



Subcritical CO₂ Innovations

Energy Conscious Products & Solutions for Supermarkets

SPORLAN



ENGINEERING YOUR SUCCESS.

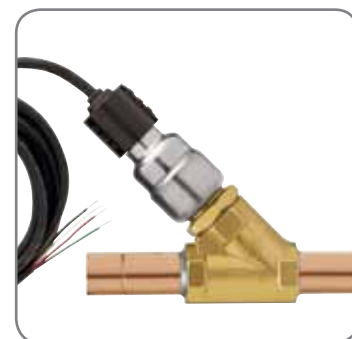
Subcritical CO₂ Innovations

Energy Conscious Products & Solutions for Supermarkets

As a world leader in refrigerant flow controls, Sporlan Division of Parker Hannifin continues to meet the challenges of the future. **Our growing line of products for CO₂ set new standards for robust design and advanced technology.**

This condensed catalog contains product information specifically for CO₂ applications. By including a minimum of engineering information we are able to provide a concise reference to pertinent data and specifications on Sporlan CO₂ products.

For additional engineering information, a complete Sporlan Catalog or CD, please contact your nearest Sporlan Sales Office, Authorized Sporlan Wholesaler or log on to www.sporlan.com.



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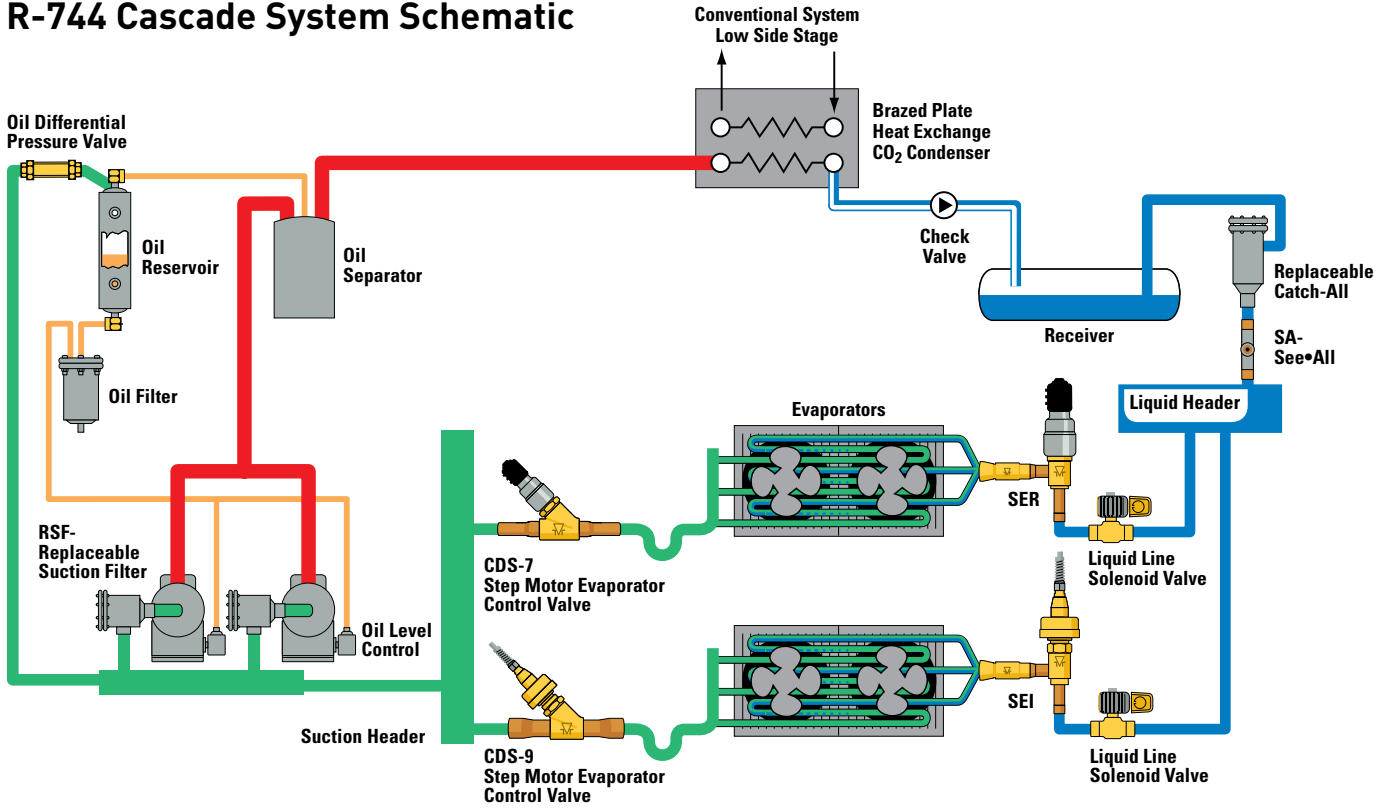
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For further information on the products featured in this catalog, see Bulletin number listed below.

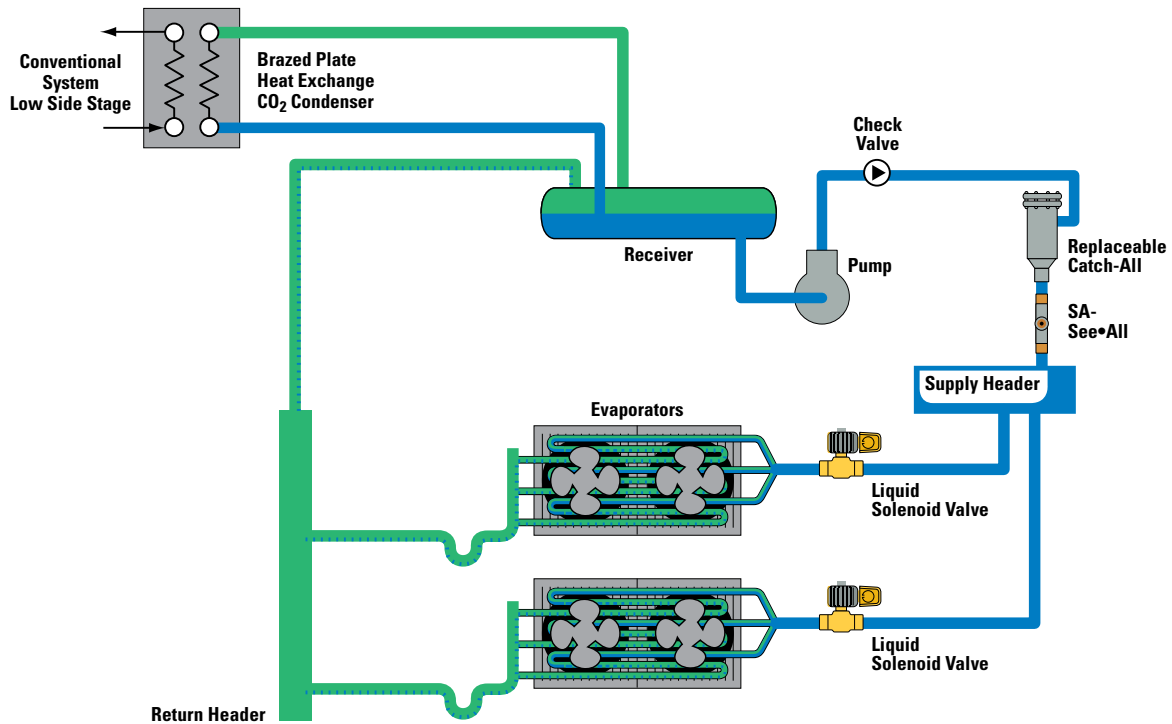
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*To request individual Sporlan Product Bulletins, contact your nearest Sporlan Sales Office or Wholesaler, write Parker Hannifin, Sporlan Division, Washington, Missouri or visit our website at www.sporlan.com.

R-744 Cascade System Schematic



R-744 Secondary System Schematic



Note: No pressure relief or ball valves shown. Relief valves must be present where liquid CO₂ can be trapped. All components must be properly pressure rated and protected for safe installation.

UL Guidelines

CO₂

Use this table to determine the maximum start to discharge pressure relief valve setting for each component in the system. It is the system designers responsibility to determine the correct pressure relief valve setting. The pressures listed are **NOT** the maximum rated pressure of the product.

Maximum Safety Pressure Relief Valve Setting Guidelines*

PRODUCT	MODEL	UL REFERENCED "Start To Discharge" Pressure Relief Valve Setting	FUTURE UL APPROVALS "Start To Discharge" Pressure Relief Valve Setting*
Distributors	All	420 psig 29 barg	600 psig 41.36 barg
Solenoid Valves	E2xxxx-HP	420 psig 29 barg	600 psig 41.36 barg
	E5xxxx-HP		
	E6xxxx-HP		
	E9xxxx-HP		
	E10xxxx-HP		
	E14xxxx-HP		
	E19xxxx-HP		
	E25xxxx-HP		
Catch-All Filter-Driers (Sealed)	E35xxxx-HP	420 psig 29 barg	600 psig 41.36 barg
	C-030 Series		
	C-050 Series		
	C-080 Series		
	C-160 Series		
	C-300 Series		
Catch-All Filter-Driers (Replaceable Core)	C-410 Series	420 psig 29 barg	600 psig 41.36 barg
	C-600 Series		
	C-R420 Series		
	C-R480 Series		
	C-R960 Series		
See-All Moisture and Liquid Indicators	C-R1440 Series	420 psig 29 barg	600 psig 41.36 barg
	C-R1920 Series		
Replaceable Suction Filters	All (up to 1-5/8 ODF)	420 psig 29 barg	600 psig 41.36 barg
	RSF-480 Series	420 psig 29 barg	500 psig 34.47 barg
Electric Expansion Valves	RSF-960 Series	420 psig 29 barg	600 psig 41.36 barg
	SER Series	420 psig 29 barg	600 psig 41.36 barg
Electric Evaporator Control Valves	SEI Series	420 psig 29 barg	600 psig 41.36 barg
	CDS Series (up to 1-5/8 ODF)	420 psig 29 barg	600 psig 41.36 barg
Pressure Transducer (0-500 psi)	952505	420 psig 29 barg	—

*UL 207 Standard is referenced in establishing the maximum "start to discharge" pressure relief valve settings.

Failure or improper selection or improper use of the products described herein or related items can cause death, personal injury and property damage.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the products in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Distributors

CO₂

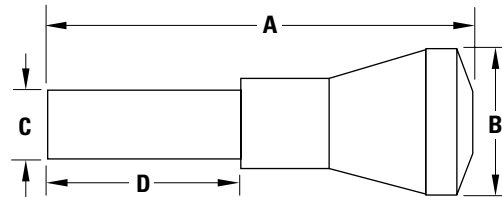
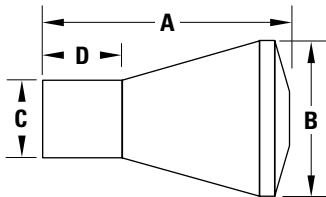
All Sporlan distributors are ready for service with CO₂. The following tables are provided for making selections based on procedure explained in Bulletin 20-10.



Quick Reference

CONNECTION SIZE Inches	TYPICAL EEV TYPES	DISTRIBUTOR TYPE	MAXIMUM NUMBER OF CIRCUITS				NOZZLE TYPE	SIDE CONNECTION	MATERIAL
			3/16	1/4	5/16	3/8			
1/2 ODM	SER 1.5 - 20 SEI 0.5 - 11	1613	6	4	—	—	PERM.	—	#360 BRASS
		1616	8	6	—	—	PERM.	—	
		D260	6	4	—	—	L	—	
		D262	9	6	4	—	L	—	
5/8 ODM	SER 1.5 - 20 SERI G SEI 30	1620	6	4	—	—	J	—	
		1622	9	7	4	—	J	—	
		1651(R)	7	5	—	—	J (R)	3/8 or 1/2 ODF	
7/8 ODM	SER 20 SERI G, J SEI 30, 50	1112	7	6	4	2	G	—	
		1113	12	8	6	4	G	—	
		1653(R)	12	9	6	4	G (R)	3/8 or 1/2 ODF	
1-1/8 ODM	SER 20 SERI J, K SEI 30, 50	1115	15	10	9	6	E	—	
		1116	20	15	—	—	E	—	
		1655 (R)	20	12	10	7	E (R)	1/2 or 5/8 ODF	
1-3/8 ODM	SEI 50	1117	18	15	9	7	C	—	
		1126	24	18	15	12	C	—	
		1128	28	25	21	16	C	—	
		1657(R)	26	18	14	11	C (R)	5/8 or 7/8 ODF	

Dimensions











Specifications

NUMBER OF CIRCUITS & TUBING SIZES AVAILABLE	NOZZLE ORIFICE NUMBERS AVAILABLE	NOZZLE & RETAINER RING SIZE	INLET CONNECTION Inches	DISTRIBUTOR	DIMENSIONS								
					Inches				mm				
					A	B	C	D	A	B	C	D	
Type D260 Net Weight - Approximately 2 oz. (60 g)						1.96	0.81	.497 .503	0.82	49.8	21	12.6 12.8	21
2 to 6	3/16"	1/9 thru 8	L	1/2 ODM Solder									
2 to 4	1/4"												
Type D262 Net Weight - Approximately 3 oz. (80 g)						2.44	1.00	.497 .503	0.81	62.0	25.4	12.6 12.8	21
7 to 9	3/16"	1/9 thru 8	L	1/2 ODM Solder									
5 to 6	1/4"												
2 to 4	5/16"												
Type 1613 Net Weight - Approximately - Approximately 2 oz. (60 g)						1.17	0.81	.498 .500	0.50	29.7	21	12.6 12.7	13
2 to 7	5/32"	1/2 thru 5	PERM.	1/2 ODM Solder									
2 to 6	3/16"												
2 to 4	1/4"												
Type 1616 Net Weight - Approximately - Approximately 3 oz. (80 g)						1.55	1.00	.498 .500	0.50	39.4	25.4	12.6 12.7	13
8 to 10	5/32"	1/2 thru 5	PERM.	1/2 ODM Solder									
7 to 8	3/16"												
5 to 6	1/4"												
2 to 4	5/16"												
Type 1620 Net Weight - Approximately 2 oz. (60 g)						1.14	0.81	.623 .625	0.69	29.0	21	15.8 15.9	18
2 to 6	3/16"	1/9 thru 8	J	5/8 ODM Solder									
2 to 4	1/4"												

