	38	38	39	39	38	34	29	23	18	X11873-B4B
	38	42	45	47	48	49	49	49	49	44	37	29	23	X11873-B5B
	47	52	55	57	59	60	60	60	60	54	45	36	28	X9117-B6B
	54	59	63	66	68	69	69	69	69	62	51	41	32	X9117-B7B
	74	81	87	90	93	94	95	95	94	85	71	57	45	X9117-B8B
	90	99	105	110	113	115	116	116	115	103	86	69	54	X9117-B9B
	115	127	135	141	145	147	148	148	147	132	110	88	69	X9166-B10B
	131	144	153	160	164	167	168	168	167	150	125	100	79	X9144-B11B
	156	172	183	191	196	199	201	201	199	179	149	120	94	X9144-B13B
40	16	23	28	31	33	35	36	36	37	33	28	23	18	X11873-B4B
	21	30	36	39	42	44	45	46	47	42	36	29	23	X11873-B5B
	26	37	44	49	52	54	56	57	57	52	44	36	28	X9117-B6B
	29	42	50	55	59	62	64	65	66	60	50	41	32	X9117-B7B
	40	58	69	76	82	85	88	89	90	82	69	56	44	X9117-B8B
	49	70	84	93	99	104	107	109	110	100	84	68	54	X9117-B9B
	63	90	107	119	127	133	137	139	141	128	108	87	69	X9166-B10B
	71	102	121	135	144	151	156	158	160	145	122	99	78	X9144-B11B
	85	122	145	161	172	180	186	189	190	173	146	118	93	X9144-B13B
30				20	25	28	30	32	33	30	26	21	17	X11873-B4B
				25	32	36	38	40	42	39	33	27	22	X11873-B5B
				31	39	44	47	50	51	47	41	33	27	X9117-B6B
				36	44	50	54	57	59	54	46	38	30	X9117-B7B
				49	61	69	74	78	81	74	64	52	42	X9117-B8B
				60	74	84	90	95	98	91	78	63	51	X9117-B9B
				77	95	107	116	122	126	116	99	81	65	X9166-B10B
				87	108	122	131	138	143	132	113	92	74	X9144-B11B
				104	129	145	157	165	170	157	135	110	88	X9144-B13B

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TJRE/TERE/TIRE/THRE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A Capacity [kW]													Cage assembly type
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	37	37	37	37	36	36	35	34	33	29	23	18	14	X11873-B4B
	47	47	47	47	46	46	44	43	42	36	30	23	18	X11873-B5B
	58	58	58	58	57	56	55	53	51	45	37	29	22	X9117-B6B
	66	67	67	66	65	64	62	61	58	51	42	33	25	X9117-B7B
	91	92	92	91	90	88	86	83	80	70	58	45	35	X9117-B8B
	110	111	112	111	109	107	104	101	98	86	70	55	43	X9117-B9B
	141	143	143	142	140	137	134	130	125	110	90	71	55	X9166-B10B
	160	162	162	161	159	156	152	147	142	125	102	80	62	X9144-B11B
	191	193	194	192	190	186	181	176	170	149	122	96	74	X9144-B13B
60	36	37	38	39	39	39	38	38	37	33	27	22	17	X11873-B4B
	46	48	49	50	50	49	49	48	47	42	35	28	22	X11873-B5B
	57	59	60	61	61	61	60	59	58	52	43	34	27	X9117-B6B
	65	67	69	70	70	70	69	68	66	59	49	39	31	X9117-B7B
	89	92	95	96	96	96	95	93	91	81	67	54	42	X9117-B8B
	108	112	115	116	117	116	115	113	111	99	82	66	51	X9117-B9B
	139	144	147	149	150	149	147	145	142	126	105	84	66	X9166-B10B
	157	163	167	169	170	169	167	165	161	143	119	95	75	X9144-B11B
	188	195	200	202	203	202	200	196	192	171	142	114	89	X9144-B13B
50	31	34	36	37	38	39	39	39	39	35	29	24	19	X11873-B4B
	39	43	46	48	49	50	50	50	49	44	37	30	24	X11873-B5B
	48	53	56	59	60	61	61	61	61	55	46	37	29	X9117-B6B
	55	61	65	67	69	70	70	70	69	62	52	42	34	X9117-B7B
	76	83	89	92	95	96	96	96	95	86	72	58	46	X9117-B8B
	92	102	108	112	115	117	117	117	116	104	88	71	56	X9117-B9B
	118	130	138	144	148	150	150	150	149	134	113	91	72	X9166-B10B
	134	148	157	163	167	170	171	170	168	152	128	103	82	X9144-B11B
	160	176	187	195	200	203	204	203	201	181	152	123	98	X9144-B13B
40	18	25	29	32	35	36	37	38	38	35	29	24	19	X11873-B4B
	23	32	37	41	44	46	47	48	48	44	38	31	25	X11873-B5B
	28	39	46	51	54	57	58	59	59	54	46	38	30	X9117-B6B
	32	44	53	58	62	65	67	68	68	62	53	43	34	X9117-B7B
	44	61	72	80	85	89	92	93	93	85	73	59	47	X9117-B8B
	53	74	88	97	104	108	111	113	114	104	88	72	58	X9117-B9B
	68	95	113	125	133	139	143	145	146	133	113	92	74	X9166-B10B
	77	108	128	142	151	158	162	164	165	151	128	105	84	X9144-B11B
	92	129	153	169	180	188	193	196	197	180	153	125	100	X9144-B13B
30				22	27	30	32	34	35	32	28	23	19	X11873-B4B
				28	34	38	41	43	44	41	36	29	24	X11873-B5B
				35	42	47	51	53	54	51	44	36	29	X9117-B6B
				39	48	54	58	60	62	58	50	41	33	X9117-B7B
				54	66	74	79	83	86	80	69	57	46	X9117-B8B
				66	80	90	97	101	104	97	84	69	56	X9117-B9B
				85	103	115	124	130	133	124	107	89	72	X9166-B10B
				96	117	131	140	147	151	141	122	100	81	X9144-B11B
				115	139	156	168	176	181	168	145	120	97	X9144-B13B

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TCLE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze													Cage assembly type
	Capacity [kW]													
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	0.9	0.7	0.6	0.4	X22440-B1B
	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	1.8	1.4	1.1	0.9	X22440-B2B
	4.7	4.8	4.8	4.8	4.7	4.6	4.5	4.4	4.3	3.8	3.1	2.4	1.8	X22440-B3B
	7.1	7.2	7.2	7.2	7.1	7.0	6.8	6.6	6.4	5.7	4.6	3.6	2.8	X22440-B3.5B
	10.3	10.4	10.5	10.4	10.3	10.1	9.9	9.7	9.4	8.2	6.7	5.2	4.0	X22440-B4B
	13.2	13.4	13.4	13.4	13.2	13.0	12.7	12.4	12.0	10.5	8.6	6.7	5.1	X22440-B5B
	18.1	18.3	18.4	18.3	18.1	17.8	17.4	17.0	16.5	14.4	11.8	9.2	7.0	X22440-B6B
	24.4	24.8	24.8	24.7	24.5	24.1	23.6	23.0	22.3	19.5	16.0	12.5	9.5	X22440-B7B
	28.4	28.8	28.9	28.8	28.5	28.0	27.4	26.7	25.9	22.7	18.6	14.5	11.1	X22440-B8B
60	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	0.8	0.6	0.5	X22440-B1B
	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	1.9	1.6	1.2	1.0	X22440-B2B
	4.4	4.5	4.7	4.7	4.8	4.7	4.7	4.6	4.5	4.0	3.3	2.6	2.0	X22440-B3B
	6.6	6.8	7.0	7.1	7.2	7.1	7.1	7.0	6.8	6.1	5.0	4.0	3.1	X22440-B3.5B
	9.5	9.9	10.2	10.4	10.4	10.4	10.3	10.1	9.9	8.8	7.3	5.8	4.5	X22440-B4B
	12.2	12.8	13.1	13.3	13.4	13.3	13.2	13.0	12.8	11.3	9.4	7.4	5.7	X22440-B5B
	16.8	17.5	17.9	18.2	18.3	18.2	18.1	17.8	17.5	15.5	12.8	10.1	7.8	X22440-B6B
	22.7	23.6	24.3	24.6	24.7	24.7	24.4	24.1	23.6	21.0	17.3	13.7	10.6	X22440-B7B
	26.4	27.5	28.2	28.6	28.8	28.7	28.4	28.0	27.5	24.4	20.2	15.9	12.3	X22440-B8B
50	0.8	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.0	0.8	0.7	0.5	X22440-B1B
	1.6	1.8	2.0	2.0	2.1	2.1	2.1	2.1	2.1	1.9	1.6	1.3	1.0	X22440-B2B
	3.5	3.9	4.2	4.4	4.5	4.6	4.6	4.6	4.5	4.1	3.4	2.7	2.1	X22440-B3B
	5.3	5.9	6.3	6.6	6.8	6.9	6.9	6.9	6.8	6.1	5.1	4.1	3.2	X22440-B3.5B
	7.7	8.5	9.1	9.5	9.8	10.0	10.0	10.0	10.0	8.9	7.5	5.9	4.6	X22440-B4B
	9.8	10.9	11.7	12.3	12.6	12.8	12.9	12.9	12.8	11.5	9.6	7.6	6.0	X22440-B5B
	13.5	15.0	16.0	16.8	17.3	17.5	17.6	17.6	17.5	15.7	13.1	10.5	8.2	X22440-B6B
	18.2	20.3	21.7	22.7	23.3	23.7	23.9	23.8	23.7	21.2	17.7	14.1	11.0	X22440-B7B
	21.2	23.6	25.2	26.4	27.1	27.6	27.8	27.7	27.5	24.7	20.6	16.4	12.8	X22440-B8B
40	0.6	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.8	0.6	0.5	X22440-B1B
	1.2	1.5	1.7	1.8	1.9	2.0	2.0	2.0	2.0	1.8	1.5	1.2	1.0	X22440-B2B
	2.6	3.2	3.6	3.9	4.1	4.2	4.3	4.3	4.3	3.9	3.3	2.7	2.1	X22440-B3B
	3.8	4.8	5.4	5.8	6.1	6.3	6.4	6.5	6.5	5.9	5.0	4.0	3.2	X22440-B3.5B
	5.6	6.9	7.8	8.5	8.9	9.2	9.3	9.4	9.4	8.5	7.2	5.8	4.6	X22440-B4B
	7.2	8.9	10.1	10.9	11.4	11.8	12.0	12.1	12.1	11.0	9.3	7.5	5.9	X22440-B5B
	9.8	12.2	13.8	14.9	15.6	16.1	16.4	16.5	16.5	15.0	12.7	10.2	8.1	X22440-B6B
	13.3	16.5	18.6	20.1	21.1	21.8	22.2	22.3	22.3	20.3	17.2	13.8	10.9	X22440-B7B
	15.5	19.2	21.6	23.4	24.5	25.3	25.8	26.0	26.0	23.6	20.0	16.1	12.7	X22440-B8B
30	0.5	0.6	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.7	0.6	0.5	X22440-B1B	
	0.9	1.3	1.5	1.6	1.7	1.8	1.8	1.8	1.6	1.4	1.1	0.9	X22440-B2B	
	2.0	2.7	3.1	3.4	3.6	3.8	3.8	3.8	3.5	3.0	2.5	2.0	X22440-B3B	
	3.0	4.1	4.7	5.2	5.5	5.7	5.7	5.7	5.3	4.5	3.7	2.9	X22440-B3.5B	
	4.4	5.9	6.9	7.5	8.0	8.3	8.3	8.3	7.7	6.6	5.4	4.3	X22440-B4B	
	5.7	7.6	8.8	9.6	10.2	10.6	10.6	10.6	9.8	8.4	6.9	5.5	X22440-B5B	
	7.8	10.4	12.1	13.2	14.0	14.5	14.5	14.5	13.5	11.6	9.4	7.5	X22440-B6B	
	10.5	14.1	16.3	17.9	18.9	19.6	19.6	19.6	18.2	15.6	12.8	10.2	X22440-B7B	
	12.2	16.3	19.0	20.8	22.0	22.8	22.8	22.8	21.2	18.2	14.8	11.8	X22440-B8B	

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

TJRE/TERE/TIRE/THRE: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze													Cage assembly type
	Capacity [kW]													
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	35	35	35	35	35	34	33	32	31	28	23	18	13	X11873-B4B
	44	45	45	45	44	43	42	41	40	35	29	22	17	X11873-B5B
	54	55	55	55	54	53	52	51	49	43	35	28	21	X9117-B6B
	62	63	63	63	62	61	60	58	56	49	40	32	24	X9117-B7B
	85	86	86	86	85	84	82	80	77	68	56	43	33	X9117-B8B
	104	105	105	105	104	102	100	97	94	83	68	53	40	X9117-B9B
	133	134	135	134	133	131	128	125	121	106	87	68	52	X9166-B10B
	151	152	153	152	151	148	145	141	137	120	98	77	59	X9144-B11B
	180	182	183	182	180	177	173	169	164	144	117	92	70	X9144-B13B
60	32	33	34	35	35	35	34	34	33	30	24	19	15	X11873-B4B
	41	43	44	44	45	44	44	43	43	38	31	25	19	X11873-B5B
	50	52	54	54	55	55	54	53	52	46	38	30	23	X9117-B6B
	57	60	61	62	63	62	62	61	60	53	44	35	27	X9117-B7B
	79	82	84	86	86	86	85	84	82	73	60	48	37	X9117-B8B
	96	100	103	104	105	104	103	102	100	89	73	58	45	X9117-B9B
	123	128	132	133	134	134	133	131	128	114	94	74	58	X9166-B10B
	140	145	149	151	152	152	150	148	145	129	107	84	65	X9144-B11B
	167	174	178	181	182	181	180	177	174	154	127	101	78	X9144-B13B
50	26	29	31	32	33	33	34	34	33	30	25	20	16	X11873-B4B
	33	36	39	41	42	43	43	43	43	38	32	25	20	X11873-B5B
	40	45	48	50	52	52	53	53	52	47	39	31	24	X9117-B6B
	46	51	55	57	59	60	60	60	60	54	45	36	28	X9117-B7B
	63	70	75	79	81	82	83	83	82	74	62	49	38	X9117-B8B
	77	86	92	96	99	100	101	101	100	90	75	60	47	X9117-B9B
	99	110	118	123	127	129	129	129	128	115	96	77	60	X9166-B10B
	112	125	134	140	144	146	147	147	146	131	109	87	68	X9144-B11B
	134	149	159	167	171	174	175	175	174	156	130	104	81	X9144-B13B
40	19	23	26	28	30	31	31	32	29	24	20	15	X11873-B4B	
	24	30	34	36	38	39	40	40	37	31	25	20	X11873-B5B	
	29	36	41	44	47	48	49	49	45	38	31	24	X9117-B6B	
	34	42	47	51	53	55	56	57	51	43	35	28	X9117-B7B	
	46	57	65	70	73	76	77	78	71	60	48	38	X9117-B8B	
	56	70	79	85	89	92	94	95	86	73	59	46	X9117-B9B	
	72	89	101	109	115	118	120	121	110	93	75	59	X9166-B10B	
	82	101	115	124	130	134	136	138	125	106	85	67	X9144-B11B	
	98	121	137	148	155	160	163	164	149	126	102	80	X9144-B13B	
30	15	20	23	25	27	28	26	22	18	14	X11873-B4B			
	19	25	29	32	34	35	33	28	23	18	X11873-B5B			
	23	31	36	40	42	43	40	35	28	23	X9117-B6B			
	27	36	41	45	48	50	46	40	32	26	X9117-B7B			
	36	49	57	62	66	68	63	54	44	35	X9117-B8B			
	44	60	69	76	80	83	77	66	54	43	X9117-B9B			
	57	76	89	97	103	106	99	85	69	55	X9166-B10B			
	65	87	100	110	116	121	112	96	79	63	X9144-B11B			
	77	103	120	131	139	144	134	115	94	75	X9144-B13B			

