



Catalog 410A

Energy Conscious A/C Solutions

SPORLAN



ENGINEERING YOUR SUCCESS.

Condensed Catalog 410A

April 2011

This condensed catalog contains product specifically for R-410A applications. By including a minimum of engineering information we are able to provide a concise reference to pertinent data and specifications on Sporlan R-410A 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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FOR USE ON REFRIGERATION and/or AIR CONDITIONING SYSTEMS ONLY

Catalog 410A, April 2011 supersedes Catalog 410A dated January 2009 and all prior publications.

Thermostatic Expansion Valves

410A

Sporlan offers thermostatic expansion valves in R-410A nominal capacities between 1/3 and 60 tons (1.17 and 210 kW). The models offered are externally equalized, have straight through or angle configuration, and ODF connections.

The Sporlan refrigerant code for R-410A is the letter “Z”, which is found in valve nomenclature.

The ERZE models have the advantage of a balanced port construction, which makes them ideally suited for systems with a wide range of operating conditions.

See Bulletin 10-10-8 for additional information regarding the complete line of Type R thermostatic expansion valves including the R(E) with SAE flare fittings, the SR(E) with the removable strainer and the new fractional capacity valves.

The RCZE model is similar to the ERZE but has an internal check valve to allow refrigerant flow to bypass the expansion valve port in the reverse flow direction in heat pump systems. The integral check valve means fewer connections, easier installation, and increased reliability.

The Sporlan TEVs designed for R-410A have replaceable thermostatic elements designed for the higher pressures associated with R-410A.






Replaceable thermostatic elements are designated by:

KT	–	45	–	ZGA	–	5'
Kit		Element Size		Charge		Length

ZGA – Has similar performance to the VGA charge used in R-22 or NGA charge used in R-407C systems. The constituents and heavy thermal ballasts in the charge provide excellent anti-hunt characteristics by dampening the valve in the opening direction. The maximum operating pressure or MOP of this charge is not as defined as the ZCP180 charge, an alternate charge for R-410A air conditioning and heat pump applications.

ZCP180 – Has similar performance to the VCP100 charge used in R-22 systems or the NCP100 charge used in R-407C systems. The maximum operating pressure or MOP of this charge takes effect around 60°F (16°C) evaporator temperature. The ZCP180 charge has a mild thermal ballast that dampens the valve in the opening direction.

Contact the nearest Sporlan sales office if you have an application that requires a valve or charge that is not listed.

VALVE TYPE	CONNECTIONS - Inches		EXTERNAL EQUALIZER	VALVE DESCRIPTION AND APPLICATION
	Inlet	Outlet		
 <p>ERZE</p>	3/8 ODF 1/2 ODF 5/8 ODF 7/8 ODF	3/8 ODF 1/2 ODF 5/8 ODF 7/8 ODF 1-1/8 ODF 1-3/8 ODF	1/4" ODF or 1/8" ODF Capillary Tube Lengths Available With OR Without 1/4" SAE Flare Nut	Small brass body valve available with either angle style or straight through connection pattern. ERZE valves are available both externally adjustable and non-adjustable. The ERZE has a balanced port construction, which makes it ideal for applications with a wide range of operating conditions. May be applied in bi-directional applications.
 <p>RCZE</p>	3/8 ODF 1/2 ODF Chatleff	3/8 ODF 1/2 ODF 5/8 ODF Chatleff	1/4" ODF OR Without 1/4" SAE Flare Nut	In addition to the features described above for the ERZE valve, the RCZE has a built-in check valve to allow bypass flow in the reverse direction. This feature makes this valve type ideally suited for heat pump applications. RCZE valves are available both externally adjustable and non-adjustable.
 <p>O</p>	7/8 ODF 1-1/8 ODF	1-1/8 ODF 1-3/8 ODF 1-5/8 ODF	1/4" ODF	Brass bar body, externally adjustable valve. Inlet has a permanent 12 mesh strainer. This valve features a balanced port construction, and it is suitable for both air conditioning and refrigeration applications.
 <p>SBQE</p>	3/8 ODF 90° Angle Inlet	1/2 ODF	1/4" ODF Pointed Toward Bottom Cap	Features ODF solder connections and a forged brass inlet fitting with a removable 100 mesh strainer which can be cleaned and/or replaced without removing the valve from the line. May be applied in bi-directional applications.
 <p>EBQE</p>	3/8 ODF 1/2 ODF Straight Through	1/2 ODF 5/8 ODF 7/8 ODF		Features extended ODF connections. A 100 mesh insert strainer is provided with the valve. May be applied in bi-directional applications.

