Electrical Control Valves Series EX4-8

Features

- Multifunction as expansion valve, hot gas bypass, suction gas throttling, head pressure, liquid level actuator etc.
- Fully hermetic design (no thread joints between valve body and motor compartment)
- Applicable to all common refrigerants and for subcritical CO_2 applications
- Stepper motor driven
- Short opening and closing time
- Very fast full-stroke time
- High resolution and excellent repeatability
- Positive shut-off function to eliminate the need for additional solenoid valve
- Bi-flow versions for heat pump applications
- High 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)
- Ceramic slide and port for highly accurate flow and minimal wear
- Europe patent No. 0743476, USA patent No. 5735501, Japan patent No. 28225789
- Balanced force design
- Corrosion resistant stainless steel body and stainless steel connections


EX5


EX4


EX7


EX6


EX8

Selection Table (Capacities See Following Page)

Type	Part No.	Flow Pattern	Capacity Range	Inlet Connection	Outlet Connection	Electrical Connection
EX4-I21	800 615	Uni-flow	10 ... 100%	3/8" ODF	5/8" ODF	M12 Plug
EX4-M21	800 616			10mm ODF	16mm ODF	
EX5-U21	800 618			5/8" (16mm) ODF	7/8" (22mm) ODF	
EX6-I21	800 620			7/8" ODF	1-1/8" ODF	
EX6-M21	800 621			22mm ODF	28 mm ODF	
EX7-I21	800 624			1 1/8" ODF	1-3/8" ODF	
EX7-M21	800 625			28mm ODF	35mm ODF	
EX8-M21	800 629			42mm ODF	42mm ODF	
EX8-U21	800 630			1 3/8" (35mm) ODF	1 3/8" (35mm) ODF	
EX8-I21	800 631			1-5/8" ODF	1-5/8" ODF	
EX4-U31	800 617	Bi-flow (Heat Pump)		5/8" (16mm) ODF	5/8" (16mm) ODF	
EX5-U31	800 619			7/8" (22mm) ODF	7/8" (22mm) ODF	
EX6-I31	800 622			1-1/8" ODF	1 1/8" ODF	
EX6-M31	800 623			28mm ODF	28mm ODF	
EX7-U31	800 626			1 3/8" (35mm) ODF	1 3/8" (35mm) ODF	

Cable Connector Assemblies

Type	Part No.	Temperature Range	Length	Connector Type to Valve	Connector Type to Driver or Controller	Illustration
EXV-M15	804 663	-50 ... +80°C	1.5 m	M12, 4 Pins	Loose Wires	
EXV-M30	804 664		3.0 m			
EXV-M60	804 665		6.0 m			

Capacity Data

Nominal capacities...

...as expansion valves and liquid injection valves, (kW) (10%...100%)

Type	R410A	R134a	R22	R404A / R507	R407C	R1234ze	R448A	R449A	R450A	R513A	R744	R124	R23	R452A
EX4	19.3	12.8	16.5	11.5	17.4	10.0	16.5	16.1	11.3	11.5	27.0	9.4	17.8	12.5
EX5	58.1	39.0	50.0	35.0	53.0	30.2	49.9	48.7	34.1	34.9	82.0	28.7	54.0	38
EX6	140	93	120	84	126	72	120	117	82	84	197	69	130	91
EX7	385	255	330	230	347	199	329	321	225	230	540	186	357	250
EX8	1028	680	880	613	925	531	877	857	600	614	1440	495	-	666

Note 1: Bi-flow versions are not released for use with R124, R452A and R23 refrigerants.
Note 2: Bi-flow versions have identical capacity in both flow directions.

...as hot gas bypass regulator, (kW)

Type	Kv (m^3/h)	R410A	R134a	R22 / R407C	R404A / R507	R1234ze	R448A	R449A	R450A	R513A	R452A
EX4	0.21	5.9	2.7	4.4	3.8	2	4.5	4.4	2.4	2.7	3.9
EX5	0.68	19.1	8.8	14.3	12.2	6.5	14.6	14.4	7.7	8.6	12.8
EX6	1.57	44	20.4	33	28.3	15.1	33.7	33.1	17.7	19.9	30
EX7	5.58	156.4	72.5	117.4	100.5	53.6	119.8	117.8	63	70.7	105
EX8	16.95	475	220	357	305	163	364	358	191	215	320

Note: Bi-flow versions are not released for hot gas flow applications.

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

Type	Kv (m^3/h)	R410A	R134a	R22	R404A	R507	R407C	R1234ze	R448A	R449A	R450A	R513A	R452A
EX6	1.57	5.0	3.1	4.1	3.5	3.5	3.9	2.5	3.9	3.8	2.8	3.0	3.4
EX7	5.58	17.9	11.1	14.7	12.5	12.5	13.7	9.0	13.8	13.6	9.9	10.6	12.1
EX8	16.95	54.5	33.6	44.5	38.1	37.9	41.8	27.4	42.0	41.4	30.1	32.2	36.8

Note: Bi-flow versions are not released for use below -40°C

...as condensing pressure regulator and liquid duty, (kW)