Note 1: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

ZZ-Series: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A								Cage assembly type
	Capacity [kW]								
	Evaporating temperature [°C]								
	-40	-45	-50	-55	-60	-65	-70	-75	
40 bubble/ 44.5 dew point	1.7	1.4	1.1	0.9	0.7	0.6	0.4	0.3	X10-B01
	3.5	2.9	2.4	1.9	1.5	1.2	0.9	0.7	X10-B02
	5.9	4.9	4.0	3.2	2.6	2.0	1.6	1.2	X10-B03
	9.4	7.8	6.4	5.1	4.1	3.2	2.5	1.9	X10-B04
	14.1	11.7	9.6	7.8	6.2	4.9	3.8	2.9	X10-B05
	18.8	15.6	12.8	10.3	8.2	6.5	5.0	3.8	X10-B06
	23.5	19.5	15.9	12.9	10.3	8.1	6.3	4.8	X10-B07
30 bubble/ 34.5 dew point	1.7	1.4	1.1	0.9	0.7	0.6	0.5	0.3	X10-B01
	3.5	2.9	2.4	2.0	1.6	1.2	1.0	0.7	X10-B02
	5.9	4.9	4.0	3.3	2.6	2.1	1.6	1.2	X10-B03
	9.4	7.8	6.4	5.2	4.2	3.3	2.6	2.0	X10-B04
	14.2	11.8	9.7	7.9	6.3	5.0	3.9	3.0	X10-B05
	18.9	15.7	12.9	10.5	8.4	6.7	5.2	4.0	X10-B06
	23.6	19.6	16.2	13.1	10.5	8.3	6.5	5.0	X10-B07
20 bubble/ 25.3 dew point	1.6	1.3	1.1	0.9	0.7	0.6	0.5	0.3	X10-B01
	3.4	2.8	2.3	1.9	1.5	1.2	1.0	0.7	X10-B02
	5.7	4.8	3.9	3.2	2.6	2.1	1.6	1.2	X10-B03
	9.0	7.6	6.3	5.1	4.1	3.3	2.6	2.0	X10-B04
	13.7	11.5	9.5	7.7	6.2	4.9	3.9	3.0	X10-B05
	18.2	15.2	12.6	10.3	8.3	6.6	5.2	4.0	X10-B06
	22.7	19.0	15.8	12.9	10.4	8.2	6.4	5.0	X10-B07
10 bubble/ 15.5 dew point	1.5	1.2	1.0	0.9	0.7	0.5	0.4	0.3	X10-B01
	3.1	2.6	2.2	1.8	1.5	1.2	0.9	0.7	X10-B02
	5.2	4.4	3.7	3.0	2.4	2.0	1.5	1.2	X10-B03
	8.3	7.0	5.9	4.8	3.9	3.1	2.4	1.9	X10-B04
	12.6	10.6	8.9	7.3	5.9	4.7	3.7	2.8	X10-B05
	16.8	14.2	11.8	9.7	7.8	6.3	4.9	3.8	X10-B06
	20.9	17.7	14.7	12.1	9.8	7.8	6.1	4.7	X10-B07
0 bubble/ 5.7 dew point	1.3	1.1	0.9	0.8	0.6	0.5	0.4	0.3	X10-B01
	2.7	2.3	1.9	1.6	1.3	1.1	0.8	0.6	X10-B02
	4.6	3.9	3.3	2.7	2.2	1.8	1.4	1.1	X10-B03
	7.3	6.2	5.2	4.3	3.5	2.8	2.2	1.7	X10-B04
	11.0	9.4	7.9	6.5	5.3	4.3	3.4	2.6	X10-B05
	14.6	12.5	10.5	8.7	7.1	5.7	4.5	3.5	X10-B06
	18.3	15.6	13.1	10.9	8.8	7.1	5.6	4.3	X10-B07
-10 bubble/ -4.2 dew point	1.0	0.9	0.8	0.6	0.5	0.4	0.3	0.3	X10-B01
	2.1	1.9	1.6	1.4	1.1	0.9	0.7	0.6	X10-B02
	3.6	3.2	2.7	2.3	1.9	1.5	1.2	0.9	X10-B03
	5.8	5.1	4.3	3.6	3.0	2.4	1.9	1.5	X10-B04
	8.7	7.6	6.5	5.5	4.5	3.7	2.9	2.3	X10-B05
	11.6	10.2	8.7	7.3	6.0	4.9	3.9	3.0	X10-B06
	14.4	12.7	10.9	9.1	7.5	6.1	4.8	3.8	X10-B07
-20 bubble/ -14.1 dew point	0.6	0.6	0.5	0.5	0.4	0.3	0.3	0.2	X10-B01
	1.3	1.2	1.1	1.0	0.8	0.7	0.6	0.4	X10-B02
	2.1	2.1	1.9	1.7	1.4	1.2	0.9	0.7	X10-B03
	3.4	3.3	3.1	2.7	2.3	1.9	1.5	1.2	X10-B04
	5.1	5.1	4.6	4.0	3.4	2.8	2.3	1.8	X10-B05
	6.9	6.7	6.1	5.4	4.5	3.7	3.0	2.4	X10-B06
	8.6	8.4	7.7	6.7	5.7	4.7	3.8	3.0	X10-B07

Selection Table: L-series

Valve Series	Size code*	Capacity [kW]				Cage Type	Angle flange Type / connection		Power Element
		R448A/ R449A	R450A	R513A	R1234ze		Metric	Imperial	
LCLE-	1-*	1.9	1.3	1.3	1.1	X22440-B1B	C501-5 mm	C501-5	XB1019...1B
	2-*	3.7	2.5	2.6	2.2	X22440-B2B			
	3-*	7.9	5.4	5.5	4.8	X22440-B3B			
	3.5-*	11.9	8.1	8.3	7.2	X22440-B3.5B			
	4-*	17.3	11.8	12.1	10.5	X22440-B4B	C501-7 mm	C501-7	
	6-*	22.1	15.1	15.5	13.4	X22440-B5B			
	7-*	30.3	20.7	21.2	18.4	X22440-B6B	A576-mm	A576	
	9-*	41.0	28.0	28.7	24.8	X22440-B7B			
10-*	47.7	32.6	33.4	28.9	X22440-B8B				
LJRE-	11-*	58	40	40	35	X11873-B4B	10331	10331	XC726...2B
	12-*	74	50	52	45	X11873-B5B			
LERE-	13-*	91	62	64	55	X9117-B6B	9153 mm	9153	
	14-*	104	71	73	63	X9117-B7B			
	15-*	143	98	100	86	X9117-B8B			
	16-*	174	119	121	105	X9117-B9B			
LIRE-	17-*	222	152	156	135	X9166-B10B			

Note 1: See flange table and connection sizes at the end of T-, L-, 935-, & ZZ Series chapter.

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

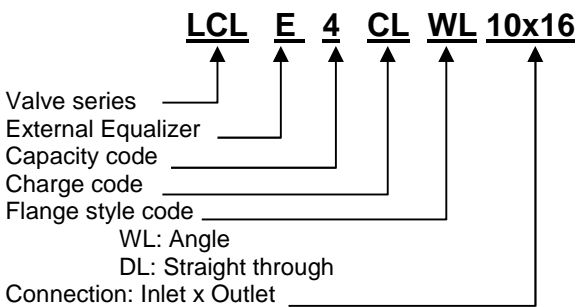
Please see the next page for nominal capacity rating conditions as desuperheating. For selection of other operating condition, please use Controls Navigator selection program.

Valve selection for desuperheating of suction gas in conjunction with hot gas bypass

The required bypass capacity (Q_{byp} [kW]) has to be multiplied with correction factors K_{ti} per table belows:

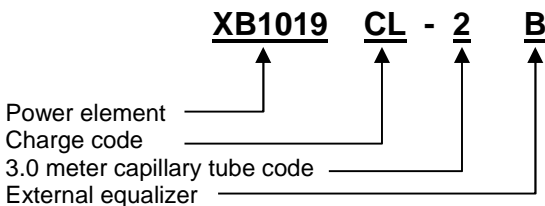
Condensing temperature [°C]	Evaporating temperature [°C]						Condensing temperature [°C]	Evaporating temperature [°C]					
	-20	-15	-10	-5	0	5		-20	-15	-10	-5	0	5
R450A/R513A	Correction factors K _{ti}						R1234ze	Correction factors K _{ti}					
20	0.41	0.36	0.32	0.28	0.25	0.22	20	0.42	0.37	0.33	0.29	0.25	0.22
25	0.45	0.40	0.35	0.31	0.28	0.25	25	0.46	0.41	0.36	0.32	0.28	0.25
30	0.49	0.44	0.39	0.35	0.31	0.28	30	0.51	0.45	0.40	0.36	0.32	0.28
35	0.54	0.49	0.43	0.39	0.35	0.31	35	0.56	0.50	0.44	0.39	0.35	0.32
40	0.60	0.54	0.48	0.43	0.39	0.35	40	0.62	0.55	0.49	0.44	0.39	0.35
45	0.66	0.59	0.53	0.48	0.43	0.39	45	0.68	0.61	0.54	0.49	0.44	0.39
50	0.74	0.66	0.59	0.53	0.48	0.43	50	0.76	0.67	0.60	0.54	0.49	0.44

Type designation L-Series



* Suction gas superheat selection

Refrigerant	Charge code *		
	CL	GL	UL
R448A	16 K	27 K	
R449A	16 K	27 K	
R450A		9 K	27 K
R513A		16 K	33 K
R1234ze			24 K



Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

Selection table: 935-series

Valve Series	Size and code	Capacity [kW]				Cage Type	Angle flange Type / connection		Power Element
		R448A/ R449A	R450A	R513A	R1234ze		Metric	Imperial	
935*-	A	5.2	3.5	3.6	3.1	X10-**01	C501-5 mm	C501-5	XB1019-***-2A
	B	10.1	6.9	7.1	6.1	X10-**02			
	C	14.2	9.7	9.9	8.6	X10-**03			
	D	21.0	14.4	14.7	12.8	X10-**04	C501-7 mm	C501-7	
	E	28.8	19.7	20.2	17.5	X10-**05			
	G	41.1	28.1	28.8	24.9	X10-**06	A576-mm	A576	
	X	59.8	40.9	41.9	36.3	X10-**07			

*) Temperature code	Temperature range [°C]	**) Spring code
3	-1...+17	B
6	+14...+38	C
105	+44...+70	C
106	+66...+94	C
100	+94...+121	C

***) Charge code
UL
KL
YL
JL
LL

Note 1: See flange table and connection sizes at the end of T-, L-, 935-, & ZZ Series chapter.

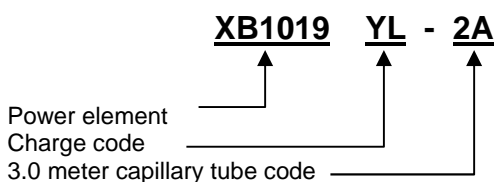
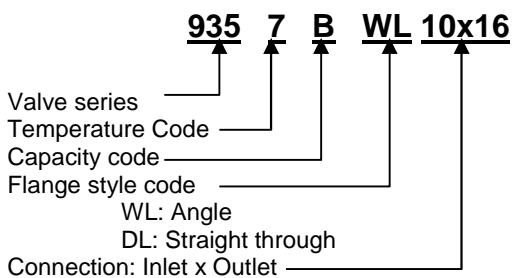
Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

The nominal capacity is based on the following conditions: 935- and L-series:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R448A, R449A	+4°C dew point	+38°C bubble / +43°C dew point	1K
R450A		+38°C bubble / +38.6°C dew point	
R513A, R1234ze		+38°C bubble / +38°C dew point	

For selection of other operating condition, please use quick selection tables in the next pages or Controls Navigator selection program.

Type designation 935-Series



Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

935-Series: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R448A/R449A Capacity [kW]													Cage assembly type
	Evaporating temperature [°C]													
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60 bubble/ 63.4 dew point	4.7	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.5	4.4	4.3	4.1	4.0	935-A
	9.2	9.3	9.3	9.3	9.3	9.2	9.0	8.9	8.7	8.5	8.3	8.0	7.8	935-B
	12.9	13.1	13.1	13.1	13.0	12.9	12.7	12.5	12.2	12.0	11.6	11.3	11.0	935-C
	19.2	19.4	19.5	19.5	19.4	19.2	18.9	18.6	18.2	17.8	17.3	16.8	16.3	935-D
	26.3	26.6	26.7	26.7	26.5	26.2	25.9	25.4	24.9	24.3	23.7	23.0	22.3	935-E
	37.5	37.9	38.1	38.0	37.8	37.4	36.9	36.3	35.5	34.7	33.8	32.8	31.8	935-G
	54.6	55.2	55.4	55.4	55.0	54.5	53.7	52.8	51.7	50.5	49.2	47.8	46.3	935-X
50 bubble/ 54 dew point	4.8	4.9	5.0	5.1	5.1	5.1	5.0	5.0	4.9	4.9	4.8	4.7	4.5	935-A
	9.3	9.6	9.7	9.8	9.9	9.9	9.8	9.7	9.6	9.4	9.2	9.0	8.8	935-B
	13.1	13.5	13.7	13.8	13.9	13.9	13.8	13.6	13.5	13.3	13.0	12.7	12.4	935-C
	19.5	20.0	20.3	20.5	20.6	20.6	20.5	20.3	20.0	19.7	19.3	18.9	18.5	935-D
	26.7	27.4	27.9	28.1	28.2	28.2	28.0	27.8	27.4	27.0	26.5	25.9	25.3	935-E
	38.1	39.1	39.7	40.1	40.3	40.2	40.0	39.6	39.1	38.4	37.7	36.9	36.0	935-G
	55.5	56.9	57.9	58.4	58.6	58.5	58.2	57.6	56.9	56.0	54.9	53.8	52.5	935-X
40 bubble/ 44.5 dew point	4.5	4.7	4.9	5.0	5.1	5.1	5.1	5.1	5.1	5.0	5.0	4.9	4.8	935-A
	8.7	9.2	9.5	9.7	9.9	9.9	10.0	10.0	9.9	9.8	9.7	9.5	9.4	935-B
	12.3	12.9	13.3	13.7	13.9	14.0	14.0	14.0	13.9	13.8	13.6	13.4	13.1	935-C
	18.2	19.1	19.8	20.3	20.6	20.8	20.8	20.8	20.7	20.5	20.2	19.9	19.5	935-D
	25.0	26.2	27.1	27.8	28.2	28.5	28.5	28.5	28.3	28.0	27.7	27.2	26.8	935-E
	35.6	37.4	38.7	39.6	40.2	40.6	40.7	40.6	40.4	40.0	39.5	38.8	38.1	935-G
	51.9	54.4	56.3	57.7	58.6	59.1	59.2	59.1	58.8	58.2	57.5	56.6	55.5	935-X
30 bubble/ 34.5 dew point	3.7	4.1	4.4	4.6	4.8	4.9	5.0	5.0	5.0	5.0	5.0	4.9	4.9	935-A
	7.3	8.0	8.6	9.0	9.3	9.5	9.7	9.7	9.7	9.7	9.7	9.6	9.4	935-B
	10.2	11.3	12.1	12.7	13.1	13.4	13.6	13.7	13.7	13.7	13.6	13.4	13.3	935-C
	15.2	16.8	17.9	18.8	19.4	19.9	20.2	20.3	20.4	20.3	20.2	20.0	19.7	935-D
	20.8	23.0	24.6	25.7	26.6	27.2	27.6	27.8	27.9	27.8	27.6	27.4	27.0	935-E
	29.7	32.7	35.0	36.7	37.9	38.8	39.4	39.7	39.8	39.7	39.4	39.0	38.5	935-G
	43.2	47.7	51.0	53.5	55.3	56.5	57.3	57.8	57.9	57.7	57.4	56.8	56.1	935-X
20 bubble/ 25.3 dew point			3.6	3.9	4.2	4.4	4.6	4.7	4.7	4.8	4.8	4.7	4.7	935-A
			6.9	7.6	8.2	8.6	8.8	9.0	9.2	9.2	9.2	9.2	9.1	935-B
			9.7	10.7	11.5	12.0	12.4	12.7	12.9	13.0	13.0	13.0	12.9	935-C
			14.4	15.9	17.1	17.9	18.5	18.9	19.2	19.3	19.3	19.2	19.1	935-D
			19.7	21.8	23.4	24.5	25.3	25.9	26.2	26.4	26.4	26.4	26.2	935-E
			28.2	31.1	33.3	34.9	36.1	36.9	37.4	37.7	37.7	37.6	37.3	935-G
			41.0	45.3	48.5	50.9	52.6	53.7	54.5	54.8	54.9	54.7	54.3	935-X
10 bubble/ 15.5 dew point					3.2	3.6	3.9	4.1	4.2	4.3	4.3	4.4	4.4	935-A
					6.3	7.0	7.5	7.9	8.2	8.3	8.4	8.5	8.5	935-B
					8.8	9.8	10.6	11.1	11.5	11.7	11.9	11.9	12.0	935-C
					13.1	14.6	15.7	16.5	17.0	17.4	17.6	17.8	17.8	935-D
					18.0	20.0	21.5	22.6	23.3	23.9	24.2	24.3	24.3	935-E
					25.7	28.6	30.7	32.2	33.3	34.0	34.5	34.7	34.7	935-G
					37.4	41.6	44.7	46.9	48.5	49.5	50.2	50.5	50.5	935-X