Note: Not all fitting combinations are available.

Thermostatic Expansion Valves

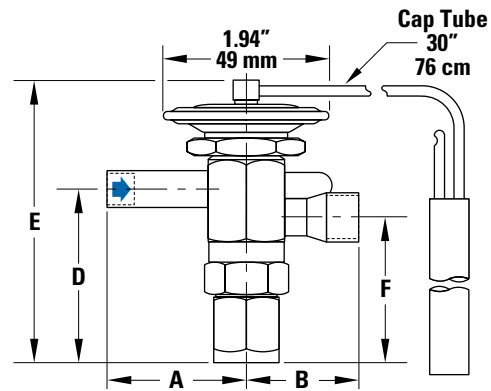
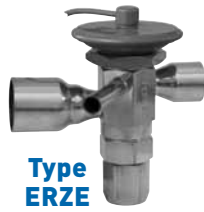
410A

Type ERZE

Knife Edge Joint

Standard Cap Tube Length 30 in. (76 cm)

The ERZE valve is an externally adjustable balance ported TEV designed for R-410A air conditioning applications. This makes the ERZE valve an excellent replacement for all OEM BI and BBI valves as well as other applications requiring a R-410A expansion valve such as I and RI valves. The ERZE valve utilizes the KT-45 element design for the higher pressures of R-410A. This valve may also be applied in bi-directional applications.



Dimensions

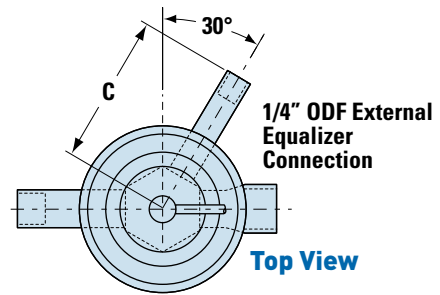
Connections

VALVE TYPE	FITTING SIZE** Inches	Inches						mm						
		A	B	C	D	E	F	A	B	C	D	E	F	
ERZE-1, 1-1/2 & 2*	3/8 ODF	1.69	1.35					42.9	34.3					
	1/2 ODF	1.75*	1.35					44.4*	34.3					
	5/8 ODF	–	2.51					–	63.8					
ERZE-3, 4, 5, 6 & 8	3/8 ODF	1.69	–	1.81	2.17	3.53	1.83	42.9	–	46.0	55.1	89.7	46.5	
	1/2 ODF	1.75	1.35					44.5	34.3					
	5/8 ODF	1.29	2.51					32.8	63.8					
	7/8 ODF	–	2.41					–	61.2					
ERZE-12-1/2 & 15	5/8 ODF	1.52	–					38.6	–					
	7/8 ODF	2.08	–					52.8	–					
	5/8 ODF Ext.	–	2.51	1.90	2.30	3.79	1.83	–	63.8	48.3	58.4	96.3	46.5	
	7/8 ODF Ext.	–	2.51					–	63.8					
	1-1/8 ODF Ext.	–	2.51					–	63.8					

*1/2 ODF inlet available on 2 ton valves only.
** Not all fitting combinations are available.

Bulb Sizes

THERMOSTATIC CHARGE	Inches	mm
ZCP180	0.50 OD x 3.00	13 OD x 76
ZGA	0.75 OD x 2.00	19 OD x 51



