

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 CO₂ 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



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	R23	R124	R744	R452A	R448A	R449A	R450A	R513A	R1234ze	R452B	R32	R454A	R454C	R1234yf	R454B	R455A
EX4	19.3	12.8	16.5	11.5	11.5	17.4	17.8	9.2	27	12.5	16.5	16.1	11.3	11.5	10	22	28.6	16.2	13.5	9.2	22.1	15.6
EX5	58	39	50	35	35	53	54	28	82	37.9	50	49	34	35	30	67	87	49	41	28	67	47
EX6	140	93	120	84	84	126	130	67	197	91	120	117	82	84	73	160	208	118	98	67	161	114
EX7	385	255	330	230	230	347	357	186	541	250	329	322	225	230	200	441	573	324	270	184	443	313
EX8	1027	680	880	613	613	925		495	1442	666	878	857	600	614	532	1175	1528	865	720	491	1180	833

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 (m³/h)	R410 A	R134 a	R22	R404 A	R507	R407 C	R452 A	R448 A	R449 A	R450 A	R513 A	R1234 ze	R452 B	R32	R454 A	R454 C	R1234 yf	R454 B	R455 A
EX4	0.21	5.82	2.7	3.91	3.74	3.74	4.37	3.93	4.47	4.39	2.35	2.64	2	#N/A	#N/A	4.62	3.81	2.31	#N/A	4.43
EX5	0.68	18.9	8.8	12.7	12.2	12.2	14.2	12.8	14.5	14.2	7.6	8.6	6.5	#N/A	#N/A	15	12.4	7.5	#N/A	14.4
EX6	1.57	44	20.4	29.5	28.3	28.3	33	29.7	33.8	33.1	17.7	19.9	15.1	#N/A	#N/A	34.9	28.7	17.4	#N/A	33.4
EX7	5.58	156	73	105	100	100	117	105	120	118	63	71	54	#N/A	#N/A	124	102	62	#N/A	119
EX8	16.95	475	220	319	305	305	356	320	364	358	192	215	163	#N/A	#N/A	376	310	188	#N/A	361

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

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

Type	Kv (m³/h)	R410 A	R134 a	R22	R404 A	R507	R407 C	R452 A	R448 A	R449 A	R450 A	R513 A	R1234 ze	R452 B	R32	R454 A	R454 C	R1234 yf	R454 B	R455 A
EX8	54.5	33.6	44.5	38.1	38.6	41.8	36.8	41.9	41.4	30.1	32.2	27.4	0	0	42.9	36.4	29.1	0	38.2	4.43
EX7	17.9	11.1	14.7	12.5	12.7	13.7	12.1	13.8	13.6	9.9	10.6	9	0	0	14.1	12	9.6	0	12.6	14.4
EX8	54.5	33.6	44.5	38.1	38.6	41.8	36.8	41.9	41.4	30.1	32.2	27.4	0	0	42.9	36.4	29.1	0	38.2	33.4

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

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

Type	Kv (m³/h)	R410 A	R134 a	R22	R404 A	R507	R407 C	R452 A	R448 A	R449 A	R450 A	R513 A	R1234 ze	R452 B	R32	R454 A	R454 C	R1234 yf	R454 B	R455 A
EX4	5.7	5.63	6.02	3.98	3.85	5.69	4.07	5.28	5.18	5.25	5.01	5.07	0	0	5.09	4.54	4.18	0	4.8	4.43
EX5	18.5	18.3	19.5	12.9	12.5	18.5	13.2	17.1	16.8	17	16.3	16.5	0	0	16.5	14.7	13.6	0	15.6	14.4
EX6	43	42.5	45.5	30	29.1	43	30.7	39.9	39.1	39.6	37.8	38.3	0	0	38.5	34.3	31.6	0	36.2	33.4
EX7	153	151	162	107	103	153	109	142	139	141	134	136	0	0	137	122	112	0	129	119
EX8	465	459	491	324	314	464	331	430	422	428	408	413	0	0	415	370	341	0	391	361

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

Type	Kv (m³/h)	R410 A	R134 a	R22	R404 A	R507	R407 C	R452 A	R448 A	R449 A	R450 A	R513 A	R1234 ze	R452 B	R32	R454 A	R454 C	R1234 yf	R454 B	R455 A
EX5	5.94	4.02	5.11	4.31	4.31	5.11	4.39	5.07	5.02	3.67	3.8	3.29	0	0	5.16	4.52	3.35	0	4.95	4.43
EX6	13.7	9.3	11.8	9.9	9.9	11.8	10.1	11.7	11.6	8.5	8.8	7.6	0	0	11.9	10.4	7.7	0	11.4	14.4
EX7	48.8	32.9	42.1	35.3	35.3	42.1	36.1	41.7	41.1	30.1	31.2	27.1	0	0	42.3	37.1	27.5	0	40.6	33.4
EX8	148	100	128	107	107	128	110	127	125	91	95	82	0	0	129	113	84	0	123	119

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 conditions, 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, R450A, R513A, R452A, R449A, R410A, R744 (subcooled), R23, R124	Evaporating Temperature	-100...+55 °C
	A2L: R32, R452B, R454B, R454C, R1234ze, R123yf Mineral and POE lubricant	Salt Spray Test	non-corrosion stainless steel body
		Connections	ODF stainless steel fittings
		Humidity	5 to 95% r.H.
MOPD (maximum operating pressure differential)	EX4/EX5/EX6: 40 bar EX7: 35 bar EX8: 30 bar	Protection accordance to IEC 529, DIN 40050	IP67 with EMERSON supplied cable connector assembly
	Max. allowable pressure PS	EX4 (uni-flow): 90 bar EX4 (bi-flow)/EX5/6/7: 60 bar EX8: 45 bar UL Approval: EX4/5/6/7: 60 bar UL Approval: EX8: 45 bar	Vibration for non-connected and fastened valve
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)
Factory Test Pressure PT	EX4 (uni-flow): 99 bar EX4 (bi-flow)/EX5/6/7: 66 bar EX7: 86 bar EX8: 65 bar	External leakage	≤ 3 gram / year
		Seat Leakage	Positive shut-off better than solenoid valves
Ambient Temperature	-40...+55 °C	Marking EX4/5/6 : EX7/8 : EX4/5/6/7/8:	None (Out of PED scope) 1017 (Module D1)
Storage Temperature	-40...+70 °C		
Medium Inlet Temperature	TS: -50...+80 °C TS: -50...+100 °C (UL-Approval based on ≥ -40 °C)		



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 $\pm 10\%$ EX8: 800 mA $\pm 10\%$
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 $\pm 25\%$ EX7: 20 mH $\pm 25\%$ EX8: 22 mH $\pm 25\%$
Step Mode	2 phase full step
Step Angle	1.8° per step $\pm 8\%$
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 $\pm 10\%$ EX7: 10 Ohm $\pm 10\%$ EX8: 7.5 Ohm $\pm 10\%$
Full Travel Time	EX4/EX5/EX6: 1.5 seconds EX7: 3.2 seconds EX8: 5.2 seconds