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

935-Series: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R450A													Cage assembly type
	Capacity [kW]													
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
60	3.2	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.0	2.5	2.0	1.5	935-A
	6.3	6.5	6.7	6.8	6.9	6.9	6.8	6.7	6.6	5.9	4.9	3.9	3.0	935-B
	8.8	9.2	9.4	9.6	9.7	9.6	9.6	9.5	9.3	8.3	6.8	5.4	4.2	935-C
	13.1	13.7	14.0	14.3	14.3	14.3	14.2	14.1	13.8	12.3	10.2	8.1	6.3	935-D
	18.0	18.7	19.2	19.5	19.6	19.6	19.5	19.3	18.9	16.8	13.9	11.0	8.6	935-E
	25.7	26.7	27.4	27.8	28.0	28.0	27.8	27.5	27.0	24.0	19.8	15.8	12.3	935-G
	37.4	38.9	39.9	40.5	40.8	40.8	40.5	40.0	39.3	34.9	28.9	22.9	17.9	935-X
50	2.7	3.0	3.1	3.3	3.4	3.4	3.5	3.5	3.4	3.1	2.6	2.1	1.6	935-A
	5.2	5.7	6.1	6.4	6.6	6.7	6.7	6.7	6.7	6.0	5.0	4.0	3.1	935-B
	7.3	8.1	8.6	9.0	9.2	9.4	9.4	9.4	9.4	8.4	7.0	5.6	4.4	935-C
	10.9	12.0	12.8	13.3	13.7	13.9	14.0	14.0	13.9	12.5	10.4	8.4	6.6	935-D
	14.9	16.4	17.5	18.3	18.8	19.1	19.2	19.2	19.1	17.1	14.3	11.4	9.0	935-E
	21.3	23.4	25.0	26.0	26.7	27.2	27.4	27.4	27.2	24.4	20.4	16.3	12.8	935-G
	31.0	34.1	36.3	37.9	39.0	39.6	39.9	39.9	39.6	35.6	29.7	23.8	18.7	935-X
40		2.1	2.5	2.8	3.0	3.1	3.2	3.3	3.3	3.0	2.5	2.0	1.6	935-A
		4.1	4.9	5.4	5.8	6.0	6.2	6.3	6.4	5.8	4.9	3.9	3.1	935-B
		5.7	6.8	7.6	8.1	8.5	8.7	8.9	9.0	8.1	6.9	5.5	4.4	935-C
		8.5	10.1	11.3	12.0	12.6	13.0	13.2	13.3	12.1	10.2	8.2	6.5	935-D
		11.7	13.9	15.4	16.5	17.3	17.8	18.1	18.2	16.5	14.0	11.3	8.9	935-E
		16.6	19.8	22.0	23.5	24.6	25.3	25.8	26.0	23.6	19.9	16.1	12.7	935-G
		24.2	28.8	32.0	34.3	35.8	36.9	37.5	37.8	34.3	29.0	23.4	18.6	935-X
30				1.8	2.2	2.5	2.7	2.8	2.9	2.7	2.3	1.9	1.5	935-A
				3.5	4.3	4.9	5.2	5.5	5.7	5.3	4.5	3.7	2.9	935-B
				4.9	6.1	6.8	7.4	7.7	8.0	7.4	6.3	5.2	4.1	935-C
				7.3	9.0	10.1	11.0	11.5	11.9	11.0	9.4	7.7	6.2	935-D
				10.0	12.3	13.9	15.0	15.8	16.3	15.1	12.9	10.5	8.4	935-E
				14.2	17.6	19.8	21.4	22.5	23.2	21.5	18.4	15.0	12.0	935-G
				20.7	25.6	28.9	31.2	32.7	33.8	31.3	26.8	21.9	17.5	935-X

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

935-Series: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R513A Capacity [kW]													Cage assembly type
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
60	3.2	3.4	3.4	3.5	3.5	3.5	3.4	3.4	3.3	2.9	2.5	2.0	1.5	935-A
	6.3	6.5	6.7	6.8	6.8	6.8	6.7	6.6	6.4	5.7	4.8	3.8	3.0	935-B
	8.8	9.2	9.4	9.5	9.5	9.5	9.4	9.2	9.0	8.0	6.7	5.3	4.2	935-C
	13.1	13.6	14.0	14.1	14.2	14.1	14.0	13.7	13.4	12.0	9.9	7.9	6.2	935-D
	18.0	18.7	19.1	19.3	19.4	19.3	19.1	18.8	18.4	16.4	13.6	10.9	8.5	935-E
	25.6	26.6	27.2	27.6	27.7	27.5	27.2	26.8	26.2	23.3	19.4	15.5	12.2	935-G
	37.3	38.8	39.7	40.2	40.3	40.1	39.7	39.0	38.2	34.0	28.3	22.6	17.7	935-X
50	2.8	3.0	3.2	3.4	3.4	3.5	3.5	3.5	3.5	3.1	2.6	2.1	1.7	935-A
	5.4	5.9	6.3	6.5	6.7	6.8	6.8	6.8	6.7	6.1	5.1	4.1	3.3	935-B
	7.5	8.3	8.8	9.2	9.4	9.5	9.6	9.5	9.5	8.5	7.2	5.8	4.6	935-C
	11.2	12.3	13.1	13.6	14.0	14.2	14.2	14.2	14.1	12.7	10.6	8.6	6.8	935-D
	15.4	16.9	17.9	18.7	19.1	19.4	19.5	19.4	19.2	17.3	14.6	11.8	9.3	935-E
	21.9	24.0	25.6	26.6	27.3	27.6	27.8	27.7	27.4	24.7	20.8	16.8	13.3	935-G
	31.9	35.0	37.2	38.7	39.7	40.3	40.4	40.3	40.0	36.0	30.3	24.5	19.4	935-X
40		2.2	2.6	2.9	3.1	3.2	3.3	3.4	3.4	3.1	2.6	2.2	1.7	935-A
		4.3	5.1	5.7	6.0	6.3	6.5	6.6	6.6	6.0	5.1	4.2	3.3	935-B
		6.1	7.2	7.9	8.5	8.8	9.1	9.2	9.3	8.5	7.2	5.9	4.7	935-C
		9.0	10.7	11.8	12.6	13.2	13.5	13.7	13.8	12.6	10.7	8.7	7.0	935-D
		12.4	14.6	16.2	17.3	18.0	18.5	18.8	18.9	17.2	14.7	12.0	9.6	935-E
		17.6	20.8	23.1	24.6	25.7	26.4	26.8	26.9	24.6	20.9	17.1	13.7	935-G
		25.7	30.3	33.6	35.8	37.4	38.4	39.0	39.2	35.8	30.4	24.9	19.9	935-X
30				2.0	2.4	2.7	2.9	3.0	3.1	2.9	2.5	2.1	1.7	935-A
				3.8	4.7	5.2	5.6	5.9	6.0	5.6	4.9	4.0	3.2	935-B
				5.4	6.6	7.3	7.9	8.3	8.5	7.9	6.8	5.6	4.6	935-C
				8.0	9.7	10.9	11.7	12.3	12.6	11.7	10.1	8.4	6.8	935-D
				11.0	13.3	14.9	16.0	16.8	17.3	16.1	13.9	11.5	9.3	935-E
				15.6	19.0	21.3	22.9	24.0	24.7	22.9	19.8	16.4	13.2	935-G
				22.8	27.7	31.0	33.3	34.9	35.9	33.4	28.8	23.8	19.3	935-X

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

935-Series: Quick selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature [°C]	R1234ze													Cage assembly type
	Capacity [kW]													
	Evaporating temperature [°C]													
	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	
60	2.9	3.0	3.1	3.1	3.1	3.1	3.1	3.0	3.0	2.7	2.2	1.7	1.3	935-A
	5.6	5.8	6.0	6.0	6.1	6.1	6.0	5.9	5.8	5.2	4.3	3.4	2.6	935-B
	7.8	8.2	8.4	8.5	8.5	8.5	8.4	8.3	8.2	7.2	6.0	4.7	3.7	935-C
	11.6	12.1	12.5	12.6	12.7	12.7	12.5	12.4	12.1	10.8	8.9	7.0	5.4	935-D
	15.9	16.6	17.1	17.3	17.4	17.3	17.2	16.9	16.6	14.7	12.2	9.6	7.5	935-E
	22.7	23.7	24.3	24.7	24.8	24.7	24.5	24.2	23.7	21.0	17.4	13.7	10.6	935-G
	33.1	34.5	35.4	35.9	36.1	36.0	35.7	35.2	34.5	30.6	25.3	20.0	15.5	935-X
50	2.3	2.6	2.7	2.9	3.0	3.0	3.0	3.0	3.0	2.7	2.2	1.8	1.4	935-A
	4.5	5.0	5.3	5.6	5.7	5.8	5.9	5.9	5.8	5.2	4.4	3.5	2.7	935-B
	6.3	7.0	7.5	7.8	8.1	8.2	8.2	8.2	8.2	7.3	6.1	4.9	3.8	935-C
	9.3	10.4	11.1	11.6	12.0	12.2	12.3	12.2	12.1	10.9	9.1	7.3	5.7	935-D
	12.8	14.2	15.3	16.0	16.4	16.7	16.8	16.8	16.6	14.9	12.5	9.9	7.8	935-E
	18.2	20.3	21.7	22.7	23.4	23.8	23.9	23.9	23.7	21.3	17.8	14.2	11.1	935-G
	26.6	29.6	31.7	33.1	34.1	34.6	34.8	34.8	34.5	31.0	25.9	20.6	16.1	935-X
40		1.7	2.1	2.4	2.5	2.7	2.8	2.8	2.8	2.6	2.2	1.7	1.4	935-A
		3.3	4.0	4.6	4.9	5.2	5.4	5.4	5.5	5.0	4.2	3.4	2.7	935-B
		4.6	5.7	6.4	6.9	7.3	7.5	7.7	7.7	7.0	5.9	4.8	3.8	935-C
		6.8	8.5	9.6	10.3	10.8	11.2	11.4	11.5	10.4	8.8	7.1	5.6	935-D
		9.3	11.6	13.1	14.1	14.8	15.3	15.6	15.7	14.3	12.1	9.7	7.7	935-E
		13.3	16.5	18.7	20.1	21.2	21.8	22.2	22.4	20.4	17.2	13.9	10.9	935-G
		19.4	24.1	27.2	29.3	30.8	31.8	32.4	32.6	29.6	25.1	20.2	15.9	935-X
30				1.3	1.8	2.1	2.3	2.4	2.5	2.3	2.0	1.6	1.3	935-A
				2.6	3.5	4.0	4.4	4.6	4.8	4.5	3.8	3.1	2.5	935-B
				3.6	4.9	5.6	6.2	6.5	6.8	6.3	5.4	4.4	3.5	935-C
				5.4	7.2	8.4	9.2	9.7	10.1	9.3	8.0	6.6	5.2	935-D
				7.4	9.9	11.5	12.6	13.3	13.8	12.8	11.0	9.0	7.2	935-E
				10.5	14.1	16.4	17.9	19.0	19.7	18.2	15.7	12.8	10.2	935-G
				15.3	20.5	23.8	26.1	27.6	28.6	26.6	22.8	18.6	14.9	935-X

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Thermo™-Expansion Valves T-, L-, 935-, ZZ-Series

Flanges: T-Series

Valve series	Orifice type	Angle style		Straight through		Connection (inlet x outlet)	
		Type	Part No.	Type	Part No.	Metric	Imperial
TCLE / LCLE	X22440-B1B / B2B/ B3B / B3.5B / B4B	C501-5	803232	9761-3	803240	-	3/8"x5/8" ODF
		C501-5mm	803233	9761-3mm	803241	10 x16 mm ODF	
	X22440-B5B / B6B	C501-7	803234	9761-4	803350		1/2"x5/8" ODF
		C501-7mm	803235	9761-4mm	803243	12 x16 mm ODF	-
	X22440-B7B / B8B	-	-	6346-17	803330	16 x22 mm ODF	5/8"x7/8" ODF
		A576	803238	-	-	-	5/8"x7/8" ODF 7/8"x1-1/8" ODM
A576-mm		803239	-	-	16 x22 mm ODF 22 x28 mm ODM	-	
TJRE / LJRE	X11873-B4B / B5B	10331	803338	10332	803324	22 x22 mm ODF	7/8"x7/8" ODF 1-1/8"x1-1/8" ODM
TERE/ TIRE LERE/ LIRE	X9117-B6B / B7B / B8B / B9B / B10B	9153	803244	9152	803286	-	7/8"x7/8" ODF 1-1/8"x1-1/8" ODM
		9153-mm	803245	9152-mm	803287	22 x22 mm ODF 22 x28 mm ODM	
THRE	X9144-B11B / B13B	9149	803284	9148	803283	22 x22 mm ODF	7/8"x7/8" ODF 1-1/8"x1-1/8" ODM

Flanges: 935- / ZZ-Series*

Valve series	Orifice type	Angle style		Straight through		Connection (inlet x outlet)	
		Type	Part No.	Type	Part No.	Metric	Imperial
935 / ZZ	X10-*01 / *02 / *03	C501-5	803232	9761-3	803240	-	3/8"x5/8" ODF
		C501-5mm	803233	9761-3mm	803241	10 x16 mm ODF	
	X10-*04 / *05	C501-7	803234	9761-4	803350		1/2"x5/8" ODF
		C501-7mm	803235	9761-4mm	803243	12 x16 mm ODF	-
	X10-*06 / *07	-	-	6346-17	803330	16 x22 mm ODF	5/8"x7/8" ODF
		A576	803238	-	-	-	5/8"x7/8" ODF 7/8"x1-1/8" ODM
A576-mm		803239	-	-	16 x22 mm ODF 22 x28 mm ODM	-	

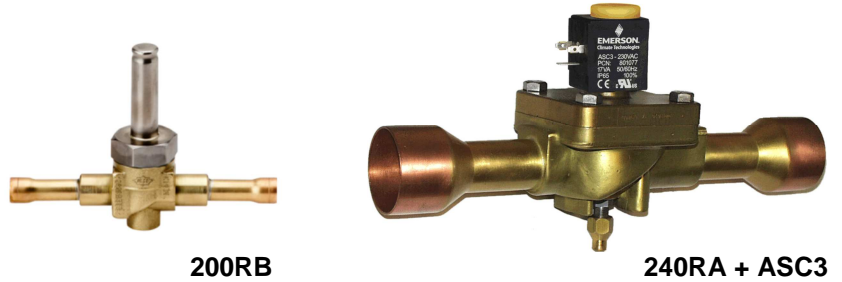
Note:
Mandatory
for ZZ-Valves

Type Bronze Screw	Part No.	Flange types
Screw BZ 32	803575	C500, C501, 9761, X6346, X6669, A576
Screw BZ 48	803576	9148, 9149, 9152, 9153, 10331

2-Way Solenoid Valves Series

Features

- Normally closed
- Pilot operated requires minimum operating pressure differential
- Compact size
- Extended fittings: No disassembly necessary for brazing
- Coil in 24VAC/50Hz and 230VAC/50Hz available



Nominal Capacity Data

Type	Kv [m ³ /h]	ΔP_{\min} [bar]	Liquid				
			R450A	R513A	R1234ze	R448A	R449A
110RB2	0.2	0	2.6	2.7	2.3	3.8	3.7
200RB3	0.4	0.05	4.8	5.0	4.3	7.1	6.9
200RB4	0.9		11.5	11.7	10.2	16.8	16.4
200RB6	1.6		20.1	20.6	17.8	29.4	28.7
240RA8	2.3		26.8	27.4	23.8	39.2	38.3
240RA9	4.8		56.3	57.6	49.9	82.3	80.4
240RA12	5.4		63	65	56	93	90
240RA16	8.8		103	105	91	150	147
240RA20	12.8		150	153	133	219	214

Type	Kv [m ³ /h]	ΔP_{\min} [bar]	Hot gas				
			R450A	R513A	R1234ze	R448A	R449A
110RB2	0.2	0	1.4	1.5	1.3	2.0	2.0
200RB3	0.4	0.05	2.9	3.0	2.6	4.0	4.0
200RB4	0.9		6.5	6.8	5.8	9.1	9.0
200RB6	1.6		11.6	12.1	10.4	16.2	15.9
240RA8	2.3		16.6	17.3	14.9	23.2	22.9
240RA9	4.8		34.7	36.2	31.1	48.5	47.8
240RA12	5.4		39.0	40.7	35.0	54.5	53.8
240RA16	8.8		63.5	66.3	57.0	88.9	87.6
240RA20	12.8		92.4	96.4	82.9	129.3	127.5

Type	Kv [m ³ /h]	ΔP_{\min} [bar]	Suction gas				
			R450A	R513A	R1234ze	R448A	R449A
240RA8	2.3	0.05	3.7	4.0	3.4	5.1	5.0
240RA9	4.8		7.8	8.4	7.1	10.6	10.5
240RA12	5.4		8.8	9.4	8.0	11.9	11.8
240RA16	8.8		14.3	15.3	13.1	19.4	19.2
240RA20	12.8		20.8	22.3	19.0	28.3	27.9

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

For selection of other operating condition, please use quick selection tables in the next pages or Controls Navigator selection program.