Capacities

Tons • psi • °F

kW • bar • °C

VALVE TYPE	NOMINAL CAPACITY (Tons)	EVAPORATOR TEMPERATURE °F			VALVE TYPE	NOMINAL CAPACITY (kW)	EVAPORATOR TEMPERATURE °C		
		40	20	0			5	-5	-15
		PRESSURE DROP ACROSS VALVE (psi)					PRESSURE DROP ACROSS VALVE (bar)		
		160	200	200			11	14	14
ERZE-1-GA	1	1.2	1.3	1.2	ERZE-1-GA	4.20	4.20	4.64	4.25
ERZE-1-1/2-GA	1-1/2	2.1	2.3	2.0	ERZE-1-1/2-GA	7.35	7.35	8.11	7.44
ERZE-2-GA	2	2.7	3.0	2.7	ERZE-2-GA	9.66	9.66	10.7	9.77
ERZE-3-GA	3	3.8	4.1	3.7	ERZE-3-GA	13.4	13.4	14.8	13.6
ERZE-4-GA	4	5.0	5.4	4.9	ERZE-4-GA	17.6	17.6	19.5	17.8
ERZE-5-GA	5	5.9	6.5	5.8	ERZE-5-GA	21.0	21.0	23.2	21.2
ERZE-6-GA	6	7.1	7.8	6.3	ERZE-6-GA	25.2	25.2	27.8	23.7
ERZE-8-GA	8	9.5	10.4	9.3	ERZE-8-GA	33.6	33.6	37.1	34.0
ERZE-12-1/2-GA	12-1/2	12.3	13.5	12.1	ERZE-12-1/2-GA	43.8	43.8	48.4	44.3
ERZE-15-GA	15	14.3	15.7	14.0	ERZE-15-GA	50.8	50.8	56.1	51.4

LIQUID TEMPERATURE ENTERING TEV °F										
40	50	60	70	80	90	100	110	120	130	140
CORRECTION FACTOR, CF LIQUID TEMPERATURE										
1.39	1.31	1.23	1.17	1.12	1.06	1.00	0.94	0.88	0.82	0.76

LIQUID TEMPERATURE ENTERING TEV °C											
5	10	15	20	25	30	35	40	45	50	55	60
CORRECTION FACTOR, CF LIQUID TEMPERATURE											
1.46	1.39	1.32	1.25	1.18	1.11	1.04	0.97	0.89	0.81	0.72	0.62

EVAPORATOR TEMPERATURE °F	PRESSURE DROP ACROSS TEV (psi)							
	80	120	160	200	240	280	320	360
	CORRECTION FACTOR, CF PRESSURE DROP							
40°	0.71	0.87	1.00	1.12	1.22	1.32	1.41	1.50
20°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34
0°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34

EVAPORATOR TEMPERATURE °C	PRESSURE DROP ACROSS TEV (bar)								
	8	10	11	12	13	14	16	18	20
	CORRECTION FACTOR, CF PRESSURE DROP								
5°	0.85	0.95	1.00	1.04	1.09	1.13	1.21	1.28	1.35
-5°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20
-15°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20

Thermostatic Expansion Valves

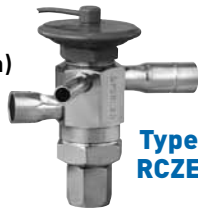
410A

Type RCZE

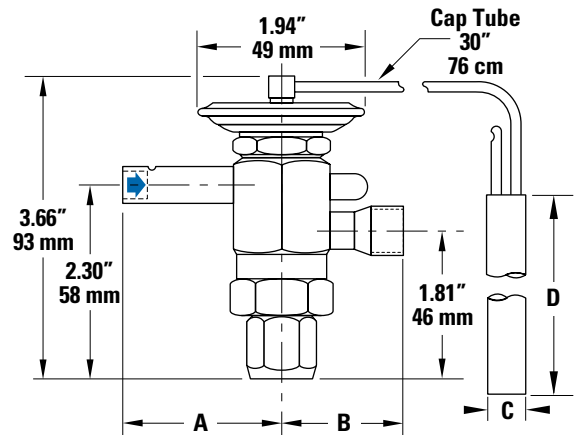
Knife Edge Joint

Standard Cap Tube Length 30 in. (76 cm)

The RCZE valve is an externally adjustable balance ported TEV with an internal check valve for heat pump applications. This makes the RCZE valve an excellent replacement for all OEM CBI and CBBI valves as well as other applications requiring a R-410A expansion valve on heat pumps. The RCZE valve may also be used on air conditioning (cooling only) applications. This allows you to reduce inventory to also replace the I, RI, BI and BBI valves. The RCZE valves utilize the KT-45 element design for the higher pressures of R-410A systems.