Distributors

CO₂

Specifications

NUMBER OF CIRCUITS & TUBING SIZES AVAILABLE	NOZZLE ORIFICE NUMBERS AVAILABLE	NOZZLE & RETAINER RING SIZE	INLET CONNECTION Inches	DISTRIBUTOR	DIMENSIONS								
					Inches				mm				
					A	B	C	D	A	B	C	D	
Type 1622 Net Weight - Approximately 3 oz. (80 g)						1.63	1.00	.623 .625	0.63	41.4	25.4	15.8 15.9	16
7 to 9	3/16"	1/9 thru 8	J	5/8 ODM Solder									
5 to 7	1/4"												
2 to 4	5/16"												
Type 1112 Net Weight - Approximately 4 oz. (110 g)						1.72	0.91	.873 .875	1.00	43.7	23	22.2 +/- 0.03	25.4
5 to 7	3/16"	1/6 thru 20	G	7/8 ODM Solder									
4 to 6	1/4"												
2 to 4	5/16"												
2	3/8"												
Type 1113 Net Weight - Approximately 5 oz. (140 g)						1.78	1.16	.873 .875	0.88	45.2	29.5	22.2 +/- 0.03	22
8 to 12	3/16"	1/6 thru 20	G	7/8 ODM Solder									
7 to 8	1/4"												
5 to 6	5/16"												
3 to 4	3/8"												
Type 1115 Net Weight - Approximately 9 oz. (250 g)						2.44	1.50	1.123 1.125	1.12	62.0	38.1	28.52 28.58	28.4
11 to 15	3/16"	2 thru 30	E	1-1/8 ODM Solder									
9 to 10	1/4"												
7 to 9	5/16"												
5 to 6	3/8"												
Type 1116 Net Weight - Approximately 9 oz. (250 g)						2.44	1.75	1.123 1.125	1.12	62.0	44.4	28.52 28.58	28.4
16 to 20	3/16"	2 thru 30	E	1-1/8 ODM Solder									
11 to 15	1/4"												
Type 1117 Net Weight - Approximately 1 lb. (450 g)						2.56	1.75	1.373 1.375	1.31	65.0	44.4	34.87 34.92	33.3
16 to 18	3/16"	3 thru 50	C	1-3/8 ODM Solder									
11 to 15	1/4"												
9	5/16"												
7	3/8"												
Type 1126 Net Weight - Approximately 1 lb., 6 oz. (620 g)						2.81	2.38	1.373 1.375	1.12	71.4	60.5	34.87 34.92	28.4
19 to 24	3/16"	3 thru 50	C	1-3/8 ODM Solder									
15 to 18	1/4"												
10 to 15	5/16"												
8 to 12	3/8"												
Type 1128 Net Weight - Approximately 1 lb., 10 oz. (740 g)						3.12	3.00	1.373 1.375	1.38	79.2	76.2	34.87 34.92	35.1
25 to 28	3/16"	3 thru 50	C	1-3/8 ODM Solder									
19 to 25	1/4"												
16 to 21	5/16"												
13 to 16	3/8"												

Distributors

CO₂

Capacities Tons • psi • °F

kW • bar • °C

NOZZLE NUMBER	DISTRIBUTOR NOZZLE CAPACITIES EVAPORATOR TEMPERATURE °F			NOZZLE NUMBER	DISTRIBUTOR NOZZLE CAPACITIES EVAPORATOR TEMPERATURE °C		
	0°	-20°	-40°		-20°	-30°	-40°
1/9	0.42	0.30	0.23	1/9	1.27	0.97	0.76
1/6	0.64	0.46	0.35	1/6	1.96	1.49	1.17
1/4	1.03	0.74	0.56	1/4	3.15	2.4	1.88
1/3	1.35	0.97	0.73	1/3	4.13	3.14	2.46
1/2	1.87	1.34	1.01	1/2	5.71	4.34	3.41
3/4	2.82	2.02	1.53	3/4	8.62	6.55	5.14
1	3.77	2.71	2.05	1	11.5	8.77	6.88
1-1/2	5.48	3.94	2.98	1-1/2	16.8	12.8	10.0
2	7.53	5.40	4.09	2	23.0	17.5	13.7
2-1/2	9.39	6.74	5.09	2-1/2	28.7	21.8	17.1
3	11.3	8.09	6.11	3	34.5	26.2	20.6
4	15.1	10.8	8.18	4	46.2	35.1	27.5
5	18.6	13.3	10.1	5	56.9	43.3	34.0
6	22.3	16.0	12.1	6	68.3	51.9	40.7
8	26.9	19.3	14.6	8	82.2	62.5	49.1
10	30.1	21.6	16.3	10	92.2	70.0	55.0
12	37.2	26.7	20.2	12	114	86.5	67.9
15	46.1	33.1	25.0	15	141	107	84.2
17	51.6	37.0	28.0	17	158	120	94.2
20	62.2	44.6	33.7	20	190	145	113
25	78.2	56.1	42.4	25	239	182	143
30	89.3	64.1	48.5	30	273	208	163
35	107	77.1	58.3	35	329	250	196
40	120	86.5	65.4	40	369	280	220
50	156	112	84.8	50	478	364	285

TUBE DIAMETER Inches	DISTRIBUTOR CAPACITY PER TUBE (Tons) EVAPORATOR TEMPERATURE °F		
	0°	-20°	-40°
3/16	1.31	0.84	0.60
1/4	3.80	2.44	1.73
5/16	7.73	4.97	3.54
3/8	14.0	8.99	6.40

TUBE DIAMETER Inches	DISTRIBUTOR CAPACITY PER TUBE (kW) EVAPORATOR TEMPERATURE °C		
	-20°	-30°	-40°
3/16	3.86	2.71	2.02
1/4	11.2	7.86	5.86
5/16	22.8	16.0	11.9
3/8	41.2	29.0	21.6

LIQUID TEMPERATURE °F				
0°	10°	20°	30°	40°
CORRECTION FACTOR FOR NOZZLE AND TUBES				
1.60	1.25	1.00	0.83	0.71

LIQUID TEMPERATURE °C					
-20°	-15°	-10°	-5°	0°	5°
CORRECTION FACTOR FOR NOZZLE AND TUBES					
1.87	1.48	1.19	1.00	0.86	0.75

TUBE LENGTH (Inches)										
12	18	24	30	36	42	48	54	60	66	72
CORRECTION FACTOR, TUBE LENGTH										
1.36	1.16	1.07	1.00	0.95	0.90	0.86	0.82	0.79	0.76	0.73

TUBE LENGTH (mm)										
300	450	600	760	900	1050	1200	1350	1500	1650	1800
CORRECTION FACTOR, TUBE LENGTH										
1.36	1.16	1.07	1.00	0.95	0.90	0.86	0.82	0.79	0.76	0.73

Nozzle ratings based on ΔP = 35 psi (2.4 bar)

Tube ratings based on ΔP = 10 psi (0.69 bar), 30 inches (760 mm) length

Solenoid Valves

CO₂

Selection - Capacity Rating

■ Capacity, MOPD and Electrical specifications are required.

All solenoid valves are tested and rated in accordance with A.R.I. Standard No. 760-2001.

Liquid Capacity Selection Table

Tons = psi = °F

TYPE NUMBER		CONNECTIONS ODF SOLDER Inches	Cv	PORT SIZE Inches	TONS OF REFRIGERATION				
"E" Series Extended Connections					PRESSURE DROP — psi*				
Without Manual Lift Stem Normally Closed	With Manual Lift Stem Normally Closed				1	2	3	4	5
E2S120-HP	—	1/4	0.15	0.075	0.66	0.95	1.16	1.34	1.51
E5S130-HP	—	3/8	0.53	0.150	2.34	3.33	4.09	4.73	5.30
E6S130-HP	ME6S130-HP	3/8	0.93	3/16	4.20	5.90	7.21	8.30	9.26
E6S140-HP	ME6S140-HP	1/2							
E9S240-HP	ME9S240-HP	1/2	1.53	9/32	6.84	9.64	11.8	13.6	15.2
E9S250-HP	—	5/8							
E10S240-HP	—	1/2	2.10	5/16	9.35	13.2	16.2	18.7	20.9
E10S250-HP	—								
E14S250-HP	ME14S250-HP	5/8	2.98	7/16	13.3	18.8	23.0	26.5	29.6
E19S270-HP	ME19S270-HP	7/8	4.57	19/32	20.3	28.8	35.3	40.8	45.6
E25S270-HP	—	7/8	7.81	25/32	34.7	49.1	60.2	69.6	77.9
E25S290-HP	ME25S290-HP	1-1/8							
—	ME35S190-HP	1-1/8	13.3	1	56.3	82.2	103	120	136
—	ME35S1110-HP	1-3/8							

Ratings based on 20°F liquid, -20°F evaporator temperature.

kW = bar = °C

TYPE NUMBER		CONNECTIONS ODF SOLDER Inches	Kv	PORT SIZE mm	kW OF REFRIGERATION				
"E" Series Extended Connections					PRESSURE DROP — bar*				
Without Manual Lift Stem Normally Closed	With Manual Lift Stem Normally Closed				0.07	0.1	0.2	0.3	0.4
E2S120-HP	—	1/4	0.13	1.9	2.31	2.76	3.93	4.84	5.60
E5S130-HP	—	3/8	0.46	3.8	8.12	9.73	13.9	17.0	19.7
E6S130-HP	ME6S130-HP	3/8	0.81	4.8	14.6	17.4	24.4	29.8	34.3
E6S140-HP	ME6S140-HP	1/2							
E9S240-HP	ME9S240-HP	1/2	1.32	7.1	23.7	28.3	39.9	48.8	56.3
E9S250-HP	—	5/8							
E10S240-HP	—	1/2	1.81	7.9	32.5	38.8	54.8	67.1	77.4
E10S250-HP	—								
E14S250-HP	ME14S250-HP	5/8	2.57	11	46.1	55.1	77.8	95.2	110
E19S270-HP	ME19S270-HP	7/8	3.95	15	70.4	84.3	119	147	169
E25S270-HP	—	7/8	6.75	20	120	144	204	250	289
E25S290-HP	ME25S290-HP	1-1/8							
E35S190-HP	ME35S190-HP	1-1/8	11.5	26	196	238	347	433	506
—	ME35S1110-HP	1-3/8							

Ratings based on -5°C liquid, -30°C evaporator temperature.

* Do not use below 1 psi (0.07 bar) pressure drop.

For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psi (31.0 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 barg).

LIQUID TEMPERATURE °F					LIQUID TEMPERATURE °C					
0°	10°	20°	30°	40°	-20°	-15°	-10°	-5°	0°	5°
CORRECTION FACTOR, LIQUID CAPACITY RATING					CORRECTION FACTOR, LIQUID CAPACITY RATING					
1.13	1.07	1.00	0.93	0.86	1.18	1.12	1.06	1.00	0.94	0.87

These factors include corrections for liquid refrigerant density and net refrigerating effect and are based on an average evaporator temperature of 40°F (5°C). For each 10°F (10°C) reduction in evaporating temperature, capacities are reduced by approximately 1-1/2%.

Disclaimer: Some CO₂ systems do not use oil or lubrication in their systems. If so, the lack of lubrication in the system may cause the internal components of the valve to wear prematurely resulting in eventual failure of the valve. This disclaimer is for solenoid valves only.

Solenoid Valves

CO₂

Suction Capacity Selection Table

Tons - psi - °F

kW - bar - °C

TYPE NUMBER		SUCTION CAPACITY RATINGS – Tons					TYPE NUMBER		SUCTION CAPACITY RATINGS – kW				
"E" Series Extended Connections		EVAPORATOR TEMPERATURE °F					"E" Series Extended Connections		EVAPORATOR TEMPERATURE °C				
Without Manual Lift Stem	With Manual Lift Stem						Without Manual Lift Stem	With Manual Lift Stem					
Normally Closed	Normally Closed	0°	-10°	-20°	-30°	-40°	Normally Closed	Normally Closed	-20°	-25°	-30°	-35°	-40°
E2S120-HP	–	0.15	0.13	0.12	0.11	0.10	E2S120-HP	–	0.52	0.46	0.42	0.38	0.35
E5S130-HP	–	0.52	0.47	0.43	0.39	0.35	E5S130-HP	–	1.83	1.65	1.51	1.37	1.23
E6S130-HP	ME6S130-HP	0.98	0.90	0.82	0.75	0.68	E6S130-HP	ME6S130-HP	3.45	3.16	2.88	2.64	2.39
E6S140-HP	ME6S140-HP						E6S140-HP	ME6S140-HP					
E9S240-HP	ME9S240-HP	1.57	1.45	1.32	1.20	1.09	E9S240-HP	ME9S240-HP	5.52	5.10	4.64	4.22	3.83
E9S250-HP	–						E9S250-HP	–					
E10S240-HP	–	2.13	1.96	1.79	1.63	1.47	E10S240-HP	–	7.49	6.89	6.30	5.73	5.17
E10S250-HP	–						E10S250-HP	–					
E14S250-HP	ME14S250-HP	3.04	2.79	2.55	2.32	2.10	E14S250-HP	ME14S250-HP	10.7	9.81	8.97	8.16	7.39
E19S270-HP	ME19S270-HP	4.55	4.18	3.81	3.46	3.13	E19S270-HP	ME19S270-HP	16.0	14.7	13.4	12.2	11.0
E25S270-HP	–	7.81	7.17	6.55	5.95	5.38	E25S270-HP	–	27.5	25.2	23.0	20.9	18.9
E25S290-HP	ME25S290-HP						E25S290-HP	ME25S290-HP					
–	ME35S190-HP	11.2	10.2	9.23	8.32	7.45	–	ME35S190-HP	39.4	35.9	32.5	29.3	26.2
–	ME35S1110-HP						–	ME35S1110-HP					

Ratings based on 20°F (-5°C) liquid, 25°F (14°C) superheat, 1 psi (0.07 bar) ΔP.