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling	Pressure Drop [bar]		
				Liquid	Hot gas	Suction
R513A, R1234ze	+4°C dew point	+38°C bubble/ +38°C dew point	1K	0.15	1	0.15
R450A		+38°C bubble/ +38.6°C dew point				
R448A, R449A		+38°C bubble/ +42.6°C dew point				

2-Way Solenoid Valves Series

Selection table valves

Function	Type		Part No.	ODF Connection	
				[mm]	[inch]
Normally closed	110 RB 2	T2	801217	6	
		T2	801210		1/4"
		T3	801209	10	
	200 RB 3	T3	801239	10	
	200 RB 4	T3	801176	10	
		T3	801190		3/8"
		T4	801178	12	
		T4	801179		1/2"
	200 RB 6	T4	801182	12	
		T4	801183		1/2"
		T5	801186	16	5/8"
	240 RA 8	T5	801160		5/8"
		T7	801143	22	7/8"
	240 RA 9	T5	801161	16	5/8"
		T7	801162	22	7/8"
		T9	801142		1-1/8"
	240 RA 12	T7	801163	22	7/8"
		T9	801144		1-1/8"
	240 RA 16	T9	801164		1-1/8"
		T11	801166	35	1-3/8"
240 RA 20	T11-M	801172	35	1-3/8"	
	T13-M	801224	42		
	T13-M	801173		1-5/8"	
	T17-M	801174	54	2-1/8"	
Normally open	540 RA8	T5	046265		5/8"
	540 RA 9	T5	046266		5/8"
		T7	046268	22	7/8"
	540 RA 12	T7	046269	22	7/8"
	540 RA 16	T9	046270		1-1/8"
	T11	047953	35	1-3/8"	

Note: Manual stems (Type M) available upon request for selected 2 types of Series 240 RA 8 to 240 RA 16.
Manual stems standard on Series 240 RA 20.

Selection table coils

Type	Part No.
ASC3-24VAC, 50 Hz	801079
ASC3-230VAC, 50 Hz	801077
ASC3-24VDC	801076

Technical data valve

Max. allowable working pressure PS	31 bar
Test pressure PT	34.1 bar
Operating Temperature Range TS	-40°C...+120°C
Ambient temperature range	-40°C...+50°C

Technical data coils

Supply voltage ASC3-24VAC ASC3-230VAC	24 VAC ±10% 230 VAC ±10%
Frequency	50 Hz
Protection Class	IP65
Marking (only coil)	CE, EAC, cRU ^{us}

Accessories and spare parts for solenoid valves

Description	Type	Part No.
Service tool for 110 RB, 240 RA, 540 RA	X 11981-1	027451
Gasket kits	KS 30040-2	801232
Repairing Kit 110 RB/RA	KS 30039-1	801233
Repairing Kit 240 RA8	KS 30061-1	801234
Repairing Kit 240 RA 9/12	KS 30062-1	801235
Repairing Kit 240 RA 16	KS 30065-1	801236
Repairing Kit 240RA 20	KS 30097-1	801237

Description	Type	Part No.
Repairing Kit 110 RB/RA	KS 30040-1	801206
Repairing Kit 200 RB/RA	KS 30039/ KS 30109	801205
Repairing Kit 240 RA 8	KS 30061	801262
Repairing Kit 240 RA 9	KS 30062	801263
Repairing Kit 240 RA 12	KS 30063	801264
Repairing Kit 240 RA 16	KS 30065	801200
Repairing Kit 240 RA 20	KS 30097	801216

2-Way Solenoid Valves Series

Liquid line solenoid valve: Quick selection (at 0.15 bar pressure drop)

Condensing temperature [°C]	R448A/R449A												Solenoid Valve type
	Capacity [kW]												
	Evaporating temperature [°C]												
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	
60 bubble/ 63.4 dew point	2.7	2.7	2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.0	110RB2
	5.0	5.0	4.9	4.7	4.6	4.5	4.4	4.3	4.2	4.0	3.9	3.8	200RB3
	11.9	11.7	11.5	11.2	11.0	10.7	10.4	10.1	9.8	9.5	9.2	8.9	200RB4
	21.0	20.6	20.2	19.7	19.3	18.8	18.3	17.8	17.3	16.8	16.2	15.7	200RB6
	28.0	27.4	26.9	26.3	25.7	25.0	24.4	23.7	23.0	22.3	21.6	20.9	240RA8
	58.7	57.6	56.4	55.2	53.9	52.6	51.2	49.8	48.4	46.9	45.4	43.8	240RA9
	66.0	64.8	63.5	62.1	60.6	59.1	57.6	56.0	54.4	52.7	51.0	49.3	240RA12
	107	105	103	101	98	96	93	91	88	86	83	80	240RA16
	156	153	150	147	143	140	136	132	129	125	121	117	240RA20
50 bubble/ 54 dew point	3.3	3.2	3.2	3.1	3.0	3.0	2.9	2.8	2.8	2.7	2.6	2.6	110RB2
	6.1	6.0	5.9	5.8	5.7	5.6	5.4	5.3	5.2	5.1	4.9	4.8	200RB3
	14.5	14.2	14.0	13.7	13.5	13.2	12.9	12.6	12.3	12.0	11.7	11.3	200RB4
	25.4	25.0	24.6	24.1	23.6	23.1	22.6	22.1	21.6	21.0	20.5	19.9	200RB6
	33.8	33.3	32.7	32.1	31.5	30.8	30.2	29.5	28.7	28.0	27.3	26.5	240RA8
	71.0	69.9	68.7	67.4	66.1	64.7	63.3	61.8	60.3	58.8	57.2	55.7	240RA9
	79.9	78.6	77.3	75.8	74.4	72.8	71.2	69.6	67.9	66.1	64.4	62.6	240RA12
	130	128	125	123	121	118	115	113	110	107	104	102	240RA16
	189	186	183	179	176	172	168	164	160	156	152	148	240RA20
40 bubble/ 44.5 dew point	3.8	3.8	3.7	3.6	3.6	3.5	3.4	3.4	3.3	3.2	3.2	3.1	110RB2
	7.1	7.0	6.9	6.8	6.7	6.6	6.4	6.3	6.2	6.0	5.9	5.8	200RB3
	16.8	16.6	16.3	16.1	15.8	15.5	15.2	14.9	14.6	14.3	13.9	13.6	200RB4
	29.6	29.1	28.7	28.2	27.7	27.2	26.7	26.2	25.6	25.1	24.5	23.9	200RB6
	39.4	38.8	38.2	37.6	37.0	36.3	35.6	34.9	34.1	33.4	32.6	31.8	240RA8
	82.7	81.5	80.3	79.0	77.6	76.2	74.7	73.2	71.7	70.1	68.5	66.8	240RA9
	93.0	91.7	90.3	88.8	87.3	85.7	84.0	82.3	80.6	78.8	77.0	75.2	240RA12
	151	149	146	144	142	139	136	134	131	128	125	122	240RA16
	220	217	213	210	206	202	199	195	191	186	182	178	240RA20
30 bubble/ 33.5 dew point	4.3	4.3	4.2	4.1	4.1	4.0	3.9	3.9	3.8	3.7	3.7	3.6	110RB2
	8.1	8.0	7.9	7.8	7.6	7.5	7.4	7.2	7.1	7.0	6.8	6.7	200RB3
	19.1	18.9	18.6	18.3	18.1	17.8	17.5	17.1	16.8	16.5	16.2	15.8	200RB4
	33.6	33.1	32.7	32.2	31.7	31.2	30.7	30.1	29.5	29.0	28.4	27.8	200RB6
	44.7	44.2	43.6	42.9	42.3	41.6	40.8	40.1	39.4	38.6	37.8	37.0	240RA8
	93.9	92.7	91.4	90.1	88.7	87.2	85.7	84.2	82.6	81.0	79.4	77.7	240RA9
	105.6	104.3	102.8	101.3	99.8	98.1	96.5	94.7	92.9	91.1	89.3	87.4	240RA12
	171	169	167	164	162	159	156	154	151	148	145	142	240RA16
	250	246	243	239	236	232	228	224	220	215	211	207	240RA20
20 bubble/ 25.3 dew point	4.8	4.7	4.7	4.6	4.5	4.4	4.4	4.3	4.2	4.1	4.1	4.1	110RB2
	8.9	8.8	8.7	8.6	8.4	8.3	8.2	8.0	7.9	7.7	7.6	7.6	200RB3
	21.1	20.8	20.6	20.3	20.0	19.7	19.3	19.0	18.7	18.3	18.0	18.0	200RB4
	37.1	36.6	36.1	35.6	35.1	34.5	34.0	33.4	32.8	32.2	31.6	31.6	200RB6
	49.4	48.7	48.1	47.4	46.7	46.0	45.2	44.5	43.7	42.9	42.1	42.1	240RA8
	103.6	102.3	101.0	99.5	98.1	96.5	95.0	93.3	91.7	90.0	88.3	88.3	240RA9
	116.6	115.1	113.6	112.0	110.3	108.6	106.8	105.0	103.1	101.3	99.3	99.3	240RA12
	189	187	184	182	179	176	173	170	167	164	161	161	240RA16
	275	272	268	265	261	257	252	248	244	239	235	235	240RA20
10 bubble/ 15.5 dew point	5.1	5.1	5.0	4.9	4.9	4.8	4.7	4.6	4.5	4.5	4.5	4.5	110RB2
	9.6	9.5	9.4	9.2	9.1	8.9	8.8	8.6	8.5	8.5	8.5	8.5	200RB3
	22.7	22.4	22.1	21.8	21.5	21.2	20.8	20.5	20.1	20.1	20.1	20.1	200RB4
	39.9	39.4	38.9	38.3	37.7	37.1	36.5	35.9	35.3	35.3	35.3	35.3	200RB6
	53.2	52.5	51.8	51.0	50.3	49.5	48.7	47.9	47.0	47.0	47.0	47.0	240RA8
	111.6	110.2	108.7	107.1	105.5	103.9	102.2	100.5	98.8	98.8	98.8	98.8	240RA9
	125.6	123.9	122.2	120.5	118.7	116.9	115.0	113.0	111.1	111.1	111.1	111.1	240RA12
	204	201	198	195	192	190	186	183	180	180	180	180	240RA16
	297	293	289	285	280	276	272	267	263	263	263	263	240RA20

2-Way Solenoid Valves Series

Liquid line solenoid valve: Quick selection (at 0.15 bar pressure drop)

Condensing temperature [°C]	R450A Capacity [kW]										Solenoid Valve type
	Evaporating temperature [°C]										
	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	1.7	1.6	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	110RB2
	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	200RB3
	7.4	7.2	6.9	6.7	6.5	6.2	6.0	5.7	5.4	5.2	200RB4
	13.0	12.6	12.2	11.8	11.3	10.9	10.5	10.0	9.6	9.1	200RB6
	17.3	16.8	16.2	15.7	15.1	14.5	13.9	13.3	12.7	12.1	240RA8
	36.4	35.3	34.1	32.9	31.7	30.5	29.2	28.0	26.7	25.5	240RA9
	41.0	39.7	38.3	37.0	35.6	34.3	32.9	31.5	30.1	28.7	240RA12
	66	64	62	60	58	56	53	51	49	46	240RA16
97	94	91	87	84	81	78	74	71	68	240RA20	
60	2.0	2.0	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.5	110RB2
	3.8	3.7	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	200RB3
	8.9	8.6	8.4	8.1	7.9	7.6	7.4	7.1	6.9	6.6	200RB4
	15.6	15.2	14.7	14.3	13.9	13.4	13.0	12.5	12.0	11.6	200RB6
	20.8	20.2	19.6	19.0	18.5	17.9	17.3	16.6	16.0	15.4	240RA8
	43.6	42.4	41.2	40.0	38.7	37.5	36.2	35.0	33.7	32.4	240RA9
	49.0	47.7	46.4	45.0	43.6	42.2	40.8	39.3	37.9	36.4	240RA12
	80	77	75	73	71	68	66	64	61	59	240RA16
116	113	110	106	103	100	96	93	89	86	240RA20	
50	2.3	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.9	1.8	110RB2
	4.4	4.3	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	200RB3
	10.3	10.1	9.8	9.6	9.3	9.0	8.8	8.5	8.2	8.0	200RB4
	18.1	17.7	17.2	16.8	16.3	15.9	15.4	15.0	14.5	14.0	200RB6
	24.1	23.5	23.0	22.4	21.8	21.2	20.5	19.9	19.3	18.7	240RA8
	50.6	49.4	48.2	47.0	45.7	44.4	43.1	41.8	40.5	39.2	240RA9
	57.0	55.6	54.2	52.8	51.4	50.0	48.5	47.0	45.6	44.1	240RA12
	92	90	88	86	83	81	79	76	74	71	240RA16
135	131	128	125	121	118	115	111	108	104	240RA20	
40	2.7	2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.1	110RB2
	5.0	4.9	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	200RB3
	11.7	11.5	11.2	11.0	10.7	10.4	10.2	9.9	9.6	9.4	200RB4
	20.6	20.2	19.7	19.3	18.8	18.3	17.9	17.4	16.9	16.4	200RB6
	27.4	26.9	26.3	25.7	25.0	24.4	23.8	23.2	22.5	21.9	240RA8
	57.6	56.4	55.1	53.9	52.6	51.3	50.0	48.6	47.3	45.9	240RA9
	64.8	63.4	62.0	60.6	59.1	57.7	56.2	54.7	53.2	51.7	240RA12
	105	103	101	98	96	94	91	89	86	84	240RA16
153	150	147	143	140	136	133	129	126	122	240RA20	
30		2.9	2.9	2.8	2.7	2.7	2.6	2.6	2.5	2.4	110RB2
		5.4	5.3	5.2	5.1	5.0	4.9	4.8	4.7	4.5	200RB3
		12.9	12.6	12.4	12.1	11.8	11.6	11.3	11.0	10.7	200RB4
		22.6	22.2	21.7	21.2	20.8	20.3	19.8	19.3	18.8	200RB6
		30.1	29.5	28.9	28.3	27.7	27.0	26.4	25.7	25.1	240RA8
		63.3	62.0	60.7	59.4	58.1	56.7	55.4	54.0	52.7	240RA9
		71.2	69.8	68.3	66.8	65.3	63.8	62.3	60.8	59.2	240RA12
		115	113	111	108	106	104	101	99	96	240RA16
	168	165	161	158	154	151	147	144	140	240RA20	
20				3.1	3.0	3.0	2.9	2.9	2.8	2.7	110RB2
				5.8	5.7	5.6	5.5	5.3	5.2	5.1	200RB3
				13.8	13.5	13.2	12.9	12.7	12.4	12.1	200RB4
				24.1	23.7	23.2	22.7	22.2	21.7	21.2	200RB6
				32.2	31.5	30.9	30.2	29.6	28.9	28.3	240RA8
				67.5	66.2	64.9	63.5	62.1	60.7	59.4	240RA9
				76.0	74.5	73.0	71.4	69.9	68.3	66.8	240RA12
				123	121	118	116	113	111	108	240RA16
			180	176	172	169	165	161	158	240RA20	