Type RCZE



Dimensions

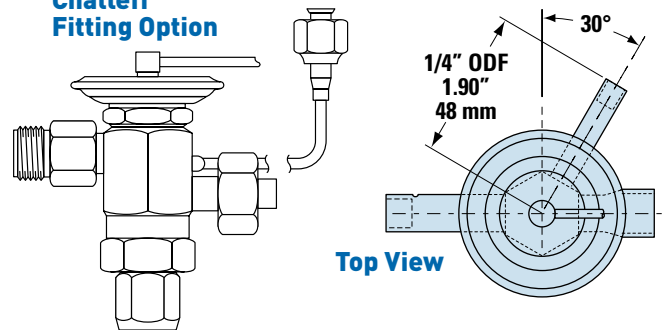
Connections

VALVE TYPE	FITTING SIZE** Inches	Inches		mm	
		A	B	A	B
RCZE-1, 1-1/2 & 2	3/8 ODF	1.92	1.45	48.8	36.8
	1/2 ODF	1.98*	1.45	50.3	36.8
	5/8 ODF	—	1.53	—	38.9
RCZE-3, 4, 5 & 6	3/8 ODF	1.92	1.45	48.8	36.8
	1/2 ODF	1.98	1.45	50.3	36.8
	5/8 ODF	—	1.53	—	38.9
RCZE Chatleff Fitting		1.89	1.71	48.0	43.4

*1/2 ODF inlet available on 2 ton valves only.

** Not all fitting combinations are available.

Chatleff Fitting Option



Bulb Sizes

THERMOSTATIC CHARGE	Inches		mm	
	C	D	C	D
ZCP180	0.50	3.00	13	76
ZGA	0.75	2.00	19	51

Capacities

Tons • psi • °F

kW • bar • °C

VALVE TYPE	NOMINAL CAPACITY (Tons)	EVAPORATOR TEMPERATURE °F		
		40	20	0
		PRESSURE DROP ACROSS VALVE (psi)		
		160	200	200
RCZE-1-GA	1	1.2	1.3	1.2
RCZE-1-1/2-GA	1-1/2	2.1	2.3	2.0
RCZE-2-GA	2	2.7	3.0	2.7
RCZE-3-GA	3	3.8	4.1	3.7
RCZE-4-GA	4	5.0	5.4	4.9
RCZE-5-GA	5	5.9	6.5	5.8
RCZE-6-GA	6	7.1	7.8	6.3

VALVE TYPE	NOMINAL CAPACITY (kW)	EVAPORATOR TEMPERATURE °C		
		5	-5	-15
		PRESSURE DROP ACROSS VALVE (bar)		
		11	14	14
RCZE-1-GA	4.20	4.20	4.64	4.25
RCZE-1-1/2-GA	7.35	7.35	8.11	7.44
RCZE-2-GA	9.66	9.66	10.7	9.77
RCZE-3-GA	13.4	13.4	14.8	13.6
RCZE-4-GA	17.6	17.6	19.5	17.8
RCZE-5-GA	21.0	21.0	23.2	21.2
RCZE-6-GA	25.2	25.2	27.8	23.7

LIQUID TEMPERATURE ENTERING TEV °F										
40	50	60	70	80	90	100	110	120	130	140
CORRECTION FACTOR, CF LIQUID TEMPERATURE										
1.39	1.31	1.23	1.17	1.12	1.06	1.00	0.94	0.88	0.82	0.76

LIQUID TEMPERATURE ENTERING TEV °C											
5	10	15	20	25	30	35	40	45	50	55	60
CORRECTION FACTOR, CF LIQUID TEMPERATURE											
1.46	1.39	1.32	1.25	1.18	1.11	1.04	0.97	0.89	0.81	0.72	0.62

EVAPORATOR TEMPERATURE °F	PRESSURE DROP ACROSS TEV (psi)							
	80	120	160	200	240	280	320	360
CORRECTION FACTOR, CF PRESSURE DROP								
40°	0.71	0.87	1.00	1.12	1.22	1.32	1.41	1.50
20°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34
0°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34

EVAPORATOR TEMPERATURE °C	PRESSURE DROP ACROSS TEV (bar)								
	8	10	11	12	13	14	16	18	20
CORRECTION FACTOR, CF PRESSURE DROP									
5°	0.85	0.95	1.00	1.04	1.09	1.13	1.21	1.28	1.35
-5°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20
-15°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20

Thermostatic Expansion Valves

410A

Type O

Knife Edge Joint

Standard Cap Tube Length 5 Feet (1.5 m)



Type O

Sporlan Type O Valve is a brass bar body, externally adjustable valve with ODF solder connections. The thermostatic element is replaceable, and the inlet connection has a permanent 12 mesh strainer. This valve type features a balanced port construction, and it is designed for both air conditioning and refrigeration applications. A synthetic seating surface provides tight shut-off during system off periods.