Type	Kv (m^3/h)	R407C	R134a	R22	R404A	R507	R1234ze	R448A	R449A	R450A	R513A	R452A
EX4	0.21	5.7	5.6	6.0	4.0	3.8	5.1	5.3	5.2	5.3	5.0	4.1
EX5	0.68	18.5	18.3	19.6	12.9	12.5	16.5	17.1	16.8	17.0	16.3	13
EX6	1.57	43.0	42.4	45.5	29.9	29.0	38.3	39.9	39.1	39.6	37.8	31
EX7	5.58	153	151	162	106	103	136	142	139	141	134	109
EX8	16.95	464	458	491	323	313	413	430	422	428	408	331

...for hot gas flow such as heat reclaim application, (kW)

Type	Kv (m^3/h)	R410A	R134a	R22 / R407C	R404A / 507	R1234ze	R448A	R449A	R450A	R513A	R452A
EX5	0.68	5.9	4	5.1	4.3	3.3	5.1	5	3.7	3.8	4.4
EX6	1.57	13.7	9.3	11.8	9.9	7.6	11.7	11.6	8.5	8.8	10.1
EX7	5.58	49	33	42	35	27	42	41	30	31	36
EX8	16.95	148	100	128	107	82	127	125	91	95	110

Note: Bi-flow versions are not released for hot gas flow applications.

The nominal capacity is based on the following conditions:

Refrigerant	Evaporating temperature	Condensing temperature	Pressure drop (For suction duty	Pressure drop (For liquid duty)	Pressure drop (For hot gas flow duty)	Isentropic efficiency (For hot gas flow duty)
R134a, R404A, R410A, R513A, R1234ze	+4°C dew point	+38°C bubble & dew point	0.15 bar	0.35 bar	0.5 bar	80%
R407C	+4°C dew point	+38°C bubble/ +43°C dew point				
R124	+20°C	+80°C				
R23	-60°C	-25°C				
R744	-10°C	+10°C				
R450A	+4°C	+38°C bubble/ +38.6°C dew point				
R452A		+38°C bubble/ +41.6°C dew point				
R448A, R449A		+38°C bubble/ +42.6°C dew point				

Note: For selection of other operating condition, please use quick selection tables in the next pages or Navigator selection program 2019.

Technical Data

Compatibility **Note:** UL only for use with A1 refrigerants.	**A1**: R134a, R404A, R507, R407C, R450A, R513A, R452A, R448A, R449A, R410A, R744 (subcritical), R23, R124 **A2L**: R32, R452B, R454B, R454A, R454C, R1234ze, R123yf Mineral and POE lubricants
MOPD (maximum operating pressure differential)	EX4/EX5/EX6: 40 bar EX7: 35 bar EX8: 30 bar
Max. allowable pressure PS	EX4 (uni-flow): 90 bar EX4/5/6/7 (bi-flow): 60 bar EX8: 45 bar UL Approval: EX4/5/6/7: 60 bar UL Approval: EX8: 45 bar
Factory Test Pressure PT	EX4 (uni-flow): 99 bar EX4/5/6: 66 bar EX7: 86 bar EX8: 65 bar
Ambient Temperature **Storage Temperature**	-40...+55°C -40...+70°C
Medium Inlet Temperature **Bi-flow version:** **Uni-flow version:**	 TS: -50...+80°C TS: -50...+100°C (UL-Approval based on ≥ -40°C)

Evaporating Temperature	-100...+55°C
Salt Spray Test	non-corrosion stainless steel body
Connections	ODF stainless steel fittings
Humidity	5 to 95% r.H.
Protection accordance to IEC 529, DIN 40050	IP67 with EMERSON supplied cable connector assembly
Vibration for non-connected and fastened valve	4g (0...1000 Hz, 1 octave /min.)
Shock	20g at 11 ms 80g at 1 ms
Net weight (kg)	0.5 kg (EX4), 0.52 kg (EX5), 0.60 kg (EX6), 1.1 kg (EX7), 1.5 kg (EX8)
External leakage	≤ 3 gram / year
Seat Leakage	Positive shut-off better than solenoid valves
Marking **EX4/5/6:** **EX7/8:** **EX4/5/6/7/8:**	 None (Out of PED scope) CE 1017 (Module D1) cULus

Electrical Data

Stepper Motor Type	Bi-polar, phase current by chopper control (constant current)
Electrical Connection	4 pin terminal via plug
Recom. Driver Supply	24 VDC (nominal)
Driver Supply Voltage Range	18...36 VDC
Phase Current, Operating	EX4/EX5/EX6: 500 max, -10% EX7: 750 mA ±10% EX8: 800 mA ±10%
Holding Current	EX4/EX5/EX6: 100 mA EX7: 250 mA EX8: 500 mA
Nominal Input Power per Phase	EX4/EX5/EX6: 3.5 W EX7/EX8: 5 W
Stepping Rate	500 Hz

Phase Inductance	EX4/EX5/EX6: 30 mH ± 25% EX7: 20 mH ± 25% EX8: 22 mH ± 25%
Step Mode	2 phase full step
Step Angle	1.8° per step ± 8%
Reference Position	Mechanical stop at fully close position
Total Number of Steps	EX4/EX5/EX6: 750 full steps EX7: 1600 full steps EX8: 2600 full steps
Winding Resistance per Phase	EX4/EX5/EX6: 14 Ohm ±10% EX7: 10 Ohm ±10% EX8: 7.5 Ohm ±10%
Full Travel Time	EX4/EX5/EX6: 1.5 seconds EX7: 3.2 seconds EX8: 5.2 seconds