2-Way Solenoid Valves Series

Liquid line solenoid valve: Quick selection (at 0.15 bar pressure drop)

Condensing temperature [°C]	R513A Capacity [kW]										Solenoid Valve type
	Evaporating temperature [°C]										
	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.1	1.1	1.0	110RB2
	3.0	2.8	2.7	2.6	2.5	2.4	2.3	2.1	2.0	1.9	200RB3
	7.0	6.7	6.5	6.2	5.9	5.6	5.3	5.1	4.8	4.5	200RB4
	12.3	11.8	11.3	10.9	10.4	9.9	9.4	8.9	8.4	7.9	200RB6
	16.4	15.7	15.1	14.5	13.8	13.2	12.5	11.8	11.2	10.5	240RA8
	34.4	33.1	31.7	30.4	29.0	27.7	26.3	24.9	23.5	22.1	240RA9
	38.6	37.2	35.7	34.2	32.7	31.1	29.6	28.0	26.4	24.8	240RA12
	63	60	58	55	53	50	48	45	43	40	240RA16
91	88	84	81	77	74	70	66	62	59	240RA20	
60	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5	1.5	1.4	110RB2
	3.7	3.6	3.5	3.3	3.2	3.1	3.0	2.9	2.7	2.6	200RB3
	8.7	8.5	8.2	7.9	7.6	7.3	7.0	6.8	6.5	6.2	200RB4
	15.3	14.9	14.4	13.9	13.4	12.9	12.4	11.9	11.3	10.8	200RB6
	20.4	19.8	19.2	18.5	17.8	17.2	16.5	15.8	15.1	14.4	240RA8
	42.9	41.6	40.2	38.8	37.4	36.0	34.6	33.2	31.7	30.3	240RA9
	48.3	46.8	45.2	43.7	42.1	40.5	38.9	37.3	35.7	34.1	240RA12
	78	76	73	71	68	66	63	60	58	55	240RA16
114	111	107	103	100	96	92	88	84	80	240RA20	
50	2.4	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.8	110RB2
	4.4	4.3	4.2	4.0	3.9	3.8	3.7	3.5	3.4	3.3	200RB3
	10.4	10.1	9.9	9.6	9.3	9.0	8.7	8.4	8.1	7.8	200RB4
	18.3	17.8	17.3	16.8	16.3	15.8	15.2	14.7	14.2	13.7	200RB6
	24.4	23.7	23.1	22.4	21.7	21.0	20.3	19.6	18.9	18.2	240RA8
	51.1	49.8	48.4	47.0	45.5	44.1	42.6	41.2	39.7	38.2	240RA9
	57.5	56.0	54.4	52.8	51.2	49.6	48.0	46.3	44.6	43.0	240RA12
	93	91	88	86	83	80	78	75	72	70	240RA16
136	132	129	125	121	117	113	109	105	102	240RA20	
40	2.7	2.7	2.6	2.5	2.5	2.4	2.3	2.3	2.2	2.1	110RB2
	5.1	5.0	4.8	4.7	4.6	4.5	4.3	4.2	4.1	4.0	200RB3
	12.0	11.8	11.5	11.2	10.9	10.6	10.3	10.0	9.7	9.4	200RB4
	21.1	20.6	20.1	19.6	19.1	18.6	18.0	17.5	17.0	16.4	200RB6
	28.2	27.5	26.8	26.1	25.4	24.7	24.0	23.3	22.6	21.9	240RA8
	59.1	57.7	56.3	54.9	53.4	51.9	50.4	48.9	47.4	45.9	240RA9
	66.5	65.0	63.4	61.7	60.1	58.4	56.7	55.1	53.4	51.7	240RA12
	108	105	103	100	97	95	92	89	87	84	240RA16
157	153	150	146	142	138	134	130	126	122	240RA20	
30	3.0	3.0	2.9	2.8	2.7	2.7	2.6	2.5	2.5	2.5	110RB2
	5.6	5.5	5.4	5.3	5.1	5.0	4.9	4.7	4.6	4.6	200RB3
	13.3	13.0	12.7	12.4	12.1	11.8	11.5	11.2	10.9	10.9	200RB4
	23.4	22.9	22.4	21.8	21.3	20.8	20.2	19.7	19.1	19.1	200RB6
	31.2	30.5	29.8	29.1	28.4	27.7	26.9	26.2	25.5	25.5	240RA8
	65.5	64.1	62.6	61.1	59.6	58.1	56.5	55.0	53.5	53.5	240RA9
	73.7	72.1	70.4	68.7	67.0	65.3	63.6	61.9	60.2	60.2	240RA12
	120	117	114	111	109	106	103	100	98	98	240RA16
174	170	166	162	158	154	150	146	142	142	240RA20	
20	3.2	3.2	3.1	3.0	2.9	2.9	2.8	2.8	2.8	2.8	110RB2
	6.0	5.9	5.8	5.6	5.5	5.4	5.2	5.2	5.2	5.2	200RB3
	14.3	14.0	13.7	13.4	13.0	12.7	12.4	12.4	12.4	12.4	200RB4
	25.1	24.5	24.0	23.4	22.9	22.3	21.8	21.8	21.8	21.8	200RB6
	33.4	32.7	32.0	31.2	30.5	29.7	29.0	29.0	29.0	29.0	240RA8
	70.2	68.6	67.1	65.6	64.0	62.5	60.9	60.9	60.9	60.9	240RA9
	78.9	77.2	75.5	73.7	72.0	70.2	68.5	68.5	68.5	68.5	240RA12
	128	125	122	120	117	114	111	111	111	111	240RA16
186	182	178	174	170	166	162	162	162	162	240RA20	

2-Way Solenoid Valves Series

Liquid line solenoid valve: Quick selection (at 0.15 bar pressure drop)

Condensing temperature °C]	R1234ze										Solenoid Valve type
	Capacity [kW]										
	Evaporating temperature [°C]										
	15	10	5	0	-5	-10	-15	-20	-25	-30	
70	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0	110RB2
	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	200RB3
	6.7	6.4	6.2	6.0	5.7	5.5	5.2	5.0	4.7	4.5	200RB4
	11.7	11.3	10.9	10.5	10.0	9.6	9.2	8.8	8.3	7.9	200RB6
	15.6	15.1	14.5	13.9	13.4	12.8	12.2	11.7	11.1	10.5	240RA8
	32.7	31.6	30.4	29.3	28.1	26.9	25.7	24.5	23.3	22.1	240RA9
	36.8	35.5	34.2	32.9	31.6	30.3	28.9	27.6	26.2	24.8	240RA12
	60	58	56	53	51	49	47	45	42	40	240RA16
87	84	81	78	75	71	68	65	62	59	240RA20	
60	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	110RB2
	3.4	3.3	3.2	3.1	3.0	2.8	2.7	2.6	2.5	2.4	200RB3
	8.0	7.7	7.5	7.2	7.0	6.7	6.5	6.2	6.0	5.7	200RB4
	14.0	13.5	13.1	12.7	12.3	11.8	11.4	10.9	10.5	10.1	200RB6
	18.6	18.0	17.5	16.9	16.3	15.8	15.2	14.6	14.0	13.4	240RA8
	39.1	37.9	36.7	35.5	34.3	33.1	31.9	30.6	29.4	28.2	240RA9
	43.9	42.6	41.3	39.9	38.6	37.2	35.8	34.4	33.1	31.7	240RA12
	71	69	67	65	63	60	58	56	54	51	240RA16
104	101	98	94	91	88	85	81	78	75	240RA20	
50	2.1	2.0	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.6	110RB2
	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.0	2.9	200RB3
	9.2	9.0	8.7	8.5	8.2	8.0	7.7	7.5	7.2	6.9	200RB4
	16.2	15.7	15.3	14.9	14.4	14.0	13.6	13.1	12.7	12.2	200RB6
	21.5	21.0	20.4	19.8	19.2	18.6	18.1	17.5	16.9	16.3	240RA8
	45.2	44.0	42.8	41.6	40.4	39.1	37.9	36.6	35.4	34.1	240RA9
	50.9	49.5	48.2	46.8	45.4	44.0	42.6	41.2	39.8	38.4	240RA12
	83	80	78	76	74	71	69	67	65	62	240RA16
120	117	114	111	107	104	101	97	94	91	240RA20	
40	2.4	2.3	2.3	2.2	2.1	2.1	2.0	2.0	1.9	1.8	110RB2
	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.4	200RB3
	10.5	10.2	10.0	9.7	9.5	9.2	8.9	8.7	8.4	8.2	200RB4
	18.4	17.9	17.5	17.0	16.6	16.1	15.7	15.2	14.8	14.3	200RB6
	24.5	23.9	23.3	22.7	22.1	21.5	20.9	20.3	19.7	19.1	240RA8
	51.4	50.1	48.9	47.7	46.4	45.2	43.9	42.6	41.3	40.1	240RA9
	57.8	56.4	55.0	53.6	52.2	50.8	49.4	47.9	46.5	45.1	240RA12
	94	91	89	87	85	82	80	78	75	73	240RA16
137	133	130	127	123	120	117	113	110	106	240RA20	
30		2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.1	110RB2
		4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	200RB3
		11.4	11.2	10.9	10.7	10.4	10.1	9.9	9.6	9.4	200RB4
		20.1	19.6	19.2	18.7	18.3	17.8	17.4	16.9	16.4	200RB6
		26.8	26.2	25.6	25.0	24.4	23.7	23.1	22.5	21.9	240RA8
		56.2	54.9	53.7	52.4	51.1	49.8	48.6	47.3	46.0	240RA9
		63.2	61.8	60.4	59.0	57.5	56.1	54.6	53.2	51.7	240RA12
		103	100	98	96	93	91	89	86	84	240RA16
	149	146	143	139	136	132	129	126	122	240RA20	
20				2.7	2.7	2.6	2.6	2.5	2.4	2.4	110RB2
				5.1	5.0	4.9	4.8	4.7	4.6	4.5	200RB3
				12.2	11.9	11.6	11.4	11.1	10.8	10.6	200RB4
				21.3	20.9	20.4	19.9	19.5	19.0	18.5	200RB6
				28.4	27.8	27.2	26.6	26.0	25.3	24.7	240RA8
				59.7	58.4	57.1	55.8	54.5	53.2	51.8	240RA9
				67.1	65.7	64.2	62.8	61.3	59.8	58.3	240RA12
				109	107	104	102	99	97	95	240RA16
			159	155	152	148	145	141	138	240RA20	

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

3-Way Solenoid Valves Series M36

Features

- For heat reclaim application
- Pilot connection to suction line. No need for minimum pressure differential
- Compact size
- Snap-on clip for attaching solenoid coils
- No disassembly necessary for brazing
- Max. allowable pressure PS: 35 bar

Accessories

- ASC3 Coils and Cable assemblies conform to Low Voltage Directive



M36-118 + ASC3

Selection table and Capacity Data

Type	Part No.	Connection Solder/ODF		Nominal Capacity Q _n [kW]					k _v -value [m ³ /h]	Coil Type
		[mm]	[inch]	R448A	R449A	R450A	R513A	R1234ze		
M36-078	801420	22	7/8"	31.3	31.3	28.9	28.9	28.9	6.7	ASC3
M36-118	801421		1-1/8"							

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature	Condensing temperature	Subcooling	Pressure Drop Liquid
R513A, R1234ze	+4°C dew point	+38°C bubble/ +38°C dew point	1K	0.15 bar
R450A		+38°C bubble/ +38.6°C dew point		
R448A, R449A		+38°C bubble/ +42.6°C dew point		

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

For selection of other operating condition, please use Controls Navigator selection program.

Selection table coils

Type	Part No.
ASC3-24VAC, 50 Hz	801079
ASC3-230VAC, 50 Hz	801077
ASC3-24VDC	801076

Accessories and spare parts

Description	Part No.
Repair Kit for M36-UNF (O-Ring Gasket & pilot assembly)	801440

ACP / CPHE - Hot Gas Bypass Regulators

Features

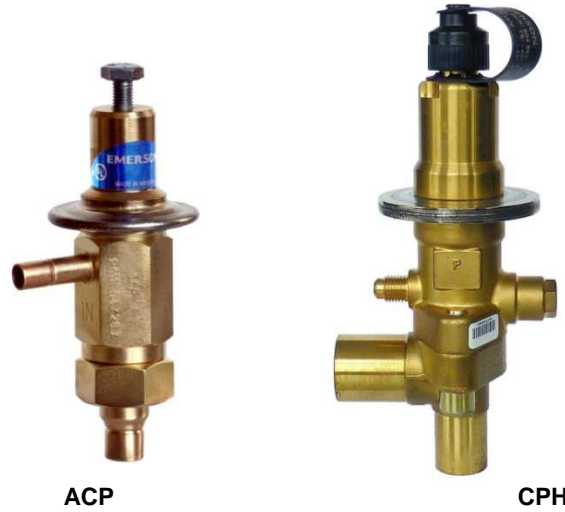
- High quality materials and processes for high reliability and long lifetime

ACP

- Internal equalization
- Compact size

CPHE

- Superior partial load performance due to double seat orifice design (CPHE3 to CPHE6)
- Modular design for economical logistics and easy assembly and servicing
- External equalization
- Specific connection sizes and flanges available on request



ACP

CPHE

Selection tables

Type	Nominal Bypass Capacity Q _n [kW]					Orifice	Standard Flange Solder/ODF		Power Assembly
	R450A	R513A	R1234ze	R448A	R449A		[mm]	[inch]	
CPHE-1X	3.4	2.6	5.9	5.8	3.1	X 22440-B5B	C 501 - 7mm 12 x 16	C 501 - 7 1/2 x 5/8	X7818 - 1
CPHE-2X	6.2	4.8	10.6	10.5	5.6	X 22440-B8B	A 576mm 16 x 22 (22 x 28 ODM)	A 576 5/8 x 7/8 (7/8 x 1-1/8 ODM)	
CPHE-3X	12	9	20	20	10	X 11873-B5B	10331 22 x 22	10331 7/8 x 7/8 (1-1/8 x 1-1/8 ODM)	
CPHE-3,5X	13	10	22	22	12	X 9117-B7B	9153mm 22 x 22	9153 7/8 x 7/8	
CPHE-4X	16	12	27	26	14	X 9117-B9B			
CPHE-5X	20	15	35	34	18	X 9166-B10B			
CPHE-6X	34	26	59	58	31	X 9144-B13B	9149 22 x 22	9149 7/8 x 7/8	

Note 1: Nominal capacities at 38°C condensing temperature, +4°C evaporating temperature (saturated temperatures / dew point) and 1K liquid subcooling at inlet of the expansion valve.

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Type	Part No.	Connection, Angle Solder/ODF [inch]	Nominal Bypass Capacity Q _n [kW]				
			R450A	R513A	R1234ze	R448A	R449A
ACP 1	047680	1/4 x 3/8	0.2	0.2	0.2	0.4	0.4
ACP 3	047283	1/4 x 3/8	0.5	0.5	0.4	0.9	0.9
ACP 5	053374	3/8 x 3/8	1.1	1.2	0.9	2.1	2.0

Note: Nominal capacities at 38°C Condensing temperature. +4°C evaporating temperature (saturated temperatures 7 dew point) and 1K liquid subcooling at inlet of the expansion valve.