This valve type has two body styles: a small body which provides capacities up to 35 tons (120 kW) R-410A, and a large body which extends capacities up to 60 tons (210 kW) R-410A.

Refrigerant distributors that will mate directly to this valve are listed below. Refer to Sporlan Bulletin 20-10 for additional application information on this subject.

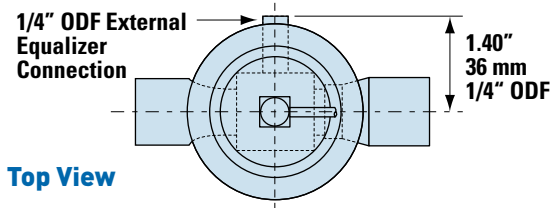
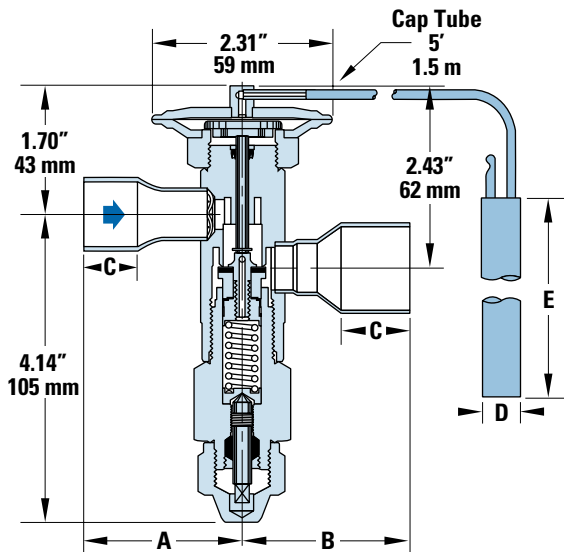
Outlet Connections Distributors

1-1/8" ODF	1115, 1116, 1655R
1-3/8" ODF	1117, 1126, 1128, 1657R
1-5/8" ODF	1125, 1127, 1143, 1659R

Dimensions

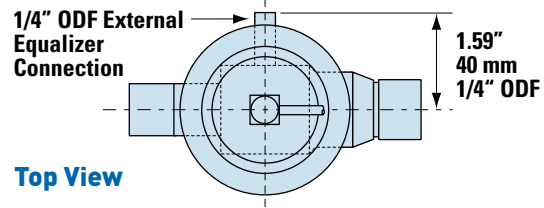
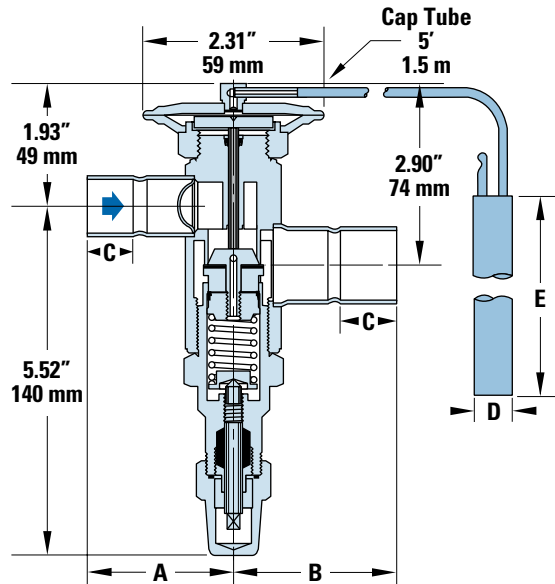
Type O with Number 85 Element

For use on 20 thru 35 Ton Valves



Type O with Number 85-3 Element

For use on 50 and 60 Ton Valves



Connections

STRAIGHT THRU ODF SOLDER	Inches			mm		
	A	B	C	A	B	C
7/8	2.09	–	0.75	53	–	19
1-1/8	2.21	2.23	0.91	56	57	23
1-3/8	–	2.39	0.97	–	61	25

Bulb Sizes

THERMOSTATIC CHARGE	Inches		mm	
	D	E	D	E
ZGA	0.75	2.00	19	51

Connections

STRAIGHT THRU ODF SOLDER	Inches			mm		
	A	B	C	A	B	C
1-1/8	2.69	–	0.91	68	–	23
1-3/8	–	2.84	0.97	–	72	25
1-5/8	–	3.12	1.09	–	79	28