Discharge Gas Capacity Selection Table

Tons - psi - °F

kW - bar - °C

TYPE NUMBER		DISCHARGE CAPACITY RATINGS – Tons					TYPE NUMBER		DISCHARGE CAPACITY RATINGS – kW				
"E" Series Extended Connections		ΔP - psi					"E" Series Extended Connections		ΔP - bar				
Without Manual Lift Stem	With Manual Lift Stem						Without Manual Lift Stem	With Manual Lift Stem					
Normally Closed	Normally Closed	2	5	10	25	50	Normally Closed	Normally Closed	0.15	0.3	0.7	1.5	4.0
E2S120-HP	–	0.21	0.34	0.48	0.77	1.25	E2S120-HP	–	0.78	1.11	1.71	2.52	4.67
E5S130-HP	–	0.75	1.20	1.70	2.72	4.39	E5S130-HP	–	2.75	3.91	6.02	8.87	16.45
E6S130-HP	ME6S130-HP	1.40	2.20	3.09	4.85	7.46	E6S130-HP	ME6S130-HP	5.11	7.19	10.9	15.9	27.9
E6S140-HP	ME6S140-HP						E6S140-HP	ME6S140-HP					
E9S240-HP	ME9S240-HP	2.26	3.57	5.03	7.91	11.1	E9S240-HP	ME9S240-HP	8.27	11.7	17.7	25.9	41.6
E9S250-HP	–						E9S250-HP	–					
E10S240-HP	–	3.07	4.85	6.86	10.8	16.9	E10S240-HP	–	11.2	15.9	24.2	35.4	63.4
E10S250-HP	–						E10S250-HP	–					
E14S250-HP	ME14S250-HP	4.38	6.91	9.76	15.4	23.2	E14S250-HP	ME14S250-HP	16.0	22.6	34.5	50.3	87.2
E19S270-HP	ME19S270-HP	6.59	10.5	14.8	23.5	34.5	E19S270-HP	ME19S270-HP	24.1	34.2	52.4	76.9	129
E25S270-HP	–	11.3	17.9	25.4	40.0	55.0	E25S270-HP	–	41.3	58.5	89.6	131	206
E25S290-HP	ME25S290-HP						E25S290-HP	ME25S290-HP					
–	ME35S190-HP	16.7	27.5	40.1	66.2	96.5	–	ME35S190-HP	61.3	89.4	142	215	363
–	ME35S1110-HP						–	ME35S1110-HP					

Ratings based on 20°F (-5°C) condensing, isentropic compression plus 50°F (28°C), -20°F (-30°C) evaporator, 5°F (-15°C) suction gas at the compressor.

LIQUID TEMPERATURE °F					LIQUID TEMPERATURE °C					
0°	10°	20°	30°	40°	-20°	-15°	-10°	-5°	0°	5°
CORRECTION FACTOR, SUCTION AND DISCHARGE RATING					CORRECTION FACTOR, SUCTION AND DISCHARGE RATING					
1.07	1.04	1.00	0.96	0.92	1.10	1.07	1.03	1.00	0.97	0.93

Solenoid Valves

CO₂

Type E2 and E5 Series

The **E5 Series** are hermetic solenoid valves with pilot operated disc construction. These valves **may be mounted horizontally, on their side or in a vertical line.**

The **E5** series solenoid valves feature extended solder type connections as standard. One important benefit to the user is that all valves in the “E5” series can be installed using either low or no silver content brazing alloy.

The MKC-1 coil is Class “F” temperature rated and is provided as standard, therefore a high temperature coil is not required for discharge service.

Ordering Instructions

When ordering complete valves, specify Valve Type, Connections, Voltage and Cycles. When ordering Body Assembly, specify Valve Type and Connections. When ordering Coil Assembly **ONLY**, specify Coil Type, Voltage and Cycles. **Example: MKC-1 120/50-60.**

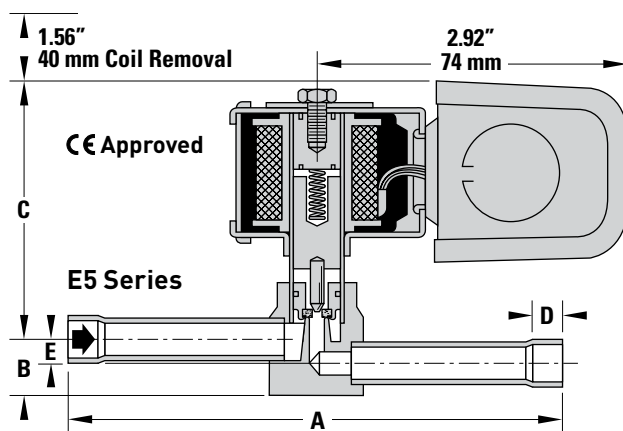


Type E5S130-HP

Dimensions

VALVE SERIES	TYPE	A	B	C	D	E
					FITTING DEPTH	OFFSET
Inches						
E2	E2S120-HP	4.63	0.55	1.96	0.31	0.29
E5	E5S130-HP	4.56	0.53	2.48		0.23
mm						
E2	E2S120-HP	118	14	50	8	7.4
E5	E5S130-HP	116	13	63		6

COIL RATINGS		
STANDARD VOLTS/CYCLES	WATTS	
	AC	DC
24/50-60 120/50-60 208-240/50-60 120-208-240/50-60	10	15



Specifications - MKC-1 Coil

Tons • psi • °F

kW • bar • °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Cv	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES
					AC	DC	TONS of REFRIGERATION
							PRESSURE DROP 3 psi
E2	E2S120-HP	1/4	0.15	0.075	450	400	1.16
E5	E5S130-HP	3/8	0.53	0.150			4.09

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Kv	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES
					AC	DC	kW of REFRIGERATION
							PRESSURE DROP 0.2 bar
E2	E2S120-HP	1/4	0.13	1.9	31.0	27.6	3.93
E5	E5S130-HP	3/8	0.46	3.8			13.9

■ Capacities based on 20°F (-6.7°C) liquid temperature, -20°F (-29°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psi (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 barg).

■ Dual voltage 4-wire coils, 120-208-240/50-60 are available at slight additional cost. For other voltages and cycles, consult Sporlan Division of Parker, Washington, MO.
 ■ Available with conduit boss, junction box, or DIN at no extra charge.
 ■ For capacity at other pressure drops, see page 7 and 8.
 ■ See disclaimer on page 7.

Solenoid Valves

CO₂

Type E6 Series

The **E6 Series** are compact solenoid valves with pilot operated disc construction for refrigeration and air conditioning. These valves **may be mounted horizontally, on their side or in a vertical line**. They are suitable for suction line service because very low pressure differential, 1 psi, is required for full operation.

The **Type E6** series solenoid valves feature extended solder type connections as standard. One important benefit to the user is that all valves in the “**E6**” series can be installed without disassembly using either low or no silver content brazing alloy.

The MKC-I coil is Class “F” temperature rated and is provided as standard, therefore a high temperature coil is not required for discharge service.



Type E6S130-HP

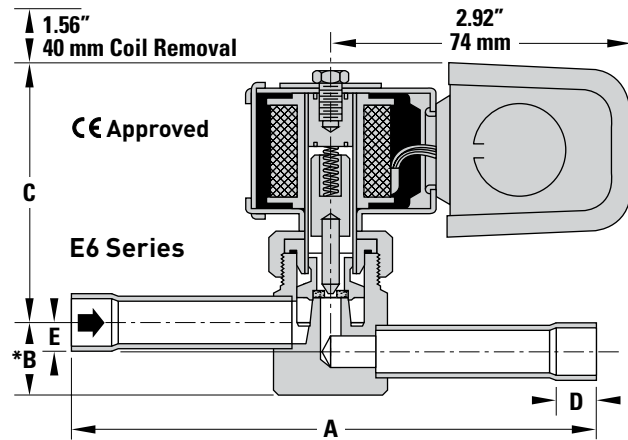
Ordering Instructions

When ordering complete valves, specify Valve Type, Connections, Voltage and Cycles. When ordering Body Assembly, specify Valve Type and Connections. When ordering Coil Assembly ONLY, specify Coil Type, Voltage and Cycles. **Example: MKC-1 120/50-60.**

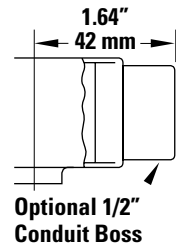
Dimensions

VALVE SERIES	TYPE	A	B*	C	D	E
					FITTING DEPTH	ODF
Inches						
E6	E6S130-HP	4.63	0.75	2.44	0.31	0.31
	E6S140-HP	5.00			0.38	
mm						
E6	E6S130-HP	118	19	62	7.9	7.9
	E6S140-HP	127			9.7	

* Add 1.12" (28 mm) for valves with Manual Lift Stem.



COIL RATINGS		
STANDARD VOLTS/CYCLES	WATTS	
	AC	DC
24/50-60	10	15
120/50-60		
208-240/50-60		
120-208-240/50-60		



Specifications - MKC-1 Coil

Tons = psi = °F

kW = bar = °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Cv	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES	
					AC	DC	TONS of REFRIGERATION	
							PRESSURE DROP 3 psi	
E6	E6S130-HP	3/8	0.93	3/16	450	400	7.21	
	ME6S130-HP							
	ME6S140-HP	1/2						

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Kv	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES	
					AC	DC	kW of REFRIGERATION	
							PRESSURE DROP 0.2 bar	
E6	E6S130-HP	3/8	0.81	4.8	31.0	27.6	24.4	
	ME6S130-HP							
	ME6S140-HP	1/2						

- Capacities based on 20°F (-6.7°C) liquid temperature, -20°F (-29°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psi (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 barg).
- Dual voltage 4-wire coils, 120-208-240/50-60 are available at slight additional cost. For other voltages and cycles, consult Sporlan Division of Parker, Washington, MO.

- Available with conduit boss, junction box, or DIN at no extra charge.
- For mounting holes and/or bracket information, see Bulletin 30-11
- E6 series with mounting holes are NOT standard.
- For capacity at other pressure drops, see page 7 and 8.
- See disclaimer on page 7.

Solenoid Valves

CO₂

Types E9, E10, E14, E19 and E25 Series

Types **E9, E10, E14, E19 and E25 Series** are compact solenoid valves with pilot operated disc construction for refrigeration and air conditioning. These valves **may be mounted horizontally, on their side or in a vertical line**. These valves are also suitable for suction line service because very low pressure differential, 1 psi, is required for full operation.

The **E9, E10, E14, E19 and E25** series solenoid valves feature extended solder type connections as standard. One important benefit to the user is that all valves in the “**E9, E10, E14, E19 and E25 series**” series can be installed without disassembly using either low or no silver content brazing alloy.

The MKC-2 and OMKC-2 coils are Class “F” temperature rated and are provided as standard, therefore a high temperature coil is not required for discharge service.



Type E14S250-HP

Ordering Instructions

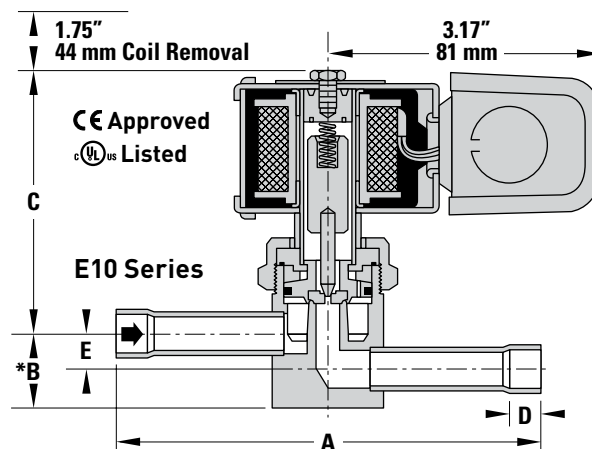
When ordering complete valves, specify Valve Type, Connections, Voltage and Cycles. When ordering Body Assembly, specify Valve Type and Connections. When ordering Coil Assembly ONLY, specify Coil Type, Voltage and Cycles. **Example: MKC-2 120/50-60; OMKC-2 120/50-60.**

Dimensions

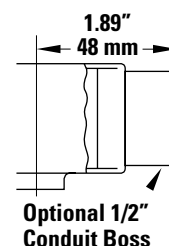
VALVE SERIES	TYPE	A	*B	C NORMALLY CLOSED	D FITTING DEPTH	E OFFSET
Inches						
E9	E9S230-HP	4.63	0.69	2.65	0.31	0.39
	E9S240-HP	5.00	0.75	2.70	0.38	0.33
	E9S250-HP	6.50	0.69	2.74	0.50	0.31
E10	E10S240-HP	5.00	0.85	3.13	0.38	0.38
	E10S250-HP					
E14	E14S250-HP	6.88	0.46	3.26	0.50	—
E19	E19S270-HP	7.13	0.81	3.41	0.75	—
E25	E25S270-HP	7.50	0.72	3.81	0.75	—
	E25S290-HP	8.50	0.72	3.81	0.91	—

mm						
E9	E9S230-HP	118	18.0	67	7.9	9.9
	E9S240-HP	127	9.7	69	9.7	7.9
	E9S250-HP	165	12.7	69	13.0	9.7
E10	E10S240-HP	127	9.7	80	9.7	9.7
	E10S250-HP					
E14	E14S250-HP	175	11.7	83	13.0	—
E19	E19S270-HP	181	21.0	87	19.0	—
E25	E25S270-HP	191	18.0	97	19.0	—
	E25S290-HP	216	18.0	97	23.0	—

* Add 1.12" (28 mm) for valves with Manual Lift Stem.