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature [°C]	Condensing temperature [°C]	Subcooling
R513A, R1234ze	+4°C dew point	+38°C bubble/ +38°C dew point	1K
R450A		+38°C bubble/ +38.6°C dew point	
R448A, R449A		+38°C bubble/ +42.6°C dew point	

Features

- Max. working pressure PS 46 bar
- Self-contained unit with oil level sensor and integral solenoid to manage oil level supply
- 3 Zone Level Control by using precise Hall-Sensor measurement, not prone to errors by foaming or light like optical sensors
- Alarm, status and level indication by LED's
- Supply 24VAC or 230VAC
- SPDT output contact for compressor shut down or alarming, rating 230VAC / 3A
- Easy installation by sight-glass replacement and front side mounting without nuts
- Adapters suitable for various types of compressors
- Recommended by leading compressor manufacturers
- **CE** marking under Low Voltage and EMC Directive, **EAC**



OM3 + ASC3 Coil 230V + OM-230V

Product Selection OM3 (select one item of each group)

1. Base Units (supplied without adapter and coil)

Type	Part No.	Max. working pressure PS	Time delay alarm
OM3-020	805133	46 bar	20 sec
OM3-120	805134		120 sec

2. Adapter Flanges

OM0-CUA	805037	Flange adapter 3- / 4-hole
OM0-CCC	805041	Flange adapter 3-hole
OM0-CBB	805038	Screw adapter 1-1/8"-18 UNEF
OM0-CCA	805039	Screw adapter 3/4"-14 NPTF
OM0-CCB	805040	Screw adapter 1-1/8"-12 UNF
OM0-CCD	805042	Rotalock adapter 1-3/4"-12UNF
OM0-CCE	805043	Rotalock adapter 1-1/4"-12UNF

3. Cables Alarm Relay

OM3-N30	805141	Connection to Relay 3 m
OM3-N60	805142	Connection to Relay 6 m
OM3-N100	805146	Connection to Relay 10 m



Supply voltage 24V ±10%

4. Solenoid Coil

Type	Part No.	
ASC3 24 VAC	801079	50 Hz, 17 VA

5. Cable Assembly Power Supply and Solenoid

OM3-P30	805151	24V, 3 m
OM3-P60	805152	24V, 6 m
OM3-P100	805153	24V, 10 m

Supply voltage 230V ±10%

4. Solenoid Coil

Type	Part No.	
ASC3 230 VAC	801077	50 Hz, 17 VA

5. Cable Assembly with 230V module

OM-230V-3	805163	230V, 3 m
OM-230V-6	805164	230V, 6 m

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Oil Management Kits including Adapter and 24V Coil: Cross Reference

Kits incl. Adapter	Part No.	Base Unit	Part No.	Adapter	Part No.	Coil	Part No.
OM3-CUA	805030	OM3-020	805133	OM0-CUA	805037	ASC3 24 VAC	801079
OM3-CBB	805032			OM0-CBB	805038		
OM3-CCA	805033			OM0-CCA	805039		
OM3-CCB	805034			OM0-CCB	805040		
OM3-CCC	805035			OM0-CCC	805041		
OM3-CCD	805031			OM0-CCD	805042		
OM3-CCE	805029			OM0-CCE	805043		

Accessories and Spare Parts

Type	Part No.	Description	Weight
ECT-623	804421	Transformer 230 VAC / 24VAC, 60 VA (supply of 3 pieces Base unit)	1.20 kg
ASC3-K01	801080	Retainer Kit ASC3 incl. O-rings	0.10 kg
ODP-33A	800366	Differential Oil Check Valve 3.5 bar, PS: 46 bar (Inlet 5/8"-UNF female, outlet 5/8"-UNF male)	0.14 kg
OM3-K01	805036	Repair Kit OM3/OM4 (consists of sight glass with O-ring and screws, oil adapter with strainer, O-ring back side)	0.26 kg
OM-HFC-K01	805081	Sealing Kit OM3/OM4 (consists of all O-rings for OM3/OM4 and for all types of adapters)	
OM-HFC-K02	805083	Enclosing tube for OM3/OM4 (including O-ring), only for replacement of new version with hexagonal nut!	

Technical Data

Markings:	<p>CE under:</p> <ul style="list-style-type: none"> - Low Voltage Directive 2006/95/EC - EMC Directive 89/336/EC <p>ERC</p>	Materials:	<p>Body and Adapter: aluminum (EN AW 6060)</p> <p>Screws: galvanized steel</p> <p>Sight Glass: nickel-plated steel (ISO 2081)</p>
Applied Standards:	EN 12284, EN 378, EN 61010, EN 50081-1, EN 50082-1	Flow rate	OM3 at $\Delta P = 3$ bar: 340g/min. (22°C oil temperature, oil type HM46)
Max. working pressure PS: Max. Test pressure PT:	46 bar 51 bar	Orientation of base unit: Level control:	Horizontal, +/- 1° 40% to 60% of sight glass height
Supply voltage / total power:	24VAC, 50/60 Hz, $\pm 10\%$, 17VA	Weight: 24V System 230V System	750 ... 920 g incl. adapter 1100 ... 1270 g incl. adapter
• with ASC3-24VAC coil	230VAC, 50/60 Hz, $\pm 10\%$, 17VA	Alarm contact:	max. 3A, 230VAC, SPDT dry contact
• with ASC3-230VAC coil and OM-230V-x module		Time Delay Alarm:	20 sec.: OM3-020, all OM3 Kits 120 sec.: OM3-120
Solenoid valve MOPD	30 bar	Time Delay Filling:	10 sec.
Vibration resistance (EN60068-2-6)	max. 4g, 10...250 Hz	Oil connection	7/16"-20 UNF male, with strainer and O-ring (replaceable, see acc.)
Medium temperature Ambient/Storage temp.	-20...+80°C -20...+50°C	Enclosing tube	Replaceable for cleaning, hexagon wrench size 18, see spare parts
Protection class	IP 65 (IEC529/EN 60529)		

OW4 TraxOil are intended for systems which require oil level monitoring and alarming instead of active oil level balancing like OM3/4/5 series.

Features

- Max. working pressure PS: 60 bar
- 3 Zone Level Control by using precise Hall-sensor measurement, not prone to errors by foaming or light like optical sensors
- Alarm, status and 3 zone indication by LED's
- SPDT output contact for compressor shut down or alarming, rating (230VAC / 3A)
- Easy installation by sight-glass replacement and front side mounting without nuts
- Supply 24V AC, 50/60Hz
- Adapters suitable for various types of compressors
- Recommended by leading compressor manufacturers
- **CE** marking under Low Voltage and EMC Directive, **EAC**



OW4 TraxOil

Product Selection OW4 (select one item of each group)

1. Base Units

Type	Part No.	Max. working pressure PS	Time delay alarm
OW4-020	805116	60 bar	20 sec

2. Adapter flanges

OM0-CUA	805037	Flange adapter 3- / 4-hole
OM0-CCC	805041	Flange adapter 3-hole
OM0-CBB	805038	Screw adapter 1-1/8"-18 UNEF
OM0-CCA	805039	Screw adapter 3/4"-14 NPTF
OM0-CCB	805040	Screw adapter 1-1/8"-12 UNF
OM0-CCD	805042	Rotalock adapter 1-3/4"-12UNF
OM0-CCE	805043	Rotalock adapter 1-1/4"-12UNF

3. Cables Alarm Relay

OM3-N30	805141	Connection to Relay 3 m
OM3-N60	805142	Connection to Relay 6 m
OM3-N100	805146	Connection to Relay 10 m

4. Cable Power Supply

OW-24V-3	804672	Connection to Power Supply 24VAC 3 m
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Accessories and Spare Parts

Type	Part No.	Description	Weight
ECT-623	804421	Transformer 230VAC / 24VAC, 60VA	1.20 kg
OM-HFC-K01	805081	Sealing Kit OW4 (consists of all O-rings, incl. adapter gaskets)	

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Technical Data

Max. working pressure PS:	OW4: 60 bar
Max. test pressure PT:	OW4: 66 bar
Burst Pressure:	OW4: 230 bar
Applied Standards:	EN 12284, EN 378, EN 61010, EN 50081-1, EN 50082-1
Supply voltage / current	24VAC, 50 Hz, ±10%, 0.05A
Vibration resistance (EN60068-2-6)	max. 4g, 10...250Hz

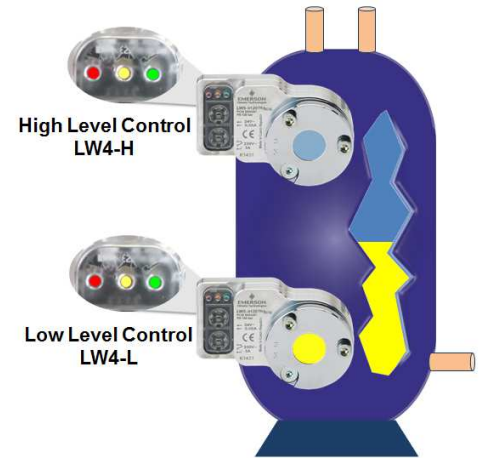
Medium temperature	-20...+80°C
Ambient/Storage temperature	-20...+50°C
Alarm contact:	max. 3A, 230VAC SPDT dry contact
Time Delay Alarm:	20 sec or 120 sec
Protection class	IP65 (IEC529/EN 60529)
Weight	850...920g incl. adapter

LW4 Liquid Level Monitoring Systems

LW4 are self-contained units intended for liquid level monitoring at the sight glass connection of vessels, maintaining a permanent visibility of the liquid level versus other liquid level sensors.

Features

- Two Versions of each model:
 - LW4-H for high liquid level monitoring
 - LW4-L for low liquid level monitoring
- 3 Zone Level Control by using precise Hall-sensor measurement, not prone to errors by foaming or light like optical sensors
- Alarm, status and 3 zone indication by LED's
- Two independent output signals:
 1. 24V output signal for critical levels and actuator activation
 2. SPDT output contact for alarming (230VAC / 3A) at very low liquid levels
- Easy installation by sight-glass replacement and front side mounting without nuts
- Supply 24V AC, 50/60Hz
- Adapters suitable for various types of vessels
- **CE** marking under Low Voltage and EMC Directive, **EMC**



Product Selection LW4 (select one item of each group)

1. Base Units

Type	Part No.	Max. working pressure PS
LW4-H120	805491	60 bar
LW4-L120	805490	60 bar

2. Adapter flanges

OM0-CUA	805037	Flange adapter 3- / 4-hole
OM0-CCC	805041	Flange adapter 3-hole
OM0-CBB	805038	Screw adapter 1-1/8"-18 UNF
OM0-CCA	805039	Screw adapter 3/4"-14 NPTF
OM0-CCB	805040	Screw adapter 1-1/8"-12 UNF
OM0-CCD	805042	Rotalock adapter 1-3/4"-12UNF
OM0-CCE	805043	Rotalock adapter 1-1/4"-12UNF

3. Cables Alarm Relay

OM3-N30	805141	Connection to Relay 3 m
OM3-N60	805142	Connection to Relay 6 m
OM3-N100	805146	Connection to Relay 10 m

4. Cable Power Supply

LW-24V-3	805500	Connection to Power Supply 24VAC 3 m
LW-24V-6	805501	Connection to Power Supply 24VAC 6 m
LW-24V-10	805502	Connection to Power Supply 24VAC 10 m

Technical Data

Max. working pressure PS:	LW4: 60 bar
Max. test pressure PT:	LW4: 66 bar
Burst Pressure:	LW4: 230bar
Supply voltage / current	24VAC, 50/60Hz, ±10%, 0.05A
Vibration resistance (EN60068-2-6)	max. 4g, 10...250Hz
Medium temperature	-20...+80°C
Ambient/Storage temperature	-20...+50°C
Protection class	IP65 (IEC529/EN 60529)



LW4

Accessories and Spare Parts

Type	Part No.	Description	Weight
ECT-623	804421	Transformer 230 VAC / 24VAC, 60 VA	1.20 kg
OM-HFC-K01	805081	Sealing-Kit LW4 (contains all gaskets incl. adapter gaskets)	

Time Delay Alarm:	120 sec
Output Signal	24V AC, Inductive load: 35 VA Time delay 20 sec
Alarm contact:	max. 3 A, 230 VAC, SPDT dry contact
Weight	850...920 g incl. adapter

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

Pressure Controls with Adjustable Setpoints

Features PS1/PS2

- Adjustable pressure range
- Narrow adjustable differential depending on model
- High rated SPDT contacts for all versions
- Chatter resistant contacts
- Dual pressostats with two independent SPDT controls
- Standard pressure connection 7/16"-20 UNF for 1/4" SAE male flare connection, alternative pressure connectors including 6 mm ODF solder connection
- Automatic and manual reset versions
- Some versions with convertible auto/manual reset
- Locking plate and mounting screws included
- Factory set to customer specification possible
- Low pressure and high pressure versions available with TÜV approval according to EN 12263 to meet requirements of DIN 8901 and EN 378



Single controls PS1



Dual controls PS2

Pressure Controls with Fixed Setpoints

Features PS3

- Maximum Operating Pressure up to 43 bar, Test Pressure up to 48 bar
- Standard factory settings from stock in small volumes
- High and low pressure controls
- High temperature version with snubber for direct compressor mounting (Range 6)
- Direct mounting reduces the number of joints and thus avoiding potential leakage
- Precise setting and repeatability
- IP65 protection if used with the new PS3-Nxx cables with plug (acc. EN 175301-803), no additional gasket required (molded into plug)
- Customer specific versions in multipacks, minimum order quantity 100 pcs
- TÜV approved versions for high and low pressure
- Micro-switch for narrow pressure differentials
- Gold plated contacts for low voltage/current applications



PS3

Features PS4

- High- and low pressure controls
- Precise settings and repeatability
- Cable version with IP67 (IP20 for terminal version)
- Normally open/closed electrical contacts (under standard operating conditions)
- TÜV approved versions
- Compatible with RoHS directive
- Minimum lot size 100 pieces



PS4

⚠ Warning: R1234ze classified as A2L. Use of product only for non-explosive environment, non ATEX zone.

For part selection, please use General Product Guide. For further technical detail see Technical Bulletin/ Datasheet.

Hermetic Liquid Line Filter-Driers Series ADK

ADK filter-driers are used for protection of systems against contaminant.

Features

- Solid block
- Hermetic design, rugged steel shells
- Corrosion resistant epoxy paint
- Cushioned flow for non-turbulent performance
- High water and acid adsorption capacity
- High filtration capacity / efficiency
- No CE marking according art. 3.3 PED 97/23 EC
- Max. working pressure PS: 46 bar (680 psi)



ADK

Selection table

Type	Part No.	Connection ODF*/SAE*	Flow capacity [kW] Pressure drop 0.07 bar				
			R448A	R449A	R450A	R513A	R1234ze
ADK-032	003595	1/4"(6 mm) SAE	6.1	5.9	5.9	6.4	6.2
ADK-032S	003596	1/4" ODF	7.4	7.0	7.1	7.7	7.5
ADK-036MMS	003597	6 mm ODF	6.7	6.4	6.4	7.0	6.8
ADK-052	003598	1/4"(6 mm) SAE	6.4	6.1	6.1	6.6	6.5
ADK-052S	003599	1/4" ODF	9.1	8.6	8.7	9.4	9.2
ADK-056MMS	003600	6 mm ODF	8.4	8.0	8.0	8.7	8.5
ADK-053	003601	3/8"(10 mm) SAE	11.9	11.3	11.4	12.3	12.1
ADK-053S	003602	3/8" ODF	13.7	13.1	13.1	14.3	14.0
ADK-0510MMS	003603	10 mm ODF	13.7	13.1	13.1	14.3	14.0
ADK-082	003604	1/4"(6 mm) SAE	6.5	6.2	6.2	6.8	6.7
ADK-082S	003605	1/4" ODF	10.0	9.6	9.6	10.4	10.2
ADK-086MMS	003606	6 mm ODF	9.0	8.5	8.6	9.3	9.1
ADK-083	003607	3/8"(10 mm) SAE	13.8	13.1	13.2	14.3	14.0
ADK-083S	003608	3/8" ODF	13.8	13.1	13.2	14.3	14.0
ADK-0810MMS	003609	10 mm ODF	13.8	13.1	13.2	14.3	14.0
ADK-084	003610	1/2"(12 mm) SAE	21.5	20.5	20.6	22.4	21.9
ADK-084S	003611	1/2" ODF	22.5	21.4	21.5	23.3	22.9
ADK-0812MMS	003612	12 mm ODF	22.1	21.1	21.1	22.9	22.5
ADK-162	003613	1/4"(6 mm) SAE	6.7	6.4	6.4	6.9	6.8
ADK-163	003614	3/8"(10 mm) SAE	14.1	13.4	13.4	14.6	14.3
ADK-163S	003615	3/8" ODF	15.7	15.0	15.0	16.3	16.0
ADK-1610MMS	003616	10 mm ODF	15.7	15.0	15.0	16.3	16.0
ADK-164	003617	1/2"(12 mm) SAE	26.3	25.1	25.1	27.3	26.7
ADK-164S	003618	1/2" ODF	30.2	28.8	28.9	31.4	30.7
ADK-1612MMS	003619	12 mm ODF	27.1	25.9	25.9	28.2	27.6
ADK-165	003620	5/8"(16 mm) SAE	37.7	35.9	36.0	39.1	38.3
ADK-165S	003621	5/8"(16 mm) ODF	41.8	39.8	39.9	43.3	42.5
ADK-303	003622	3/8"(10 mm) SAE	14.9	14.2	14.2	15.4	15.1
ADK-304	003623	1/2"(12 mm) SAE	26.3	25.1	25.1	27.3	26.7
ADK-304S	003624	1/2" ODF	30.3	28.8	28.9	31.4	30.8
ADK-305	003626	5/8"(16 mm) SAE	44.2	42.1	42.2	45.9	45.0
ADK-305S	003627	5/8"(16 mm) ODF	44.3	42.2	42.4	46.0	45.1
ADK-307S	003628	7/8"(22 mm) ODF	55.7	53.0	53.2	57.8	56.6
ADK-414	003629	1/2"(12 mm) SAE	30.9	29.4	29.5	32.1	31.4
ADK-415	003632	5/8"(16 mm) SAE	49.2	46.9	47.0	51.1	50.0
ADK-415S	003633	5/8"(16 mm) ODF	52.9	50.4	50.5	54.9	53.8
ADK-417S	003634	7/8"(22 mm) ODF	65.4	62.4	62.5	67.9	66.6
ADK-757S	003635	7/8"(22 mm) ODF	88.6	84.4	84.7	92.0	90.1
ADK-759S	003636	1-1/8" ODF	98.4	93.8	94.0	102.1	100.1

Note 1: Flow capacities are in accordance with ARI710-86 and DIN894, Liquid temperature at +30°C and at -15°C evaporating temperature.