Bulb Sizes

THERMOSTATIC CHARGE	Inches		mm	
	D	E	D	E
ZGA	0.75	2.00	19	51

Thermostatic Expansion Valves

410A

Capacities

Tons • psi • °F

kW • bar • °C

VALVE TYPE	NOMINAL CAPACITY (Tons)	EVAPORATOR TEMPERATURE °F		
		40	20	0
		PRESSURE DROP ACROSS VALVE (psi)		
		160	200	200
OZE-20	20	19.7	21.6	20.4
OZE-25	25	23.7	25.9	24.5
OZE-35	35	32.6	35.6	33.6
OZE-50	50	49.3	54.0	51.0
OZE-60	60	59.2	64.8	61.2

VALVE TYPE	NOMINAL CAPACITY (kW)	EVAPORATOR TEMPERATURE °C		
		5	-5	-15
		PRESSURE DROP ACROSS VALVE (bar)		
		11	14	14
OZE-20	70	70.1	77.4	73.7
OZE-25	84	84.1	92.8	88.5
OZE-35	116	116.0	128.0	122.0
OZE-50	175	175.0	193.0	184.0
OZE-60	210	210.0	232.0	221.0

LIQUID TEMPERATURE ENTERING TEV °F										
40	50	60	70	80	90	100	110	120	130	140
CORRECTION FACTOR, CF LIQUID TEMPERATURE										
1.39	1.31	1.23	1.17	1.12	1.06	1.00	0.94	0.88	0.82	0.76

LIQUID TEMPERATURE ENTERING TEV °C												
5	10	15	20	25	30	35	40	45	50	55	60	
CORRECTION FACTOR, CF LIQUID TEMPERATURE												
1.46	1.39	1.32	1.25	1.18	1.11	1.04	0.97	0.89	0.81	0.72	0.62	

EVAPORATOR TEMPERATURE °F	PRESSURE DROP ACROSS TEV (psi)							
	80	120	160	200	240	280	320	360
	CORRECTION FACTOR, CF PRESSURE DROP							
40°	0.71	0.87	1.00	1.12	1.22	1.32	1.41	1.50
20°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34
0°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34

EVAPORATOR TEMPERATURE °C	PRESSURE DROP ACROSS TEV (bar)									
	8	10	11	12	13	14	16	18	20	
	CORRECTION FACTOR, CF PRESSURE DROP									
5°	0.85	0.95	1.00	1.04	1.09	1.13	1.21	1.28	1.35	
-5°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20	
-15°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20	

Thermostatic Expansion Valves

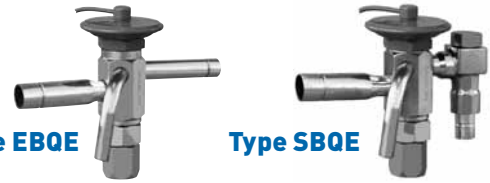
410A

Type EBQE & SBQE Balanced Port Replaceable Cartridge Style

Knife Edge Joint

Standard Cap Tube Length 5 Feet (1.5 m)

Sporlan Types SBQE & EBQE are small brass bar body valves with extended ODF solder connections and the same balanced port construction as the Type BF valve. Both valves have replaceable thermostatic elements. The Type EBQE has a 100 mesh insert strainer. The Type SBQE has a 100 mesh removable strainer that can be cleaned and/or replaced while the valve is still soldered to