COIL RATINGS		
STANDARD VOLTS/CYCLES	WATTS	
	AC	DC
24/50-60	15	18
120/50-60		
208-240/50-60		
120-208-240/50-60		



Specifications - MKC-2 and OMKC-2 Coil

Tons - psi - °F

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Cv	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES TONS of REFRIGERATION PRESSURE DROP 3 psi			
					AC	DC				
					E9	E9S230-HP		3/8	1.53	9/32
	E9S240-HP	1/2								
	E9S250-HP	5/8								
E10	E10S240-HP	1/2	2.10	5/16	450	400	16.2			
		E10S250-HP						5/8		
E14	E14S250-HP	5/8	2.98	7/16				450	400	23.0
E19	E19S270-HP	7/8	4.57	19/32	450	400	25.3			
E25	E25S270-HP	7/8	7.81	25/32						
		E25S290-HP			1-1/8					

kW - bar - °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Kv	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES kW of REFRIGERATION PRESSURE DROP 0.2 bar			
					AC	DC				
					E9	E9S230-HP		3/8	1.32	7.1
	E9S240-HP	1/2								
	E9S250-HP	5/8								
E10	E10S240-HP	1/2	1.81	7.9	31.0	27.6	54.8			
		E10S250-HP						5/8		
E14	E14S250-HP	5/8	2.57	11				31.0	27.6	77.8
E19	E19S270-HP	7/8	3.95	15	31.0	27.6	119			
E25	E25S270-HP	7/8	6.75	20						
		E25S290-HP			1-1/8					

■ Capacities based on 20°F (-6.7°C) liquid temperature, -20°F (-29°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psi (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 barg).

■ Dual voltage 4-wire coils, 120-208-240/50-60 are available at slight additional cost.
 ■ For other voltages and cycles, consult Sporlan Division of Parker, Washington, MO.
 ■ Available with conduit boss, junction box, or DIN at no extra charge.
 ■ For capacity at other pressure drops, see page 7 and 8.
 ■ See disclaimer on page 7.

Solenoid Valves

CO₂

Types E35 Series

Types **E35 Series** solenoid valves are pilot operated for refrigeration and air conditioning applications. They are suitable for suction service because very low pressure differential, 1 psi, is required for full operation. The **E35 Series may be mounted horizontally, on their side or in a vertical line.**

The **Type E35** series solenoid valves feature extended solder type connections as standard. One important benefit to the user is that all valves in the “**E35**” series can be installed without disassembly using either low or no silver content brazing alloy.

The MKC-1 and OMKC-1 coils are Class “F” temperature rated and are provided as standard, therefore a high temperature coil is not required for discharge service.

Ordering Instructions

When ordering complete valves, specify Valve Type, Connections, Voltage and Cycles. When ordering Body Assembly, specify Valve Type and Connections.



Type ME35S1110-HP

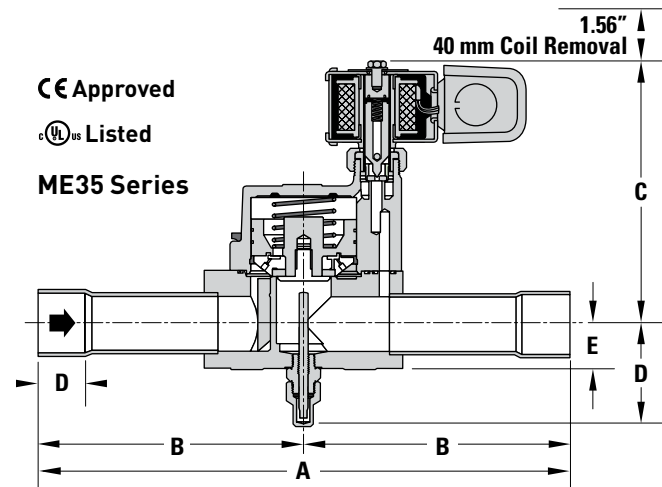
- ① 1-5/8” ODM Type L tubing may be slipped over 1-3/8” fitting, without the use of a coupling.

When ordering Coil Assembly ONLY, specify Coil Type, Voltage and Cycles. **Example: MKC-1 120/50-60; OMKC-1 120/50-60.**

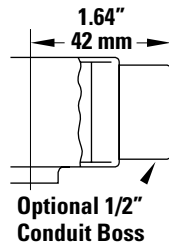
Dimensions

VALVE SERIES	TYPE	A	B	C		D	*E
				NORMALLY CLOSED	NORMALLY OPEN		
Inches							
E35	E35S190-HP	10.06	5.03	4.81	5.94	0.91	0.84
	E35S1110-HP	11.06	5.53			0.97	
mm							
E35	E35S190-HP	256	128	122	151	23	21
	E35S1110-HP	281	140			25	

* Add 1.12” (28 mm) for valves with Manual Lift Stem.



COIL RATINGS		
STANDARD VOLTS/CYCLES	WATTS	
	AC	DC
24/50-60 120/50-60 208-240/50-60 120-208-240/50-60	10	15



Specifications - MKC-1 and OMKC-1 Coil

Tons = psi = °F

kW = bar = °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Cv	PORT SIZE Inches	MOPD psi			NOMINAL LIQUID CAPACITIES TONS of REFRIGERATION PRESSURE DROP 3 psi	VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	Kv	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES kW of REFRIGERATION PRESSURE DROP 0.2 bar
					AC	DC	AC							DC		
					E35	ME35S190-HP	1-1/8							13.3	1	
	ME35S1110-HP	①1-3/8							ME35S1110-HP	①1-3/8						

■ Capacities based on 20°F (-6.7°C) liquid temperature, -20°F (-29°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psi (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 barg).

- Dual voltage 4-wire coils, 120-208-240/50-60 are available at slight additional cost. For other voltages and cycles, consult Sporlan Division of Parker, Washington, MO.
- Available with conduit boss, junction box, or DIN on no extra charge.
- For capacity at other pressure drops, see page 7 and 8.
- See disclaimer on page 7.

Solenoid Valves

CO₂

Identification

Nomenclature - E Series

M	E	10	S	2	5	0	S
Manual Lift Stem	Design Series	Port Size in 1/32"	Connections Solder	Coil Size ①, ②	Connection Size in 1/8"	*Connections 0 - ODF X ODF 1 - ODF X ODM 2 - ODM X ODF 3 - ODM X ODM	Coil Connection S- Spade E - DIN 43650A

Type "E" series is identified by an expanded nomenclature. The system of valve identity based on port size. In addition, the "E" series identifies the connection size and type. The advantage of the "E" series nomenclature system is that it allows ease in valve identification of the standard line and can provide considerable information about special valves supplied to manufacturers.

- ① The MKC-1, OMKC-1, MKC-2 and OMKC-2 are fungus proof and meet MIL-I-631C.
- ② The standard MKC-1 and MKC-2 are class "F" rated.
- * Standard connections are ODF inlet x ODF outlet on "E" Series valves. Minimum quantities may be required for other connections.



For connections and other special features consult Sporlan Division of Parker, Washington, MO.

Application

Compressor Capacity Reduction Service

Sporlan Solenoid Valves may be used in conjunction with Sporlan Discharge Bypass Valves for capacity reduction service. For capacity information and further details on the Discharge Bypass Valves see pages 36 to 39 or consult Sporlan Division of Parker, Washington, MO.

Filter-Driers are Essential

Dirt and other system contaminants present a problem for refrigeration and air conditioning controls. Since pilot operated solenoid valves operate with rather close tolerances, system cleanliness is imperative. The Sporlan **Catch-All® Filter-Drier** filters out minute particles of dirt and other foreign matter, thus protecting the valve.

Sporlan recommends using a **Catch-All® Filter-Drier** ahead of every solenoid valve on all refrigeration and air conditioning applications. Contact Sporlan before adding a **Catch-All® Filter-Drier** in the discharge line.

Transformer Selection for Low-Voltage Control Systems

Many systems utilize low voltage controls, requiring the use of a transformer for voltage reduction, normally to 24 volts. The selection of a transformer is not accomplished by merely selecting one that has the proper voltage requirements. The volt-ampere (VA) rating is equally important. To determine the VA requirement for a specific solenoid valve, refer to the chart below. It should be noted, that insufficient transformer capacity will result in reduced operating power or lowering of the MOPD value.

If more than one solenoid valve and/or other accessories are operated from the same transformer, then the transformer VA rating must be determined by adding the individual accessories' VA requirements.

Fusing

Sporlan Solenoid Valves are not supplied with fuses. Fusing should be according to local codes. We recommend fusing the hot leg of the valve wiring with fast acting fuses and the valve should be grounded either through the fluid piping or the electrical conduit.

COIL KIT	24 VOLTS/ 50-60 CYCLES		120 VOLTS/ 50-60 CYCLES		240 VOLTS/ 50-60 CYCLES		TRANSFORMER RATING VOLTS-AMPERES
	CURRENT-AMPERES		CURRENT-AMPERES		CURRENT-AMPERES		
	INRUSH	HOLDING	INRUSH	HOLDING	INRUSH	HOLDING	FOR 100% OF RATED MOPD OF VALVE
MKC-1 OMKC-1	1.9	0.63	0.39	0.14	0.19	0.09	60
MKC-2 OMKC-2	3.1	1.4	0.60	0.26	0.31	0.13	100

- All current values are based on 60 cycles.
- Volt-ampere ratings are based on inrush currents.
- Above values are based on the most severe conditions. — Consult Sporlan Division of Parker, Washington, MO for coil characteristics on specific valve types.

Catch-All Filter-Driers

CO₂

The universal acceptance of the **Catch-All® Filter-Drier** is due to its unique molded porous core, consisting of a blend of highly effective desiccants. The quality features built into it assure years of service on any refrigeration system.



Foreign Matter – The **Catch-All Filter-Drier** will filter out scale, solder particles, carbon, sludge, dirt or any other foreign matter with negligible pressure drop. Fine particles that would go through an ordinary strainer are removed down to a minimum size in one pass filtration. The large filtering area of the **Catch-All Filter-Drier** core permits it to collect a large amount of dirt without plug up.

Moisture – The **Catch-All Filter-Drier** removes moisture from the refrigerant by adsorbing and retaining it deep within the desiccant granules. The blend of desiccants used in the **Catch-All Filter-Drier** are specially formulated for exceptional water removal.

Acid – The **Catch-All Filter-Drier** is unexcelled in acid removal ability. The hydrochloric, hydrofluoric, and various organic acids are adsorbed and held by the desiccant in a manner similar to the

Sealed Type – Liquid Line and Suction Line Specifications

Tons = °F = psi



"C" SERIES LIQUID LINE TYPE		SUCTION LINE TYPE	CONNECTION SIZE Inches	VOLUME of DESICCANT Cubic Inches	OVERALL LENGTH Inches		SOLDER SOCKET DEPTH Inches	DIAMETER of BODY Inches
SAE FLARE	ODF SOLDER	ODF SOLDER			SAE FLARE	ODF SOLDER		
C-032	C-032-S	—	1/4	3	4.19	3.81	0.38	1.75
—	C-032-CAP C-032-CAP-T	—	Extended 1/4 Male		—	5.81	—	
C-032-F	—	—	1/4 Male - Inlet 1/4 Female - Outlet		3.81	—	—	
C-032-FM	—	—	1/4 Female - Inlet 1/4 Male - Outlet		3.81	—	—	
C-033	C-033-S	—	3/8		4.69	3.88	0.44	
C-052	C-052-S C-0525-S	—	1/4 5/16	5	4.75 —	4.19 4.38	0.38 0.44	2.44
C-052-F	—	—	1/4 Male - Inlet 1/4 Female - Outlet		4.19	—	—	
C-052-FM	—	—	1/4 Male - Inlet 1/4 Female - Outlet		4.19	—	—	
C-053	C-053-S	—	3/8		5.19	4.31	0.44	
C-082	C-082-S C-0825-S	—	1/4 5/16	9	5.62 —	5.12 5.31	0.38 0.44	2.62
C-083	C-083-S	C-083-S-T-HH	3/8		6.06	5.25	0.44	
C-084	C-084-S	C-084-S-T-HH	1/2		6.31	5.44	0.50	
C-162	C-162-S	—	1/4		6.25	5.75	0.38	
—	C-1625-S	—	5/16	—	5.94	0.44		
C-163	C-163-S	—	3/8	16	6.75	5.88	0.44	3.00
C-164	C-164-S	C-164-S-T-HH	1/2		6.94	6.00	0.50	
C-165	C-165-S	C-165-S-T-HH	5/8		7.25	6.31	0.62	
—	—	C-166-S-T-HH	3/4		—	6.75	0.62	
—	C-167-S	C-167-S-T-HH	7/8		—	6.93	0.75	
C-303	C-303-S	—	3/8	30	9.69	8.88	0.44	3.00
C-304	C-304-S	—	1/2		9.88	9.00	0.50	
C-305	C-305-S	C-305-S-T-HH	5/8		10.19	9.25	0.62	
—	C-306-S	C-306-S-T-HH	3/4		—	9.65	0.62	
—	C-307-S	C-307-S-T-HH	7/8		—	9.80	0.75	
—	C-309-S	C-309-S-T-HH	1-1/8		—	9.75	0.96	
C-413	—	—	3/8	41	9.56	—	—	3.50
C-414	C-414-S	—	1/2		9.94	9.05	0.50	
C-415	C-415-S	—	5/8		10.25	9.35	0.62	
—	C-417-S	C-417-S-T-HH	7/8		—	9.81	0.75	
—	C-419-S	C-419-S-T-HH	1-1/8		—	9.75	0.96	
—	C-607-S C-609-S	C-607-S-T-HH C-609-S-T-HH	7/8 1-1/8	60	—	16.00 16.00	0.75 0.96	3.00

Catch-All Filter-Driers

CO₂

adsorption of moisture. Tests have demonstrated that the **Catch-All Filter-Drier** has superior acid removal ability when compared to competitive driers. This ability, along with its excellent ability to clean up the oil, is responsible for the excellent field performance in cleaning up severely contaminated systems.

Oil, Sludge and Varnish – Even the best refrigeration oils break down to produce varnish, sludge and organic acids. Only the **Catch-All Filter-Drier** is capable of removing these products of oil decomposition.

Special Applications – A special “HH” core **Catch-All Filter-Drier** is available to remove wax which frequently causes difficulty on low temperature refrigeration systems. For cap tube systems, use the C-032-CAP or C-032-CAP-T Catch-All which has fittings suitable for attaching to any size capillary tube.

Remember...It’s the CORE that counts!