*) SAE = Flare, ODF = Brazing female

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use Controls Navigator selection program.

Filter-Driers Series FDB

FDB is a hermetic filter-drier in compacted bead style for use on liquid line.

Features

- Compacted bead style (spring loaded)
- Hermetic design, rugged steel shells
- Corrosion resistant epoxy paint
- Solder connection made from copper for easy soldering
- Cushioned flow for non-turbulent performance
- High water adsorption capacity
- High acid adsorption capacity
- High filtration capacity / efficiency
- Filtration first for more effective use of surface area of desiccant
- Max. working pressure PS: 46 bar (680 psi)



FDB-164

Selection table

Type	Part No.	Connection ODF*/SAE*	Flow capacity [kW]				
			Pressure drop 0.07 bar				
			R448A	R449A	R450A	R513A	R1234ze
FDB-032	059305	1/4"(6 mm) SAE	6.0	5.9	5.8	5.5	5.5
FDB-032S	059306	1/4" ODF	9.2	9.1	8.9	8.5	8.5
FDB-052	059307	1/4"(6 mm) SAE	6.2	6.1	6.0	5.7	5.7
FDB-052S	059309	1/4" ODF	9.2	9.1	8.9	8.5	8.5
FDB-053	059308	3/8"(10 mm) SAE	14.7	14.4	14.2	13.5	13.6
FDB-053S	059310	3/8" ODF	18.4	18.0	17.7	16.9	16.9
FDB-082	059311	1/4"(6 mm) SAE	6.4	6.3	6.2	5.9	5.9
FDB-082S	059314	1/4" ODF	9.4	9.2	9.1	8.6	8.7
FDB-083	059312	3/8"(10 mm) SAE	15.0	14.7	14.4	13.8	13.8
FDB-083S	059315	3/8" ODF	18.8	18.4	18.1	17.3	17.3
FDB-084	059313	1/2"(12 mm) SAE	25.1	24.6	24.2	23.0	23.1
FDB-084S	059316	1/2" ODF	26.9	26.4	25.9	24.7	24.8
FDB-162	059317	1/4"(6 mm) SAE	6.4	6.3	6.2	5.9	5.9
FDB-163	059318	3/8"(10 mm) SAE	15.4	15.1	14.9	14.2	14.2
FDB-163S	059321	3/8" ODF	21.9	21.4	21.1	20.1	20.1
FDB-164	059319	1/2"(12 mm) SAE	26.6	26.0	25.6	24.4	24.5
FDB-164S	059322	1/2" ODF	34.2	33.6	33.0	31.4	31.5
FDB-165	059320	5/8"(16 mm) SAE	34.9	34.2	33.6	32.0	32.1
FDB-165S	059323	5/8" ODF	46.4	45.5	44.7	42.6	42.8
FDB-303	059324	3/8"(10 mm) SAE	17.2	16.8	16.5	15.8	15.8
FDB-304	059325	1/2"(12 mm) SAE	30.2	29.6	29.1	27.8	27.8
FDB-304S	003667	1/2" ODF	36.2	35.4	34.8	33.2	33.3
FDB-305	059326	5/8"(16 mm) SAE	38.3	37.6	36.9	35.2	35.3
FDB-305S	059327	5/8" ODF	51.2	50.1	49.3	47.0	47.1
FDB-307S	059328	7/8" ODF	47.3	46.4	45.6	43.4	43.6
FDB-415	059329	5/8"(16 mm) SAE	57.6	56.5	55.5	52.9	53.0
FDB-417S	059330	7/8" ODF	73.5	72.0	70.8	67.5	67.6

Note1: Flow capacities are in accordance with ARI710-86 and DIN8949. Liquid temperature +30°C and -15°C evaporating temperature.

*) SAE = Flare, ODF = Brazing female

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use Controls Navigator selection program.

Filter-Driers Shells Series ADKS-Plus

Features

- Rustproof Aluminum flange cover
- ODF copper fittings for easy soldering
- Rigid core holder from stele (no plastic)
- Service friendly core holder and flange cover
- Optimum flow capacity at low pressure drop
- Temperature range TS: -45°C...+65°C
- Max allowable working pressure PS:
34.5 bar (-10...+65°C)
25.9 bar (-45...-10°C)
- **CE** marking according PED 97/23 EC



ADKS-Plus

Selection table

Type	Part No.	Connection ODF		Nominal Flow capacity [kW]					Number of blocks S48, H48, W48, F48	
		mm	inch	Pressure drop 0.07 bar						
				R448A	R449A	R450A	R513A	R1234ze		
Conformity assessment cat.I, procedure module A										
485T	883551	16	5/8"	68	67	66	63	63	1	
487T	883552	22	7/8"	126	124	122	116	116		
489T	883553		1-1/8"	178	174	172	163	164		
4811T	883554	35	1-3/8"	248	243	239	228	228		
4813TMM	883836	42		270	265	260	248	249		
4817	882603	54	2-1/8"	For suction application						
967T	883555	22	7/8"	139	136	134	127	128	2	
969T	883556		1-1/8"	218	214	210	200	201		
9611T	883557	35	1-3/8"	266	260	256	244	245		
9613T	883558		1-5/8"	305	299	294	280	281		
9613TMM	883559	42		309	303	298	284	285		
9617	887215	54		305	299	294	280	281		
1449T	883560		1-1/8"	220	216	212	202	202	3	
14411T	883561	35	1-3/8"	306	300	295	281	282		
14413T	883562		1-5/8"	309	303	298	284	284		
14413TMM	883563	42		314	307	302	288	289		
14417T	883564	54	2-1/8"	366	359	353	336	337		
Conformity assessment cat.II, procedure module D1										
19211T	883565	35	1-3/8"	312	306	301	287	287	4	
19213T	883566		1-5/8"	344	337	332	316	317		
19213TMM	883567	42		349	342	336	320	321		
19217T	883568	54	2-1/8"	375	368	361	344	345		

Note 1: Flow capacities are in accordance with ARI710-86 and DIN8949. Liquid temperature +30°C and -15°C evaporating temperature.

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use Controls Navigator selection program.

Spare Parts

Description	Type	Part No.
ADKS		
Gasket Set	X 99961	003710
Schrader Nipple 1/4" NPT	X 11562-2	803251
Core Holder	X 99963	003712

Filter-Driers Shells with Quick-Cap Series FDS-24

Features

- Quick-cap flange (one bolt) design makes replacing of cores in a matter of seconds
- Ideal for retrofit, reducing installation / material cost
- Ideal for refrigerant recovery / reclaim units with regular change of filter-drier
- Free volume as a receiver in FDS-24... (580 cm³)
- ODF copper fittings for easy soldering
- Corrosion resistant powder painting of shell body
- Temperature range TS: -45°C...+65°C
- Max allowable working pressure PS:
 - 34.5 bar (-10...+65°C)
 - 25.9 bar (-45...-10°C)
- No **CE** marking according art. 3.3 PED 97/23 EC



FDS-24

Selection table

Type	Part No.	Connection ODF		Nominal liquid flow capacity [kW]				
		mm	inch	Block Core 24				
				R448A	R449A	R450A	R513A	R1234ze
FDS-245	003573	16	5/8"	65.1	63.8	62.7	59.8	59.9
FDS-247	003574	22	7/8"	97.4	95.4	93.8	89.4	89.7
FDS-249	003575		1-1/8"	98.5	96.5	94.9	90.4	90.7
FDS-249MM	003576	28	1-3/8"	99.0	97.0	95.3	90.9	91.1

Note 1: Flow capacities are in accordance with ARI710-86 and DIN8949, Liquid temperature +30°C and -15°C evaporating temperature.

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use Controls Navigator selection program.

Spare Parts

Type	Part No.	Description
X 99967	003716	Gasket Set
X 99968	003717	O-Ring Set
X 99969	003718	Core Holder

Suction Line Filters and Filter-Driers Series ASF and ASD

Features

- Minimum pressure drop due to internal construction and compacted bead style
- Service friendly with 2 Schrader valves for pressure drop measurement
- ODF copper fittings for easy soldering
- Filtration down to 40 microns
- Temperature range TS: -45°C...+50°C
- Max allowable working pressure PS: 27.5 bar
- No **CE** marking according art. 3.3 PED 97/23 EC



ASD-45S7W

Selection table

Type	Part No.	Connection ODF		Nominal Flow capacity Q _n [kW]			
		[mm]	[inch]	R448A R449A	Pressure drop 0.07 bar		R1234ze
					R450A	R513A	
Suction Line filters							
ASF-28 S3	008965		3/8"	8.3	3.7	3.4	3.2
ASF-28 S4	008941		1/2"	13.7	6.5	5.9	5.6
ASF-35 S5	008915	16	5/8"	20.9	9.9	8.9	8.5
ASF-45 S6	008946		3/4"	25.2	13.3	12.0	11.4
ASF-45 S7	008904	22	7/8"	33.1	17.3	15.7	14.9
ASF-50 S9	008908		1-1/8"	47.5	24.8	22.5	21.3
ASF-75 S11	008919	35	1-3/8"	58.3	29.9	27.1	25.7
ASF-75 S13	008940		1-3/8"	62.2	31.6	28.7	27.2
Suction Line Filter-Driers							
ASD-28 S3	008909		3/8"	8.6	4.1	3.7	3.5
ASD-28 S4	008910		1/2"	14.8	6.8	6.2	5.8
ASD-35 S5	008899	16	5/8"	23.7	11.2	10.2	9.6
ASD-45 S6	008925		3/4"	35.3	16.3	14.8	14.0
ASD-45 S7	008896	22	7/8"	43.2	22.8	20.7	19.6
ASD-50 S9	008881		1-1/8"	68.4	32.3	29.3	27.8
ASD-75 S11	008891	35	1-3/8"	57.6	40.8	37.0	35.1
ASD-75 S13	008953		1-3/8"	86.4	47.6	43.2	40.9

Note1: Nominal flow capacity at +4°C evaporating temperature (saturated condition/dew point) and a pressure drop of 0.21 bar between inlet and outlet of ASF/ASD.

Note2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use Controls Navigator selection program.

Suction Line Filters and Filter-Drier Shells Series BTAS

Features

- Corrosion-free brass body ideal for suction line applications
- Extremely large filtration area for optimum flow capacity
- Low pressure drop
- Filtration down to 40 microns
- Temperature range TS: -45°C...+50°C
- Max allowable working pressure PS: 24 bar
- UL File No.: SA 3124



BTAS

Selection table Suction Line Shells with Filter Core

Type	Part No.	Connection ODF		Nominal Flow capacity Q _n [kW]				Filter Core	
		[mm]	[inch]	R448A/R449A	R450A	R513A	R1234ze	Type	Part No.
No CE marking according to art. 3.3 PED 97/23. HP marking according to German pressurized vessel directive									
BTAS 25	015353		5/8"					A2F	009907
BTAS 27	015354	22	7/8"	31.7	16.3	14.8	14.6		
BTAS 39	015355		1-1/8"	50.4	24.8	22.5	22.2	A3F	009909
BTAS 311	015356	35	1-3/8"	54.0	27.5	25.0	24.7		
BTAS 313	015357		1-5/8"	86.4	44.2	40.1	39.6		
BTAS 342	015358	42		86.4	44.2	40.1	39.6		
BTAS 317	015359	54	2-1/8"	104.3	54.4	49.3	48.7	A4F	009911
BTAS 417	015360	54	2-1/8"	190.7	98.6	89.4	88.3		
CE marked, Conformity assessment cat. I, procedure module A									
BTAS 521	015361		2-5/8"	302.2	153.0	138.7	137.0	A5F	009913
BTAS 525	015362		3-1/8"	370.6	190.4	172.6	170.4		
BTAS 580	015363	80		370.6	190.4	172.6	170.4		

Note: Filter Core has to be ordered separately.

Selection table Suction Line Shells with Filter-Drier Core

Type	Part No.	Connection ODF		Nominal Flow capacity Q _n [kW]				Filter Core	
		[mm]	[inch]	R448A/R449A	R450A	R513A	R1234ze	Type	Part No.
No CE marking according to art. 3.3 PED 97/23. HP marking according to German pressurized vessel directive									
BTAS 25	015353		5/8"	16.6	8.5	7.7	7.6	A2F-D	009908
BTAS 27	015354	22	7/8"	27.0	13.9	12.6	12.5		
BTAS 39	015355		1-1/8"	36.0	18.0	16.3	16.1	A3F-D	009910
BTAS 311	015356	35	1-3/8"	50.4	25.2	22.8	22.5		
BTAS 313	015357		1-5/8"	72.0	37.4	33.9	33.5		
BTAS 342	015358	42		72.0	37.4	33.9	33.5		
BTAS 317	015359	54	2-1/8"	82.8	40.8	37.0	36.5	A4F-D	009912
BTAS 417	015360	54	2-1/8"	154.7	78.2	70.9	70.0		
CE marked, Conformity assessment cat. I, procedure module A									
BTAS 521	015361		2-5/8"	219.5	112.2	101.7	100.4	A5F-D	009914
BTAS 525	015362		3-1/8"	259.1	132.6	120.2	118.7		
BTAS 580	015363	80		259.1	132.6	120.2	118.7		

Note 1: Filter-Drier Core has to be ordered separately.

Note 2: Capacity rating at +4°C evaporating temperature (saturated condition/dew point) 0.2 bar pressure drop for R448A/R449A and 0.14 bar for R450A/R513A/R1234ze.

Note 3: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

AMI / MIA Moisture / Liquid Indicators

The **AMI / MIA** series of Moisture Indicators are designed to monitor the moisture content within the liquid line of a refrigeration system. MIA series with stainless steel body and extended copper tube connections are fully hermetic products without the use of any gasket.

AMI is a highly serviceable product with exchangeable lens assembly and indicator element, available in various configurations including saddle type.