Sealed Type – Liquid Line and Suction Line Specifications

kW = °C = bar



"C" SERIES LIQUID LINE TYPE		SUCTION LINE TYPE	CONNECTION SIZE Inches	VOLUME of DESICCANT cm ³	OVERALL LENGTH mm		SOLDER SOCKET DEPTH mm	DIAMETER of BODY mm
SAE FLARE	ODF SOLDER	ODF SOLDER			SAE FLARE	ODF SOLDER		
C-032	C-032-S	—	1/4	49	106	97	10	44
—	C-032-CAP C-032-CAP-T	—	Extended 1/4 Male		—	148	—	
C-032-F	—	—	1/4 Male - Inlet 1/4 Female - Outlet		97	—	—	
C-032-FM	—	—	1/4 Female - Inlet 1/4 Male - Outlet		97	—	—	
C-033	C-033-S	—	3/8		119	99	11	
C-052	C-052-S	—	1/4	82	121	106	10	62
—	C-0525-S	—	5/16		—	111	11	
C-052-F	—	—	1/4 Male - Inlet 1/4 Female - Outlet		106	—	—	
C-052-FM	—	—	1/4 Male - Inlet 1/4 Female - Outlet		106	—	—	
C-053	C-053-S	—	3/8	132	109	11		
C-082	C-082-S	—	1/4	147	143	130	10	67
—	C-0825-S	—	5/16		—	135	11	
C-083	C-083-S	C-083-S-T-HH	3/8		154	133	11	
C-084	C-084-S	C-084-S-T-HH	1/2		160	138	13	
C-162	C-162-S	—	1/4	262	159	146	10	76
—	C-1625-S	—	5/16		—	151	11	
C-163	C-163-S	—	3/8		171	149	11	
C-164	C-164-S	C-164-S-T-HH	1/2		176	152	13	
C-165	C-165-S	C-165-S-T-HH	5/8		184	160	16	
—	—	C-166-S-T-HH	3/4		—	171	16	
—	C-167-S	C-167-S-T-HH	7/8		—	176	19	
C-303	C-303-S	—	3/8	492	246	226	11	76
C-304	C-304-S	—	1/2		251	229	13	
C-305	C-305-S	C-305-S-T-HH	5/8		259	235	16	
—	C-306-S	C-306-S-T-HH	3/4		—	245	16	
—	C-307-S	C-307-S-T-HH	7/8		—	249	19	
—	C-309-S	C-309-S-T-HH	1-1/8		—	248	24	
C-413	—	—	3/8	672	243	—	—	89
C-414	C-414-S	—	1/2		252	230	13	
C-415	C-415-S	—	5/8		260	237	16	
—	C-417-S	C-417-S-T-HH	7/8		—	249	19	
—	C-419-S	C-419-S-T-HH	1-1/8		—	248	24	
—	C-607-S	C-607-S-T-HH	7/8	983	—	406	19	76
—	C-609-S	C-609-S-T-HH	1-1/8		—	406	24	

Sealed Type Liquid Line Ratings and Selection Recommendations

Tons = °F = psi

kW = °C = bar

TYPE	②SURFACE FILTERING AREA Square Inches	①REFRIGERANT FLOW CAPACITY Tons at 1 psi ΔP	TYPE	②SURFACE FILTERING AREA cm ²	①REFRIGERANT FLOW CAPACITY kW at 0.07 bar ΔP		
SEALED TYPE			SEALED TYPE				
C-032	9	2.02	C-032	58	7.03		
C-032-CAP							
C-032-S							
C-032-F							
C-032-FM							
C-033			4.90			C-033	17.0
C-033-S	5.37	C-033-S		18.6			
C-052	15	2.89	C-052	97	10.0		
C-052-S							
C-052-F							
C-052-FM							
C-0525-S			4.76			C-0525-S	16.5
C-053						5.77	
C-053-S	6.52	C-053-S	22.7				
C-082	21	2.89	C-082	135	10.0		
C-082-S							
C-0825-S			5.06			C-0825-S	17.6
C-083						6.36	
C-083-S			7.22			C-083-S	25.1
C-084			12.2			C-084	42.4
C-084-S	13.5	C-084-S	46.9				
C-162	33	2.89	C-162	213	10.0		
C-162-S							
C-1625-S			5.06			C-1625-S	17.6
C-163						6.36	
C-163-S			7.22			C-163-S	25.1
C-164			14.2			C-164	49.4
C-164-S	15.4	C-164-S	53.6				
C-165	19.4	C-165	67.4				
C-165-S	22.4	C-165-S	77.6				
C-303	53	6.37	C-303	342	22.1		
C-303-S							
C-304			14.2			C-304	49.4
C-304-S						15.4	
C-305			20.9			C-305	72.5
C-305-S			23.8			C-305-S	82.5
C-307-S	30.4	C-307-S	105				
C-414	67	16.1	C-414	432	55.7		
C-414-S			17.4			C-414-S	60.5
C-415						22.3	
C-415-S			24.8			C-415-S	86.0
C-417-S			31.1			C-417-S	108
C-419-S			34.3			C-419-S	119
C-607-S	106	41.1	C-607-S	684	143		
C-609-S			47.0			C-609-S	163

① Ratings based on 20°F (-5°C) liquid, -20°F (-30°C) evaporator temperature.

② The filtration area is equal to the core surface area plus the large internal surface available for depth filtration.

The variation in flow ratings of filter-driers having the same size core and shell is caused by the difference in connection sizes used.

Catch-All Filter-Driers

CO₂

Replaceable Core Type

ODF Solder Connections

The rugged construction of the Replaceable Core Catch-All has proven itself in the field for many years. The design features include:

1. The famous **molded porous core** for maximum contaminant removal. The core cannot swell, powder or pack – assuring ease of installation and removal.
2. The **bolt and nut attachment** of the end plate provides simple trouble-free installation.
3. The **internal construction** gives a one piece assembly and assures proper core alignment.



RCW-48



C-969-G



4. A **complete line** of fitting sizes – all with copper fittings.
5. **No plastic parts** are used – all internal parts are plated steel.
6. A **corrosion resistant powder paint** protects the exterior of the shell.

Specifications

TYPE	CONNECTIONS ODF SOLDER Inches	OPTIONAL SECONDARY FILTER*	NUMBER of CORES or FILTER ELEMENTS	CORE PART NUMBER	VOLUME of DESICCANT		FILTER ELEMENT PART NUMBER	MOUNTING BRACKETS	OVERALL LENGTH	
					Cubic Inches	cm ³			Inches	mm
C-R424-G	1/2	—	1	RCW-42	42	688	—	A-175-1	9.00	229
C-R425-G	5/8								9.06	230
C-R427-G	7/8								9.44	240
C-485-G	5/8	FS-480	1	RCW-48, RC-4864 or RC-4864-HH	48	787	RPE-48-BD	A-685	9.15	232
C-487-G	7/8								9.30	236
C-489-G	1-1/8								9.50	241
C-4811-G	1-3/8								9.60	244
C-4813-G	1-5/8								9.60	244
C-967-G	7/8	FS-960	2	RCW-48, RC-4864 or RC-4864-HH	96	1573	RPE-48-BD	A-685	14.84	377
C-969-G	1-1/8								15.04	382
C-9611-G	1-3/8								15.14	385
C-9613-G	1-5/8								15.14	385
C-1449-G	1-1/8	FS-1440	3	RCW-48, RC-4864 or RC-4864-HH	144	2360	RPE-48-BD	A-685	20.58	523
C-14411-G	1-3/8								20.68	525
C-14413-G	1-5/8								20.68	525
C-19211-G	1-3/8	FS-19200	4	RCW-48, RC-4864 or RC-4864-HH	192	3146	RPE-48-BD	A-685	26.22	666
C-19213-G	1-5/8								26.22	666

UL and UL_C Listed – Guide SMGT-File No. SA-1756. C-480 through C-1920 Series shells have a 650 psig (44.8 barg) rating.

*Optional Secondary Filter must be purchased separately. O-rings (p/n 621-025) are supplied with each secondary filter, but can be purchased separately. The secondary filter cannot be used if the shell is installed in the suction line.

Type numbers with G suffix indicate that unit is supplied with 1/4" female pipe connection in the end plate and pipe plug. For liquid line service and angle charging valve for system charging purposes can be installed in place of the pipe plug. Angle charging and Schrader type access valves are available from your Sporlan Wholesaler.

Liquid Line Ratings and Selection Recommendations

Tons = psi = °F

kW = bar = °C

TYPE	②SURFACE FILTERING AREA Square Inches	①REFRIGERANT FLOW CAPACITY Tons at 1 psi ΔP	TYPE	②SURFACE FILTERING AREA cm ²	①REFRIGERANT FLOW CAPACITY kW at 0.07 bar ΔP
REPLACEABLE CORE TYPE WITH HIGH WATER CAPACITY CORES (See page 19)			REPLACEABLE CORE TYPE WITH HIGH WATER CAPACITY CORES (See page 19)		
C-R424-G	67	16.0	C-R424-G	432	55.5
C-R425-G		19.1	C-R425-G		66.4
C-R427-G		26.1	C-R427-G		90.6
C-485-G	64	20.7	C-485-G	413	72.0
C-487-G		33.7	C-487-G		117
C-489-G		60.9	C-489-G		211
C-967-G		55.3	C-967-G		192
C-969-G	128	68.6	C-969-G	826	238
C-1449-G		83.6	C-1449-G		290
C-14411-G	192	94.3	C-14411-G	1239	327
C-19211-G		119	C-19211-G		412
C-19213-G		139	C-19213-G		484
C-19217-G	256	147	C-19217-G	1652	509

① Ratings based on 20°F (-5°C) liquid, -20°F (-30°C) evaporator temperature.

② The filtration area is equal to the core surface area plus the large internal surface available for depth filtration.

The variation in flow ratings of filter-driers having the same size core and shell is caused by the difference in connection sizes used.

Suction Line Filter-Drier Ratings

for New Systems and Clean-up after Burnout

Selection Instructions

The flow capacities are rated at the maximum recommended pressure drop for **permanent** installation.

To ensure the suction line filter-drier has ample contaminant removal ability, selection must be based on flow capacity and the amount of desiccant required for system clean-up. The suction line filter-drier must be large enough to adequately remove acid, moisture and solid contaminants without causing nuisance plug-ups. Sizing is especially important for sealed type suction line filter-driers since they should be sized to clean a small system with one service call.

To reduce the pressure drop through replaceable core shells, substitute cores with filter elements (see page 19) after the system has been cleaned up. The 6171-5 screen should be discarded when cores are replaced with RPE-48-BD elements in RSF shells.

For complete description of the suggested system clean-up procedure, request Bulletin 40-10.

Suction Line Flow Capacity

Tons • psi • °F

kW • bar • °C

EVAPORATOR TEMPERATURE		-20°F		EVAPORATOR TEMPERATURE		-30°C	
PRESSURE DROP (psi)		3.0	8.0*	PRESSURE DROP (bar)		0.20	0.55*
SEALED TYPE	C-083-S-T-HH	4.15	—	SEALED TYPE	C-083-S-T-HH	13.8	—
	C-084-S-T-HH	4.15	—		C-084-S-T-HH	13.8	—
	C-144-S-T-HH	4.15	—		C-144-S-T-HH	13.8	—
	C-145-S-T-HH	7.05	—		C-145-S-T-HH	23.4	—
	C-146-S-T-HH	9.64	—		C-146-S-T-HH	32.1	—
	C-147-S-T-HH	10.4	—		C-147-S-T-HH	34.8	—
	C-149-S-T-HH	13.9	—		C-149-S-T-HH	46.5	—
	C-164-S-T-HH	5.54	—		C-164-S-T-HH	18.4	—
	C-165-S-T-HH	6.42	—		C-165-S-T-HH	21.4	—
	C-166-S-T-HH	8.02	—		C-166-S-T-HH	26.7	—
	C-167-S-T-HH	9.15	—		C-167-S-T-HH	30.4	—
	C-305-S-T-HH	6.88	—		C-305-S-T-HH	22.9	—
	C-306-S-T-HH	8.99	—		C-306-S-T-HH	29.9	—
	C-307-S-T-HH	10.8	—		C-307-S-T-HH	36.0	—
	C-309-S-T-HH	11.9	—		C-309-S-T-HH	39.8	—
	C-417-S-T-HH	12.2	—		C-417-S-T-HH	40.7	—
	C-419-S-T-HH	12.4	—		C-419-S-T-HH	41.3	—
	C-437-S-T-HH	16.1	—		C-437-S-T-HH	53.6	—
	C-439-S-T-HH	20.3	—		C-439-S-T-HH	67.4	—
	C-4311-S-T-HH	22.3	—		C-4311-S-T-HH	74.3	—
C-4313-S-T-HH	24.6	—	C-4313-S-T-HH	81.8	—		
C-607-S-T-HH	13.5	—	C-607-S-T-HH	45.0	—		
C-609-S-T-HH	15.2	—	C-609-S-T-HH	50.5	—		
REPLACEABLE CORE TYPE	RSF-487-T	20.4	35.4	REPLACEABLE CORE TYPE	RSF-487-T	68.0	120
	RSF-489-T	24.6	42.3		RSF-489-T	81.8	143
	RSF-4811-T	29.9	51.7		RSF-4811-T	99.6	175
	RSF-4813-T	32.2	55.8		RSF-4813-T	107	189
	RSF-4817-T	34.8	60.0		RSF-4817-T	116	203
	RSF-4821-T	37.5	64.4		RSF-4821-T	125	218
	RSF-9611-T	40.7	81.6		RSF-9611-T	135	237
	RSF-9613-T	50.9	87.5		RSF-9613-T	169	296
	RSF-9617-T	50.9	87.5		RSF-9617-T	169	296
	RSF-9621-T	59.1	102		RSF-9621-T	197	344
	RSF-9625-T	60.5	104		RSF-9625-T	201	353

*Denotes TEMPORARY INSTALLATION. Cores for system clean-up; RPE-48-BD Filter Elements should be installed after clean-up.

Ratings based on 20°F (-5°C) liquid, 25°F (14°C) superheat.

Rated in accordance with ARI Standard 730.

Significance of the Type Number

The letters and numerals in the Catch-All® type number each have a significance. The “C” indicates Catch-All. The **first two or three digits** indicate cubic inches of desiccant. The **last one or two digits** indicate fitting size in eighths of an inch. For sealed models, a “-S” following the last digit indicates solder fittings, and **no letter** indicates a flare fitting. Replaceable core models (C-420 and larger) only have solder connections and the “-S” is omitted. Examples are: C-083 is 8 cu. in. and 3/8” flare, C-309-S is 30 cu. in. and 1-1/8” solder, C-19213-G is 192 cu. in. and 1-5/8” solder.

Other suffix letters indicate special qualities. For example:

- “-T” indicates a pressure tap consisting of a Schrader type access valve on the inlet end of the Catch-All.
- “-HH” indicates a charcoal style core for wax removal and clean-up after a hermetic motor burnout.
- “-F” indicates a female flare outlet fitting with a male flare inlet fitting.
- “-FM” indicates a female flare inlet fitting with a male flare outlet fitting.
- “-CAP” indicates a Catch-All particularly designed for installation on capillary tube systems.

Replaceable Cores and Pleated Filter Elements – Order Separately

Cores for replaceable core type filter-driers are molded of exactly the same desiccants that are used in the popular sealed filter-driers.

Cores are individually packed in **metal cans**, fully activated and hermetically sealed against moisture and dirt.

Filter Elements are dried and packed in individual sealed metal cans. This method of packaging prevents the element from picking up moisture from the atmosphere.

Detailed **instructions** are printed on each can. Each can contains a “**triple gasket**” consisting of a new end plate gasket, an end plate gasket for certain competitive filter-driers and a core gasket where desired. See the specifications on page 25 for the number of cores required for each type drier.

RCW-42 – High Water Capacity Core – Order as separate item – Fits ONLY shell type C-R424, C-R425 and C-R427. **Designed specially for use with POE oils.** This core should be used on systems that have a ruptured water cooled condenser, or that have been exposed to the atmosphere, or for some reason have a high amount of moisture in the system.

RC-4864 – Activated Core – Order as separate item – Fits types C-480 thru C-19200 Series shells and Replaceable Suction Filter (RSF) shells.

This is the standard core suitable for most installations in the liquid or suction line applications.



RCW-48 – High Water Capacity Core – Order as separate item – Fits types C-480 thru C-19200 Series shells and Replaceable Suction Filter (RSF) shells. **Designed specially for use with POE oils.** This core should be used on systems that have a ruptured water cooled condenser, or that have been exposed to the atmosphere, or for some reason have a high amount of moisture in the system.

RC-4864-HH – Activated Charcoal Core – Order as separate item – Fits types C-480 thru C-19200 Series shells and Replaceable Suction Filter (RSF) shells. This element should be used for wax removal on low temperature systems, and for clean-up of systems that have had a hermetic motor burnout.

RPE-48-BD – Filter Element – Order as separate item – Fits types C-480 thru C-19200 Series shells and **Replaceable Suction Filter (RSF) shells.** This element should be used in RSF shells installed in the **suction line** to obtain the lowest possible pressure drop. In cleaning up a system after a hermetic motor burnout, cores should be used first. Then after the system is thoroughly clean, this filter element can be installed in the RSF shell.

HH Style Catch-All for Wax Removal

Small amounts of wax are often a problem on **low temperature systems.** Even well engineered systems frequently contain minute quantities of wax which are sufficient to clog expansion valve screens or cause sticking of the valve. Sporlan has developed a special blend of desiccants including activated charcoal which removes small amounts of wax in the liquid line before this wax can cause trouble at the expansion valve. These Catch-All Filter-Driers have been very successful in correcting trouble jobs in the field.

Select an HH Style Catch-All Filter-Drier if wax problems occur on low temperature systems. In addition to their wax removal ability, these filter-driers will remove all of the other harmful contaminants that the standard filter-driers remove. Listed in the table are various Catch-All models that incorporate the HH style core.

TYPE	CONNECTIONS Inches	TYPE	CONNECTIONS Inches
C-052-HH	1/4 SAE Flare	C-303-HH	3/8 SAE Flare
C-082-HH	1/4 SAE Flare	C-304-HH	1/2 SAE Flare
C-083-HH	3/8 SAE Flare	C-304-S-HH	1/2 ODF Solder
C-162-HH	1/4 SAE Flare	C-305-HH	5/8 SAE Flare
C-163-HH	3/8 SAE Flare	C-305-S-HH	5/8 ODF Solder
C-163-S-HH	3/8 ODF Solder	C-414-HH	1/2 SAE Flare
C-164-HH	1/2 SAE Flare	C-415-HH	5/8 SAE Flare
C-164-S-HH	1/2 ODF Solder	C-417-S-HH	7/8 ODF Solder
C-165-HH	5/8 SAE Flare	RC-4864-HH	Replaceable Core
C-165-S-HH	5/8 ODF Solder		

See•All Moisture and Liquid Indicator

CO₂

8 Outstanding Benefits

- 1. The See•All Moisture and Liquid Indicator provides a true moisture indication for refrigerants.** The dark green indicates dry and a bright yellow indicates wet. The one indicator avoids the confusion found in models with two elements. You **cannot** pick the wrong element when checking the moisture content of the system.
- 2. Reliable and accurately calibrated color change points.** The See•All Moisture and Liquid Indicator is accurately calibrated in parts per million of moisture for each refrigerant. All moisture indicators change color on the basis of relative saturation of the refrigerant. Therefore, liquid line temperature must be considered if an accurate calibration is to be obtained. For easy comparison, a color chart is part of the label.
- 3. Color changes are easily distinguished and reversible.** The indicator's color differs so widely between WET and DRY conditions that there is no possibility of confusion between the two. Colors will reverse as often as moisture concentration in the system changes.
- 4. Large full view sight glass.** The See•All Moisture and

Liquid Indicator has an extra large crystal clear sight glass for viewing the refrigerant. Bubbles indicate a shortage of refrigerants or a restriction in the liquid line.

- 5. Indicator protected from discoloration and dirt.** The indicator is protected by a filter pad and screen. This prevents washing of the indicator by the refrigerant and protects it from system contamination and turbulence.
- 6. Replaceable indicator element.** The color indicator paper can be changed on the new fused glass models without removing the See•All from the line. Replacement is through the bottom (see SA-14SU below). Request the K-SA-4 kit.
- 7. Disassembly of the smaller sizes not required.** The extended steel fittings on solder models in the smaller sizes make it unnecessary to disassemble for installation since steel conducts only one eighth as much heat as copper.
- 8. A double duty plastic cap** is supplied to keep the glass free from dust, dirt and grease. It also permits the service engineer to use his own discretion concerning instructions to his customers on observing the See•All Moisture and Liquid Indicator.



Specifications - Inches

Listed by Underwriters' Laboratories, Inc. – Guide SEYW – File No. SA3182

CONNECTION SIZES Inches	MALE FLARE		FEMALE & MALE FLARE		MALE FLARE x SWIVEL NUT		SWIVEL NUT x SWIVEL NUT		FEMALE FLARE x SWIVEL NUT		SWIVEL NUT x ODF SOLDER		ODF SOLDER	
	TYPE NO.	OVERALL LENGTH Inches	TYPE NO.	OVERALL LENGTH Inches	TYPE NO.	OVERALL LENGTH Inches	TYPE NO.	OVERALL LENGTH Inches	TYPE NO.	OVERALL LENGTH Inches	TYPE NO.	OVERALL LENGTH Inches	TYPE NO.	OVERALL LENGTH Inches
1/4	SA-12	2.87	SA-12FM	2.56	—	—	—	—	—	—	—	—	SA-12S	—
3/8	SA-13	3.37	SA-13FM	2.97	SA-13U	3.64	SA-13UU	3.95	SA-13FU	3.19	SA-13SU	4.19	SA-13S	4.62
1/2	SA-14	3.81	SA-14FM	3.44	SA-14U	4.13	SA-14UU	4.50	SA-14FU	3.75	SA-14SU	4.62	SA-14S	4.87
5/8	SA-15	4.13	—	—	SA-15U	4.44	SA-15UU	4.75	—	—	SA-15SU	4.89	SA-15S	—
7/8	—	—	—	—	—	—	—	—	—	—	—	—	SA-17S	6.31
1-1/8	—	—	—	—	—	—	—	—	—	—	—	—	SA-19S	—
1-3/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-211	7.97
1-5/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-213	—

mm

CONNECTION SIZES Inches	MALE FLARE		FEMALE & MALE FLARE		MALE FLARE x SWIVEL NUT		SWIVEL NUT x SWIVEL NUT		FEMALE FLARE x SWIVEL NUT		SWIVEL NUT x ODF SOLDER		ODF SOLDER	
	TYPE NO.	OVERALL LENGTH mm	TYPE NO.	OVERALL LENGTH mm	TYPE NO.	OVERALL LENGTH mm	TYPE NO.	OVERALL LENGTH mm	TYPE NO.	OVERALL LENGTH mm	TYPE NO.	OVERALL LENGTH mm	TYPE NO.	OVERALL LENGTH mm
1/4	SA-12	72.9	SA-12FM	65.0	—	—	—	—	—	—	—	—	SA-12S	—
3/8	SA-13	85.6	SA-13FM	75.4	SA-13U	92.5	SA-13UU	100	SA-13FU	81	SA-13SU	106	SA-13S	117
1/2	SA-14	96.8	SA-14FM	87.4	SA-14U	105	SA-14UU	114	SA-14FU	95.3	SA-14SU	117	SA-14S	124
5/8	SA-15	105	—	—	SA-15U	113	SA-15UU	121	—	—	SA-15SU	124	SA-15S	—
7/8	—	—	—	—	—	—	—	—	—	—	—	—	SA-17S	160
1-1/8	—	—	—	—	—	—	—	—	—	—	—	—	SA-19S	—
1-3/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-211	202
1-5/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-213	—

Maximum Rated Pressure for all models is 650 psig (44.8 barg). Overall width is: 1.31" (33.3 mm) for 1/4" and 3/8" sizes, 1.58" (40.1 mm) for 1/2" and 5/8" sizes, and 1.38" (35.1 mm) for 7/8" and 1-1/8" sizes. Most solder connections can be used as male fittings as well as female fittings. The 1/4" ODF is 3/8" ODM, the 3/8" ODF is 1/2" ODM, the 1/2" ODF is 5/8" ODM, and the 5/8" ODF is 3/4" ODM. Models with female flare and/or swivel nut connections are supplied with a copper gasket in the fitting.

① These models have copper connections and feature a removable element cartridge – for replacement cartridge specify AC-20.

Replaceable *Suction Filters*

CO₂

The Replaceable Suction Filter shell, used with RPE-48-BD pleated filter element, is designed to be installed in the suction line of new systems to remove circulating contaminants.



RSF-4817-T

Design Benefits

- High flow capacity
- Corrosion resistant coating on shell
- Can be used with desiccant cores for clean-up after burnout
- Various fitting sizes up to 1-5/8" line size
- Access valve supplied for pressure drop measurement or charging

How It's Used

Sporlan Replaceable Suction Filters are installed in the suction line of refrigeration or air conditioning systems to remove contaminants that may be in the system at startup.

The Replaceable Suction Filter has large fittings permitting the use of a small shell on a system with large line sizes, resulting in considerable economy. The angle construction is suitable of flow in either direction, which results in easy installation even on compact racks.

The Replaceable Suction Filters should be used with cores for cleaning up a system after a hermetic motor burnout. Select the RC-4864, RC-4864-HH or RCW-48 replaceable cores. After cleanup, install RPE-48-BD elements in the shells.

Selection

The table below gives information for choosing the proper model for a given system. The filter elements are supplied in hermetically sealed metal cans. For flow capacity WITH CORES, see page 18.

Flow Capacity - Tons - psi - °F

kW - bar - °C

TYPE	CONNECTIONS Inches OD SOLDER	FLOW CAPACITY			NUMBER OF FILTER ELEMENTS	FILTER AREA Square Inches	OVERALL LENGTH Inches	TYPE	CONNECTIONS Inches OD SOLDER	FLOW CAPACITY			NUMBER OF FILTER ELEMENTS	FILTER AREA cm ²	OVERALL LENGTH mm
		EVAPORATOR TEMPERATURE								EVAPORATOR TEMPERATURE					
		40°F								5°C					
		PRESSURE DROP - psi								PRESSURE DROP - bar					
		1	2	3					0.07	0.14	0.20				
RSF-487-T	7/8	12.6	18.5	23.2	One RPE-48-BD	388	9.30	RSF-487-T	7/8	43.1	63.4	77.3	One RPE-48-BD	2503	236
RSF-489-T	1-1/8	19.8	29.0	36.4			9.37	RSF-489-T	1-1/8	67.6	99.3	121			238
RSF-4811-T	1-3/8	29.2	42.9	53.8			9.60	RSF-4811-T	1-3/8	99.7	147	179			244
RSF-4813-T	1-5/8	36.3	53.4	67.0			9.60	RSF-4813-T	1-5/8	124	183	223			244
RSF-4817-T	2-1/8	48.6	71.4	89.5			9.37	RSF-4817-T	2-1/8	166	244	298			238
RSF-4821-T	2-5/8	64.1	94.2	118			9.75	RSF-4821-T	2-5/8	219	322	393			248
RSF-9611-T	1-3/8	31.3	46.1	57.7	Two RPE-48-BD	776	15.14	RSF-9611-T	1-3/8	107	157	192	Two RPE-48-BD	5006	385
RSF-9613-T	1-5/8	41.8	61.4	76.9			15.14	RSF-9613-T	1-5/8	143	210	256			385

Ratings based on 20°F (-5°C) liquid, 25°F (14°C) superheat.

Listed by Underwriters' Laboratories, Inc. Guide SMGT File No. SA-1756. RSF shells have a 500 psig (34.5 barg) M.R.P. rating.

Note: Ratings are in accordance with ARI Standards 730. Flow capacity (tons/kW) with cores is approximately 40% of the above values.