Features

- Max. working pressure PS: AMI: 35 bar, MIA: 45 bar
- Fully hermetic
- Low pressure drop
- Crystal Indicator element for long lifetime and reliability
- Indication of dryness according to ASERCOM recommendation
- Easily determination of moisture content
- Sensitive indicator with calibrated four colors
- Large clear viewing area
- ODF extended tube configurations suitable for all commercial applications
- MIA only:
 - Lightweight and corrosion free stainless steel body (MIA)
 - UL certification File No.: SA 4876 (MIA only, except MIA-078)



MIA



AMI-1 SS



AMI-1 TT

Selection table MIA





Type	Part No.	For tube outside diameter	Picture
MIA 014	805883	1/4"	
MIA 038	805884	3/8"	
MIA 012	805885	1/2"	
MIA 058 / MIA M16	805886	5/8"/16 mm	
MIA 078	805887	7/8"	
MIA 118	805892	1-1/8"	
MIA M06	805880	6 mm	
MIA M10	805881	10 mm	
MIA M12	805882	12 mm	
MIA M28	805891	28 mm	
MIA M10 S Female/Male	805888	10 mm	
MIA M12 S Female/Male	805889	12 mm	

Selection table AMI

Type	Part No.	For tube outside diameter	Picture
AMI-1 TT2 MM	805697	6 mm	
AMI-1 TT2	805655	1/4"	
AMI-1 TT3 MM	805698	10 mm	
AMI-1 TT3	805654	3/8"	
AMI-1 TT4 MM	805699	12 mm	
AMI-1 TT4	805653	1/2"	
AMI-1 TT5	805652	5/8"/16 mm	
AMI-1 TT7	805656	7/8"/22 mm	
AMI-1 TT9 MM	805700	28 mm	
AMI-1 TT9	805651	1-1/8"	

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

AMI / MIA Moisture / Liquid Indicators

Type	Part No.	For tube outside diameter	Configuration	Picture
AMI-1 SS2 MM	805732	6 mm	Female solder x female solder ODF x ODF	
AMI-1 SS2	805713	1/4"		
AMI-1 SS3 MM	805733	10 mm		
AMI-1 SS3	805714	3/8"		
AMI-1 SS4 MM	805734	12 mm		
AMI-1 SS4	805715	1/2"		
AMI-1 SS5	805716	5/8"/16 mm		
AMI-1 SS7	805717	7/8"/22 mm		
AMI-1 SS9 MM	805703	28 mm		
AMI-1 SS9	805705	1-1/8"		
AMI-1 MM2	805706	1/4"/6 mm	Male flare x male flare	
AMI-1 MM3	805707	3/8"/10 mm		
AMI-1 MM4	805708	1/2"/12 mm		
AMI-1 MM5	805709	5/8"/16 mm		
AMI-1 FM2	805710	1/4"/6 mm		
AMI-1 FM3	805711	3/8"/10 mm	Female flare x male flare	
AMI-1 FM4	805712	1/2"/12 mm		
AMI-2 S11	805704	1-3/8"/35 mm		
AMI-2 S13	805659	1-5/8"/42 mm		
AMI-2 S17	805687	2-1/8"/54 mm		
AMI-3 S7	805650	7/8"/22 mm	Saddle type (for soldering onto the pipe)	
AMI-3 S9	805649	1-1/8"/28 mm		
AMI-3 S11	805648	1-3/8"/35 mm		

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Spare parts for AMI

Description	Type	Part No.
Lens assembly kit	X 12978-1	805742
O-Ring	X 99995	805643

Oil Separators OS Series

The OS Oil Separators are used for multiple compressor racks in supermarkets and air conditioning systems.

Features

- Three different construction styles:
 - OSH hermetic style
 - OST with top flange
 - OSB with bottom flange and supporter
- Solid Copper ODF connections
- Stainless steel needle valve and floater
- Temperature range TS: -10°C...+150°C
- Max. allowable pressure: 31 bar
- Permanent magnet to filter metal particles out of the oil circulation
- Corrosion resistant epoxy powder painting
- **CE** marking according PED 97/23 EC
- Comply with UL standard



Selection table

Type	Part No.	Connection ODF		Conformity Assessment Category	Conformity Assessment Procedure	Nominal capacity [kW]					Volume [l]
		[mm]	[inch]			R448A	449A	R1234ze	450A	513A	
OSH-404	881598		1/2"	Cat. I	Module A*	7.4	7.9	3.9	4.6	4.7	2.0
OSH-405	881599	16 mm	5/8"			18.8	20.1	9.9	11.7	12.1	2.4
OSH-407	881600	22 mm	7/8"			29.9	32.1	15.8	18.6	19.2	2.8
OSH-409	881792		1-1/8"			40.9	43.9	21.6	25.4	26.3	3.0
OSH-411	881794	35 mm	1-3/8"			49.3	52.9	26.0	30.7	31.7	3.6
OSH-413	881856		1-5/8"			68.7	73.6	36.2	42.7	44.1	3.6
OSH-611	881940	35 mm	1-3/8"	Cat. II	Module D1	60.6	65.0	32.0	37.7	38.9	6.5
OSH-613	881953		1-5/8"			71.7	76.8	37.8	44.5	46.0	7.9
OSH-642	889022	42 mm				-	-	-	-	-	7.9
OSH-617	881970	54 mm	2-1/8"			108.7	116.5	57.4	67.5	69.8	7.9
OST-404	881860		1/2"			Cat. I	Module A*	7.4	7.9	3.9	4.6
OST-405	881861	16 mm	5/8"	18.8	20.1			9.9	11.7	12.1	2.6
OST-407	881862	22 mm	7/8"	29.9	32.1			15.8	18.6	19.2	3.2
OST-409	881863		1-1/8"	40.9	43.9			21.6	25.4	26.3	3.8
OST-411	881938	35 mm	1-3/8"	49.3	52.9			26.0	30.7	31.7	3.8
OST-413	881939		1-5/8"	68.7	73.6			36.2	42.7	44.1	3.8
OSB-613	881971		1-5/8"	Cat. II	Module D1	71.7	76.8	37.8	44.5	46.0	7.8
OSB-617	881972	54 mm	2-1/8"			108.7	116.5	57.4	67.5	69.8	7.8


Note 1: The nominal capacities at +4°C evaporating temperature.

Note 2: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Ball Valves BVE/BVS

The BVE/BVS are ball valves with fully hermetic body design for the Refrigeration and A/C industry.

Features

- Maximum working pressure 45 bar
- BVS models have 7/16-20 UNF – 1/4" flare connection and Schrader valve
- Hermetic design with Laser welded valve body
- Patented (pending) Laser process
- Full flow design for minimal pressure drop
- Two threads at valve body for easy mounting
- Bi-directional flow characteristics
- Valve cap retained by strap attached to main body
- Applied Standards EN 122284, EN 378, EN 12420, PED 97/23/EC
- RoHS 2002/95/EC
- UL File No: SA5312
-  marking according PED 97/23 EC




BVE



BVS

Selection Table

Type BVE	Part No.	Type BVS	Part No.	Connection size ODF		Weight [kg]	Marking
				[inch]	[mm]		
BVE-014	806730	BVS-014	806750	1/4"		0.16	 EAC (pending)
BVE-M06	806731	BVS-M06	806751		6 mm	0.16	
BVE-038	806732	BVS-038	806752	3/8"		0.16	
BVE-M10	806733	BVS-M10	806753		10 mm	0.16	
BVE-012	806734	BVS-012	806754	1/2"		0.36	
BVE-M12	806735	BVS-M12	806755		12 mm	0.38	
BVE-058	806736	BVS-058	806756	5/8"	16 mm	0.38	
BVE-034	806737	BVS-034	806757	3/4"		0.44	
BVE-078	806738	BVS-078	806758	7/8"	22 mm	0.46	
BVE-118	806739	BVS-118	806759	1 1/8"		1.04	
BVE-M28	806740	BVS-M28	806760		28 mm	1.04	
BVE-138	806741	BVS-138	806761	1 3/8"	35 mm	1.64	
BVE-158	806742	BVS-158	806762	1 5/8"		2.43	
BVE-M42	806743	BVS-M42	806763		42 mm	2.43	
BVE-218	806744	BVS-218	806764	2 1/8"	54 mm	4.55	
BVE-258	806745	BVS-258	806765	2 5/8"		4.65	
BVE-318	806746	BVS-318	806766	3 1/8"		5.00	

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

Accessories: Special seal caps (Pocan)

BVE/S Valve Size	Part No.	Thread (3)	Quantity per pack
1/4" ... 7/8" (6 ... 22 mm)	806770	M18x1	10 pcs
1-1/8" ... 1 3/8" (28 ... 35 mm)	806771	M27x1	10 pcs
1-5/8 (42 mm) ... 3-1/8"	806772	M36x1	10 pcs



For further technical detail see Technical Bulletin.

Suction Accumulators Series A

The **A series** suction accumulator protects the compressor from liquid slugging and can be used with all common refrigerants.

Features

- Hermetic design
- ODF copper fittings for easy soldering
- Corrosion resistant epoxy powder painting
- Internal orifice with strainer for optimum oil return
- Temperature range TS: -45°C...+65°C
- **CE** marking for certain types according PED 97/23 EC



Suction Accumulators Series A

Selection table

Type	Part No.	Connection ODF		Nominal Capacity Qn [kW] 0.07 bar pressure drop								Conformity Assessment		Volume [l]	
		[mm]	[inch]	R450A		R513A		R1234ze		R448A R449A		Category	Procedure		
				+4	-7	+4	-7	+4	-7	+4	-7				
A08-304	001973		1/2"	4.1	2.7	3.7	2.4	3.5	2.3	7.2	5.0	No CE -Marking		0.73	
A10-305	001977	16	5/8"	5.8	4.1	5.2	3.7	5.0	3.5	10.8	7.5			0.93	
A12-305	001978	16	5/8"	5.8	4.1	5.2	3.7	5.0	3.5	10.8	7.5			1.16	
A12-306	001979		3/4"	7.8	5.4	7.1	4.9	6.7	4.6	14.4	10.0			1.16	
A14-305	001980	16	5/8"	5.8	4.1	5.2	3.7	5.0	3.5	10.8	7.5			1.40	
A14-306	001987		3/4"	7.8	5.4	7.1	4.9	6.7	4.6	14.4	10.0			1.40	
A06-405	001989	16	5/8"	5.8	4.1	5.2	3.7	5.0	3.5	10.8	7.5			0.93	
A10-405	001990	16	5/8"	5.8	4.1	5.2	3.7	5.0	3.5	10.8	7.5			1.75	
A10-406	001994		3/4"	7.8	5.4	7.1	4.9	6.7	4.6	14.4	10.0			1.75	
A09-506	881995		3/4"	7.8	5.4	7.1	4.9	6.7	4.6	14.4	10.0		Cat. I	Mod. A*	2.33
A09-507	882455	22	7/8"	13.6	9.5	12.3	8.6	11.7	8.1	26.3	18.2				2.33
A12-506	881996		3/4"	7.8	5.4	7.1	4.9	6.7	4.6	14.4	10.0				3.29
A12-507	881998	22	7/8"	13.6	9.5	12.3	8.6	11.7	8.1	26.3	18.2				3.29
A13-507	882007	22	7/8"	13.6	9.5	12.3	8.6	11.7	8.1	26.3	18.2				3.80
A13-509	882011		1-1/8"	24.5	17.0	22.2	15.3	21.0	14.4	42.5	29.6				3.80
A17-509	882012		1-1/8"	24.5	17.0	22.2	15.3	21.0	14.4	42.5	29.6				4.87
A17-511	882013	35	1-3/8"	36.4	24.8	33.0	22.3	31.3	21.0	67.6	47.0				4.87
A11-607	882014	22	7/8"	13.6	9.5	12.3	8.6	11.7	8.1	26.3	18.2				4.30
A13-607	882015	22	7/8"	13.6	9.5	12.3	8.6	11.7	8.1	26.3	18.2				4.98
A13-609	882019		1-1/8"	24.5	17.0	22.2	15.3	21.0	14.4	42.5	29.6				4.98
A14-611	882020	35	1-3/8"	36.4	24.8	33.0	22.3	31.3	21.0	67.6	47.0				5.48
A17-613	882022		1-5/8"	57.8	39.8	52.4	35.8	49.7	33.7	102.5	71.2				6.85
A17-642	889023	42		57.8	39.8	52.4	35.8	49.7	33.7	102.5	71.2				6.85
A20-613	882021		1-5/8"	57.8	39.8	52.4	35.8	49.7	33.7	102.5	71.2				8.21
A25-613	882023		1-5/8"	57.8	39.8	52.4	35.8	49.7	33.7	102.5	74.1	Cat.II	Mod. D1	10.23	

Note: Products are classified based on fluid group 2 (non-flammable) according European pressure equipment directive.

For selection of other operating condition, please use Controls Navigator selection program.

Saturation Pressure Table and Glide at different Suction Pressures

Temperature [°C]	R450A	R450A	R513A	R513A	R1234ze	R448A	R448A	R449A	R449A
	Liquid pressure [bar]	Vapor pressure [bar]	Liquid pressure [bar]	Vapor pressure [bar]	Liquid/ vapor pressure [bar]	Liquid pressure [bar]	Vapor pressure [bar]	Liquid pressure [bar]	Vapor pressure [bar]
-70	0.07	0.07	0.10	0.10	0.06	0.27	0.18	0.27	0.18
-65	0.10	0.10	0.14	0.14	0.08	0.36	0.25	0.36	0.25
-60	0.14	0.14	0.20	0.19	0.12	0.49	0.34	0.49	0.34
-55	0.19	0.19	0.27	0.26	0.16	0.64	0.45	0.64	0.46
-50	0.26	0.25	0.35	0.35	0.21	0.83	0.60	0.83	0.60
-45	0.35	0.33	0.47	0.46	0.28	1.06	0.78	1.06	0.78
-40	0.45	0.44	0.60	0.60	0.37	1.34	1.00	1.34	1.01
-35	0.58	0.57	0.77	0.76	0.48	1.67	1.27	1.67	1.28
-30	0.75	0.73	0.97	0.97	0.62	2.07	1.60	2.06	1.60
-25	0.94	0.92	1.21	1.21	0.78	2.53	1.99	2.53	1.99
-20	1.18	1.14	1.50	1.50	0.98	3.07	2.44	3.07	2.44
-15	1.45	1.41	1.84	1.83	1.21	3.70	2.97	3.69	2.97
-10	1.78	1.73	2.23	2.23	1.49	4.42	3.59	4.40	3.58
-5	2.16	2.10	2.69	2.68	1.81	5.24	4.30	5.22	4.29
0	2.59	2.53	3.21	3.21	2.18	6.16	5.11	6.14	5.10
5	3.10	3.03	3.81	3.81	2.61	7.21	6.03	7.18	6.02
10	3.67	3.60	4.49	4.49	3.10	8.38	7.08	8.35	7.07
15	4.33	4.24	5.26	5.26	3.66	9.69	8.26	9.65	8.24
20	5.07	4.97	6.12	6.12	4.29	11.14	9.58	11.10	9.56
25	5.90	5.78	7.09	7.09	5.00	12.75	11.07	12.70	11.03
30	6.83	6.70	8.17	8.17	5.80	14.53	12.72	14.47	12.68
35	7.86	7.72	9.37	9.37	6.69	16.48	14.55	16.41	14.50
40	9.01	8.86	10.70	10.70	7.67	18.62	16.58	18.54	16.52
45	10.28	10.12	12.17	12.17	8.76	20.95	18.83	20.87	18.75
50	11.69	11.51	13.78	13.78	9.97	23.49	21.31	23.40	21.21
55	13.23	13.04	15.55	15.55	11.29	26.26	24.03	26.16	23.92
60	14.91	14.72	17.48	17.48	12.75	29.25	27.03	29.15	26.90
65	16.76	16.55	19.59	19.58	14.34	32.50	30.32	32.39	30.16
70	18.77	18.56	21.88	21.88	16.08	36.00	33.93	35.88	33.74

Glide at different saturation pressures [K]

Pressure [bar]	Refrigerant				
	R450A	R513A	R1234ze	R448A	R449A
1	0.62	0.12	0.00	6.12	6.05
5	0.66	0.01	0.00	5.75	5.68
10	0.62	0.00	0.00	5.35	5.30
15	0.56	0.01	0.00	4.90	4.88
20	0.50	0.01	0.00	4.41	4.41
15	0.56	0.01	0.00	4.90	4.88
30	0.35	0.02	0.00	3.34	3.41