Acid Test Kits - Type TA-1

Designed to Test Mineral, Alkylbenzene and POE Lubricants

- Thoroughly field proven
- Takes the guesswork out of service work



Design Benefits

- **Builds Customer Confidence** – Show the test results of the acid test kit to customers, or perform the test in their presence. In this way they realize you are using the most up-to-date scientific method for system maintenance. Showing customers the test results will also help to convince them to spend the money necessary to do a proper clean-up job. Customers who are thoroughly confident of your abilities will be more interested in establishing preventive maintenance programs.
- **Accurate and Reliable** – Using a simple, scientific method, you can precisely measure the amount of acid in a lubricant sample

taken from a contaminated system. The test procedure has been proven by extensive field experience.

- **Convenient** – The TA-1 is convenient to use. The TA-1 has pre-measured solutions supplied in bottles with screw caps for easy handling. The kit may be used on the job site, or a lubricant sample can be saved and tested in the presence of the equipment owner.
- **Lubricant Sample Used for Test** – Since lubricant is the scavenger, it gives the best indication of acid in the system. Less than an ounce of lubricant is required.
- **Quick to Use** – Once the lubricant sample is obtained...it will take only minutes to perform the test. Simply mix the solutions and lubricant to be tested. Shake, and the resulting color tells the complete story.
- **Cost** – The cost of the test kit is very inexpensive.

The TA-1 is normally used on a “pass or fail” basis.

Electronic Temperature Control Systems

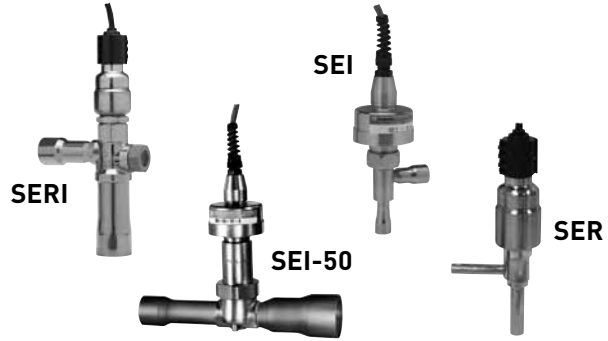
CO₂

Electric Expansion Valves

SEI, SER and SERI

Sporlan Electric Expansion Valves (EEVs) are currently available in nominal R-744 capacities from 1 to 100 tons (3.5 to 350 kW). Specific system conditions will dictate which product is necessary to control the application. Details can be reviewed with the Sporlan Sales Engineer.

The SER and SEI are Electronically Operated Step Motor flow control valves, intended for the precise control of liquid refrigerant flow. Synchronized signals to the motor provide discrete angular movement, which translates into precise linear positioning of the valve piston. Valve pistons and ports are uniquely characterized, providing improved flow resolution and performance. The SER and SEI valves are easily interfaced with microprocessor based controllers, including Sporlan supplied controllers.



All Sporlan EEVs are rated for at least 620 psig (42 barg) MRP.

Specifications

VALVE TYPE	INLET – Inches	OUTLET – Inches	CONFIGURATION	CABLE LENGTH	
				Feet	Meters
SEI 0.5, 1, 2, 3.5, 6, 8.5, 11	1/4, 3/8, 1/2 ODF 1/4, 3/8, 1/2 SAE	3/8, 1/2, 5/8 ODF 1/2 SAE	Angle	10, 20, 30, 40	3, 6, 9, 12
SEI 30	5/8, 7/8, 1-1/8 ODF	5/8, 7/8, 1-1/8, 1-3/8 ODF	Angle		
SEI 50*	7/8, 1-1/8, 1-3/8 ODF	7/8, 1-1/8, 1-3/8, 1-5/8 ODF	Straight through		
SER 1-1/2	3/8, 1/2, 5/8 ODF	3/8, 1/2, 5/8 ODF	Angle		
SER 6	3/8, 1/2, 5/8 ODF	3/8, 1/2, 5/8, 7/8 ODF	Angle		
SER 11	3/8, 1/2, 5/8 ODF	1/2, 5/8, 7/8, 1-1/8 ODF	Angle		
SER 20	1/2, 5/8, 7/8, 1-1/8 ODF	5/8, 7/8, 1-1/8, 1-3/8 ODF	Angle		
SERI G	5/8, 7/8 ODF	1/2, 5/8, 7/8, 1-1/8 ODF	Angle / Straight through		
SERI J	7/8, 1-1/8 ODF	7/8, 1-1/8, 1-3/8 ODF	Angle / Straight through		
SERI K	1-1/8 ODF	7/8, 1-1/8, 1-3/8, 1-5/8 ODF	Angle / Straight through		

*Not suitable for bi-directional applications.

Capacities – Direct Expansion

Tons = psi = °F

VALVE TYPE	NOMINAL CAPACITY (Tons)	0°F					-20°F					-40°F				
		PRESSURE DROP ACROSS VALVE (psi)														
		100	150	200	250	300	150	200	250	300	350	200	250	300	350	400
SEI 0.5	1	0.65	0.80	0.93	1.03	1.13	0.80	0.93	1.04	1.13	1.23	0.92	1.03	1.13	1.22	1.30
SEI 1	2	1.43	1.75	2.02	2.25	2.47	1.75	2.02	2.26	2.47	2.67	2.00	2.24	2.46	2.65	2.83
SEI 2	3	2.91	3.56	4.11	4.60	5.04	3.57	4.12	4.60	5.04	5.45	4.09	4.57	5.01	5.41	5.79
SEI 3-1/2	7	4.76	5.82	6.72	7.52	8.24	5.83	6.73	7.53	8.24	8.90	6.69	7.48	8.19	8.85	9.46
SEI 6	13	8.99	11.0	12.7	14.2	15.6	11.0	12.7	14.2	15.6	16.8	12.6	14.1	15.5	16.7	17.9
SEI 8-1/2	18	12.7	15.6	18.0	20.1	22.0	15.6	18.0	20.1	22.1	23.8	17.9	20.0	21.9	23.7	25.3
SEI 11	19	13.6	16.7	19.2	21.5	23.5	16.7	19.2	21.5	23.6	25.5	19.1	21.4	23.4	25.3	27.0
SEI 30	62	43.6	53.4	61.7	69.0	75.6	53.5	61.8	69.0	75.6	81.7	61.4	68.6	75.2	81.2	86.8
SEI 50	100	72.7	89.0	103	115	126	89.1	103	115	126	136	102	114	125	135	145
SER 1-1/2	3	2.18	2.67	3.09	3.45	3.78	2.67	3.09	3.45	3.78	4.08	3.07	3.43	3.76	4.06	4.34
SER 6	12	8.72	10.7	12.3	13.8	15.1	10.7	12.3	13.8	15.1	16.3	12.3	13.7	15.0	16.2	17.4
SER 11	23	16.0	19.6	22.6	25.3	27.7	19.6	22.6	25.3	27.7	30.0	22.5	25.2	27.6	29.8	31.8
SER 20	40	29.1	35.6	41.1	46.0	50.4	35.7	41.2	46.0	50.4	54.5	40.9	45.7	50.1	54.1	57.9
SERI G	47	32.8	40.2	46.5	51.9	56.9	40.3	46.5	52.0	56.9	61.5	46.2	51.7	56.6	61.1	65.3
SERI J	84	59.1	72.4	83.6	93.4	102	72.5	83.7	93.5	102	111	83.1	92.9	102	110	118
SERI K	150	107	131	152	169	186	131	152	170	186	201	151	169	185	199	213

Electronic Temperature Control Systems

CO₂

Electric Expansion Valves

SEI, SER and SERI

Capacities – Direct Expansion

kW - bar - °C

VALVE TYPE	NOMINAL CAPACITY (kW)	-20°C					-30°C				-40°C			
		PRESSURE DROP ACROSS VALVE (bar)												
		8	12	16	20	12	16	20	24	16	20	24	28	
SEI 0.5	3.5	2.43	2.98	3.44	3.84	2.98	3.44	3.84	4.21	3.42	3.82	4.18	4.52	
SEI 1	7	5.30	6.49	7.49	8.37	6.48	7.49	8.37	9.17	7.44	8.32	9.11	9.84	
SEI 2	10	10.8	13.2	15.3	17.1	13.2	15.3	17.1	18.7	15.2	17.0	18.6	20.1	
SEI 3-1/2	25	17.7	21.6	25.0	27.9	21.6	25.0	27.9	30.6	24.8	27.8	30.4	32.8	
SEI 6	45	33.4	40.9	47.2	52.8	40.9	47.2	52.8	57.8	46.9	52.5	57.5	62.1	
SEI 8-1/2	63	47.3	57.9	66.9	74.8	57.9	66.8	74.7	81.9	66.4	74.3	81.4	87.9	
SEI 11	67	50.5	61.9	71.4	79.9	61.9	71.4	79.9	87.5	71.0	79.4	86.9	93.9	
SEI 30	220	162	199	229	256	198	229	256.0	281	228	255	279	301	
SEI 50	350	270	331	382	427	331	382	427	468	380	424	465	502	
SER 1-1/2	10	8.11	9.93	11.5	12.8	9.92	11.5	12.8	14.0	11.4	12.7	14.0	15.1	
SER 6	42	32.4	39.7	45.8	51.3	39.7	45.8	51.2	56.1	45.6	50.9	55.8	60.3	
SER 11	80	59.4	72.8	84.0	94.0	72.8	84	93.9	103	83.5	93.4	102	110	
SER 20	140	108	132	153	171	132	153	171	187	152	170	186	201	
SERI G	165	122	149	173	193	149	173	193	211	172	192	210	227	
SERI J	290	220	269	311	347	269	310	347	380	309	345	378	408	
SERI K	520	398	488	563	630	487	563	629	689	560	626	685	740	

LIQUID TEMPERATURE (°F)					LIQUID TEMPERATURE (°C)					
0°	10°	20°	30°	40°	-20°	-15°	-10°	-5°	0°	5°
CORRECTION FACTOR, LIQUID CAPACITY RATING					CORRECTION FACTOR, LIQUID CAPACITY RATING					
1.13	1.07	1.00	0.93	0.86	1.18	1.12	1.06	1.00	0.94	0.87

Liquid Flow Coefficients

VALVE TYPE	Cv	Kv
SEI 0.5	0.01	0.01
SEI 1	0.03	0.03
SEI 2	0.07	0.06
SEI 3-1/2	0.11	0.09
SEI 6	0.20	0.17
SEI 8-1/2	0.29	0.25
SEI 11	0.30	0.26
SEI 30	0.98	0.85
SEI 50	1.63	1.41
SER 1-1/2	0.05	0.04
SER 6	0.20	0.17
SER 11	0.36	0.31
SER 20	0.65	0.57
SERI G	0.74	0.64
SERI J	1.33	1.15
SERI K	2.41	2.08

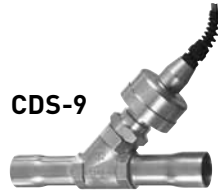
Electronic Temperature Control Systems

CO₂

Electric Evaporator Control Valves

CDS-4, -7, -9, -16 and -17

The CDS valves are designed for more precise and energy efficient control of temperatures in evaporators. Proper temperature is obtained by regulating refrigerant flow in the evaporator in response to signals generated by an electronic controller and sensor combination. The valves are built around balanced ports, which allows input power of only 4 watts, less than one quarter of the power used by older heat motor and analog designs. When not actively stepping, power to the motor is removed for further energy savings. The step motors used are standard 12-volt DC bipolar designs, which in concert with the integral gear reduction, give the valves unsurpassed accuracy and repeatability over the entire operating range. Since the valves are powered from an external controller, no pilot lines or high to low side bleeds



are required. The properly applied CDS valve and controller can replace standard mechanical evaporator pressure regulators (EPR), suction stop solenoid valves, and conventional thermostats.

All CDS valves may be applied as head pressure control, or liquid line differential valves for R-744. Contact Sporlan for more information. All Sporlan CDS valves are rated at 620 psig (42 barg) MRP.

Due to the step motor design, the CDS series are the first evaporator control valves that may be sized to contribute NO additional pressure drop to the suction line.

Simplified cartridge design allows all moving parts to be replaced as a unit. Only the valve body is left in the line. This will allow maintenance or repair without unsweating the entire valve.

Specifications

(Standard Connections and Cable Lengths are in **BOLD** type.)

TYPE	CONNECTIONS ODF SOLDER – Inches	CONFIGURATION	CABLE LENGTH		CABLE ENDS
			Feet	Meters	
CDS-4	1/2, 5/8, 7/8	Straight Through	10	3	S-Stripped and Tinned
CDS-7	5/8, 7/8, 1-1/8, 1-3/8				
CDS-9					
CDS-16	1-3/8	Angle			
CDS-17	1-3/8, 1-5/8	Straight Through			

Flow Capacity - Suction Vapor

Tons = psi = °F

kW = bar = °C

TYPE	EVAPORATOR TEMP. °F	PRESSURE DROP ACROSS VALVE – psi					TYPE	EVAPORATOR TEMP. °C	PRESSURE DROP ACROSS VALVE – bar				
		0.5	1	3	5	10			0.03	0.07	0.20	0.40	0.70
CDS-4	0	2.17	3.05	5.22	6.70	9.40	CDS-4	-20	6.79	10.3	17.2	24.1	31.7
	-20	1.83	2.57	4.39	5.64	7.92		-30	5.80	8.79	14.7	20.6	27.1
	-40	1.51	2.12	3.62	4.65	6.53		-40	4.88	7.38	12.3	17.3	22.8
CDS-7	0	6.06	8.38	14.0	17.8	24.6	CDS-7	-20	19.1	28.3	46.3	64.1	83.3
	-20	5.14	7.11	11.9	15.1	20.9		-30	16.4	24.4	39.8	55.1	71.6
	-40	4.27	5.91	9.89	12.6	17.4		-40	13.9	20.6	33.7	46.6	60.6
CDS-9	0	9.07	12.6	21.2	27.1	37.6	CDS-9	-20	28.5	42.6	70.1	97.4	127
	-20	7.68	10.7	18.0	22.9	31.8		-30	24.5	36.6	60.2	83.6	109
	-40	6.37	8.85	14.9	19.0	26.4		-40	20.7	30.9	50.8	70.6	92.1
CDS-16	0	15.0	20.7	34.6	43.9	60.7	CDS-16	-20	47.2	70.1	114	158	205
	-20	12.7	17.6	29.4	37.3	51.5		-30	40.6	60.3	98.4	136	177
	-40	10.6	14.6	24.4	31.0	42.9		-40	34.4	51.0	83.3	115	150
CDS-17	0	16.3	22.6	38.2	48.7	67.8	CDS-17	-20	51.0	76.4	126	175	229
	-20	13.7	19.1	32.3	41.2	57.4		-30	43.8	65.5	108	151	197
	-40	11.4	15.9	26.8	34.2	47.6		-40	36.9	55.3	91.2	127	166

Ratings based on 20°F (-5°C) liquid, 25°F (14°C) superheat.

LIQUID TEMPERATURE (°F)					LIQUID TEMPERATURE (°C)					
0°	10°	20°	30°	40°	-20°	-15°	-10°	-5°	0°	5°
CORRECTION FACTOR, SUCTION CAPACITY RATING					CORRECTION FACTOR, SUCTION CAPACITY RATING					
1.07	1.04	1.00	0.96	0.92	1.10	1.07	1.03	1.00	0.97	0.93

Electronic Temperature Control Systems

CO₂

Electric Evaporator Control Valves

CDS-4, -7, -9, -16 and -17

Flow Capacity - Liquid

Tons = psi = °F

kW = bar = °C

TYPE	Cv	PRESSURE DROP ACROSS VALVE – psi					TYPE	Kv	PRESSURE DROP ACROSS VALVE – bar				
		0.5	1	3	5	10			0.03	0.07	0.20	0.40	0.70
CDS-4	2.88	9.26	13.0	22.3	28.6	40.1	CDS-4	2.49	29.8	45.1	75.4	106	139
CDS-7	7.28	24.3	33.6	56.2	71.4	98.7	CDS-7	6.30	78.4	117	191	264	343
CDS-9	11.2	37.0	51.5	86.6	110	153	CDS-9	9.72	119	179	294	408	532
CDS-16	17.9	59.9	82.7	138	175	242	CDS-16	15.5	193	287	469	648	841
CDS-17	20.4	66.8	93.0	157	200	279	CDS-17	17.6	216	323	533	741	968

Ratings based on 20°F (-5°C) liquid, -20°F (-30°C) evaporator temperature.

LIQUID TEMPERATURE (°F)					LIQUID TEMPERATURE (°C)					
0°	10°	20°	30°	40°	-20°	-15°	-10°	-5°	0°	5°
CORRECTION FACTOR, LIQUID CAPACITY RATING					CORRECTION FACTOR, LIQUID CAPACITY RATING					
1.13	1.07	1.00	0.93	0.86	1.18	1.12	1.06	1.00	0.94	0.87

Controller Packages

Sporlan offers a variety of controllers for use in refrigeration and air conditioning systems. Applications include self-contained food service equipment, cold rooms and chillers. With over 80 different models, Sporlan can satisfy almost any customer requirement.

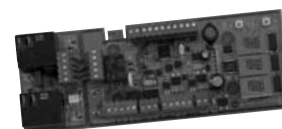
Small, standalone controllers include the compact Kelvin II and larger Superheat and Refrigeration controllers. All are designed to provide true pressure/temperature superheat control of any system using Sporlan Electric Expansion Valves (EEVs). Chiller controllers offer true pressure/temperature superheat control for two Sporlan EEVs and are available in Fahrenheit/psi or Celsius/Bar versions.

Sporlan offers many purpose built controllers, such as subcoolers for supermarket refrigeration, as well as head pressure, temperature only and pressure only.

Cold rooms can be controlled with RCS, which has onboard remote communication, and master-slave settings for defrost control. Included real time clocks allow defrost initialization times to be set precisely and relays allow control of fans, solenoids, alarms and compressors. Many of the controllers can be customized for specific needs, or supplied in an enclosure, please contact Product Manager, Electronic Products, Sporlan Division.



Kelvin II



RCS

CONTROLLER PACKAGES	DISPLAY	COMMUNICATION	RELAYS	INPUTS*	VALVES
Kelvin II	Optional	RS-485	One	1 Press, 2 Temp.	1 SER or SEI
RCS	3 Alphanumeric	RS-485	Four	1 Press, 4 Temp.	1 SER or SEI
Temperature Control	2 Numeric	None	None	1 Temperature	1 CDS
Dual Temp. Control	2 Numeric	None	None	2 Temperature	2 CDS
SELF CONTAINED EQUIPMENT					
Omnistat – Low Temp.	3 Digit	RS 485 Optional	One	Defrost, Product, Digital**	N/A
Omnistat – Med. Temp.	3 Digit	RS 485 Optional	Three	Defrost, Product, Digital**	N/A

* See accessories page 26, only Sporlan approved sensors may be used.

** All products control temperature, other functions not available on all models.

Electronic Temperature Control Systems

CO₂

Controller Packages

TCB Temperature Control Board / IB Interface Board

The TCB interface/controller was designed to allow all Sporlan step motors to be modulated in response to an externally generated signal. The IB and TCB will accept a 4-20 milliamp, or 0-10 volt DC inputs and will stroke the valve in proportion to that signal. The TCB and IB will allow use of the CDS valves with an existing DDC system or other generic temperature controller for hot gas bypass, evaporator temperature, or reclaim applications. **While the TCB and IB will also control Sporlan's line of SER and SEI step motor electric expansion valves, an external signal must be generated in response to superheat and not simply temperature. Please contact Sporlan for more information.**



When the TCB is purchased with optional set point potentiometer and sensor, the TCB becomes a stand alone single point temperature control for the CDS valves. The sensor is installed in the air stream or affixed to the pipe containing the liquid to be controlled. The potentiometer is set to the temperature desired, and the TCB will modulate the valve to maintain tight temperature control. The TCB can be configured to “close on rise” or “open on rise” and requires only an external 24 volt AC 40 VA power source. The TCB incorporates separate “pump down”, “open valve”, and “close valve” contacts for use with external relays to allow even greater control choices. The TCB and IB have screw terminals for easy connections, and should be mounted in a control panel or other enclosure.

SMA-12 Step Motor Actuator

The SMA-12 is an instrument designed to help diagnose systems with step motor valves by proving operation of the step motor. The unit is powered by two 9 volt alkaline batteries and will power any standard 12-volt DC bipolar step motor. Step rate is selectable at 1, 50, 100 or 200 steps per second and will stroke the motor in both the open and closed directions. Red lamps indicate continuity of the motor windings and battery power, and binding posts are provided for quick connection of the motor leads. In the event of a controller failure, the SMA-12 can be used to manually open or close the valve or manually step it to any position. The SMA-12 is the basic troubleshooting tool for all step motor valve operated systems.



ITEM NUMBER	DESCRIPTION	CONNECTOR
953276	SMA-12	Binding Post
953277	SMA-12 w/Pigtail	Packard Pigtail Item #958112

INTERFACE BOARDS	INPUT	VALVES*
TCB	4-20 ma, 0-10 VDC	CDS
TCB with Potentiometer	Temperature Sensor	CDS
IB-2	4-20 ma, 0-10 VDC	CDS-4, -7
IB-2Q		SERI G, J, K
IB-6		CDS-9, -16, -17
IB-Q		SER, SEI

* Interface boards may be used with electric expansion valves SER and SEI only when used with external superheat controllers. Contact Sporlan for more information.

ACCESSORIES	ITEM NUMBERS	APPLICATION
0-500 psig (0-34.5 bar) Pressure Transducer 10' Cable (Yellow Color Code)	952505	Head Pressure and CO ₂ Applications only
Surface Sensor - 2K (Black Color Code)	952662	All
Well Sensor	952795	All except IB and TCB less Potentiometer
Air Sensor	952669	All except IB and TCB less Potentiometer
Omnistat Sensor	952899	Omnistat only

Pressure Temperature Chart

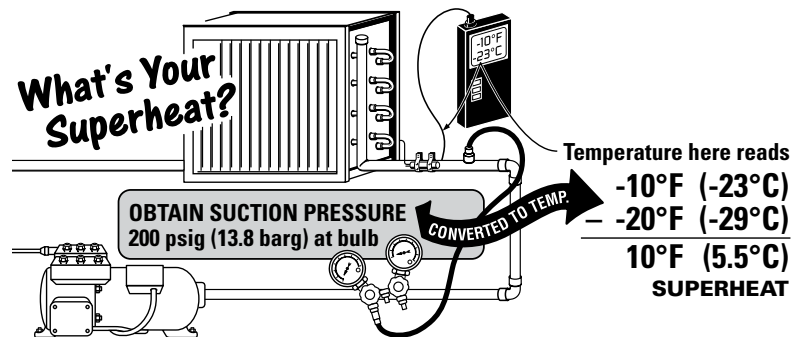
CO₂

Refrigerant 744

At Sea Level

At Altitude – 5,000 ft. (1,524 m) Above Sea Level

		Temperature				Temperature				Temperature				Temperature	
psig	barg	°F	°C	psig	barg	°F	°C	psig	barg	°F	°C	psig	barg	°F	°C
		80	5.5			-59.9	-51.1			320	22.1			5.4	-14.8
85	5.9	-57.7	-49.8	335	23.1	8.1	-13.3	85	5.9	-58.8	-50.4	335	23.1	7.7	-13.5
90	6.2	-55.5	-48.6	350	24.1	10.7	-11.8	90	6.2	-56.6	-49.2	350	24.1	10.3	-12.0
95	6.6	-53.4	-47.4	365	25.2	13.3	-10.4	95	6.6	-54.4	-48.0	365	25.2	12.9	-10.6
100	6.9	-51.3	-46.3	380	26.2	15.7	-9.0	100	6.9	-52.3	-46.9	380	26.2	15.3	-9.3
105	7.2	-49.4	-45.2	400	27.6	18.9	-7.3	105	7.2	-50.3	-45.7	400	27.6	18.5	-7.5
110	7.6	-47.5	-44.1	420	29.0	21.9	-5.6	110	7.6	-48.4	-44.7	420	29.0	21.6	-5.8
115	7.9	-45.6	-43.1	440	30.3	24.9	-3.9	115	7.9	-46.5	-43.6	440	30.3	24.5	-4.1
120	8.3	-43.8	-42.1	460	31.7	27.8	-2.4	120	8.3	-44.7	-42.6	460	31.7	27.4	-2.5
125	8.6	-42.0	-41.1	480	33.1	30.5	-0.8	125	8.6	-42.9	-41.6	480	33.1	30.2	-1.0
130	9.0	-40.3	-40.2	500	34.5	33.2	0.7	130	9.0	-41.2	-40.7	500	34.5	32.9	0.5
135	9.3	-38.7	-39.3	525	36.2	36.5	2.5	135	9.3	-39.5	-39.7	525	36.2	36.2	2.3
140	9.7	-37.0	-38.4	550	37.9	39.6	4.2	140	9.7	-37.8	-38.8	550	37.9	39.3	4.1
145	10.0	-35.5	-37.5	575	39.6	42.7	5.9	145	10.0	-36.2	-37.9	575	39.6	42.4	5.8
150	10.3	-33.9	-36.6	600	41.4	45.6	7.6	150	10.3	-34.7	-37.0	600	41.4	45.4	7.4
155	10.7	-32.4	-35.8	625	43.1	48.5	9.2	155	10.7	-33.1	-36.2	625	43.1	48.2	9.0
160	11.0	-30.9	-35.0	650	44.8	51.3	10.7	160	11.0	-31.6	-35.4	650	44.8	51.0	10.6
165	11.4	-29.5	-34.1	675	46.5	54.0	12.2	165	11.4	-30.2	-34.5	675	46.5	53.7	12.1
170	11.7	-28.0	-33.4	700	48.3	56.6	13.7	170	11.7	-28.7	-33.7	700	48.3	56.4	13.5
175	12.1	-26.6	-32.6	725	50.0	59.2	15.1	175	12.1	-27.3	-33.0	725	50.0	58.9	15.0
180	12.4	-25.3	-31.8	750	51.7	61.7	16.5	180	12.4	-25.9	-32.2	750	51.7	61.4	16.4
185	12.8	-23.9	-31.1	775	53.4	64.1	17.8	185	12.8	-24.6	-31.4	775	53.4	63.9	17.7
190	13.1	-22.6	-30.3	800	55.2	66.5	19.2	190	13.1	-23.3	-30.7	800	55.2	66.3	19.0
195	13.4	-21.3	-29.6	825	56.9	68.8	20.4	195	13.4	-22.0	-30.0	825	56.9	68.6	20.3
200	13.8	-20.1	-28.9	850	58.6	71.1	21.7	200	13.8	-20.7	-29.3	850	58.6	70.8	21.6
205	14.1	-18.8	-28.2	875	60.3	73.3	22.9	205	14.1	-19.4	-28.6	875	60.3	73.1	22.8
210	14.5	-17.6	-27.5	900	62.1	75.4	24.1	210	14.5	-18.2	-27.9	900	62.1	75.2	24.0
220	15.2	-15.2	-26.2	925	63.8	77.5	25.3	220	15.2	-15.8	-26.5	925	63.8	77.3	25.2
230	15.9	-12.9	-24.9	950	65.5	79.6	26.4	230	15.9	-13.4	-25.2	950	65.5	79.4	26.3
240	16.5	-10.6	-23.7	975	67.2	81.6	27.6	240	16.5	-11.1	-24.0	975	67.2	81.4	27.5
250	17.2	-8.4	-22.4	1000	68.9	83.6	28.7	250	17.2	-8.9	-22.7	1000	68.9	83.4	28.6
260	17.9	-6.3	-21.3					260	17.9	-6.8	-21.6				
275	19.0	-3.2	-19.5					275	19.0	-3.7	-19.8				
290	20.0	-0.2	-17.9					290	20.0	-0.7	-18.2				
305	21.0	2.7	-16.3					305	21.0	2.2	-16.6				



Example: Refrigerant 744 at Sea Level



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