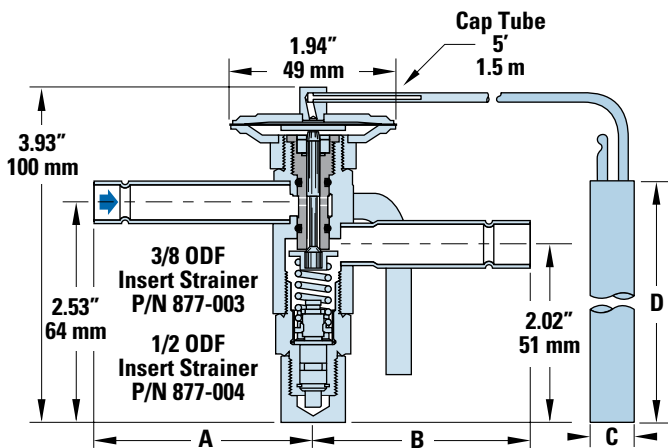
Type EBQE

Type SBQE

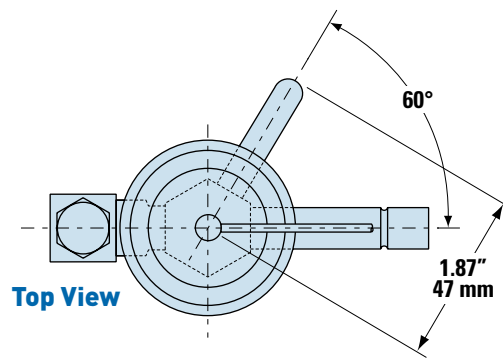
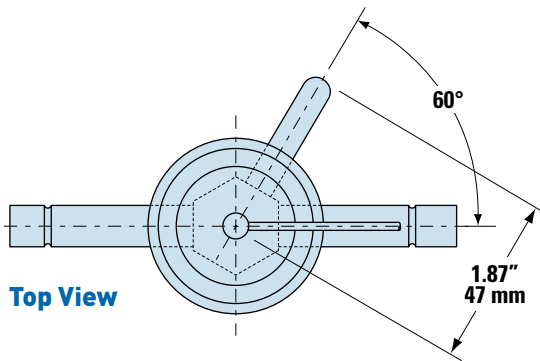
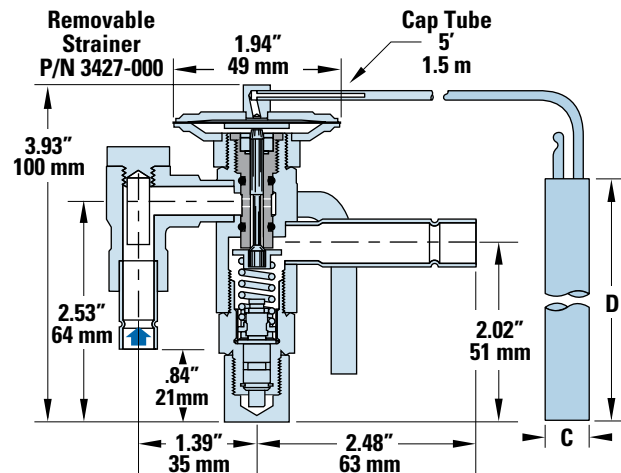
the system tubing. The balanced port construction makes these valves ideally suited for R-410A applications with varying pressure drop across the valve. The EBQE and SBQE may also be applied in bi-directional applications.

Dimensions

Type EBQE with Number 45 Element



Type SBQE with Number 45 Element



Connections

FITTING SIZE* Inches	Inches		mm	
	A	B	A	B
3/8	2.50	—	64	—
1/2	2.42	2.48	61	63
5/8	—	2.48	—	63
7/8	—	2.39	—	61

* Not all fitting combinations are available.

Bulb Sizes

THERMOSTATIC CHARGE	Inches		mm	
	C	D	C	D
ZCP180	0.50	3.00	13	76
ZGA	0.75	2.00	19	51

Connections

Only available with 3/8" ODF Inlet and 1/2" ODF Outlet.

Bulb Sizes

THERMOSTATIC CHARGE	Inches		mm	
	C	D	C	D
ZCP180	0.50	3.00	13	76
ZGA	0.75	2.00	19	51

Thermostatic Expansion Valves

410A

Specifications

TYPE EBQE	TYPE SBQE	CARTRIDGE CODE (Port Size)	NOMINAL CAPACITY RANGE		CONNECTIONS - Inches	
EXTENDED ODF SOLDER	EXTENDED ODF SOLDER (with replaceable strainer)		TONS	kW	BOLD figures are standard and will be furnished unless otherwise specified.	
EXTERNAL EQUALIZER					INLET X OUTLET	EXTERNAL EQUALIZER
EBQE-AAA	SBQE-AAA	AAA	1/4 – 1/3	0.88 – 1.17	EBQE 3/8 x 1/2 ODF 1/2 x 5/8 ODF 1/2 x 7/8 ODF Straight Thru SBQE 3/8 x 1/2 ODF 90° Angle Inlet	1/4" ODF Pointed Toward Bottom Cap
EBQE-AA	SBQE-AA	AA	1/2 – 3/4	1.76 – 2.64		
EBQE-A	SBQE-A	A	1 – 1-3/4	3.52 – 6.15		
EBQE-B	SBQE-B	B	2 – 3-1/2	7.03 – 12.3		
EBQE-C	SBQE-C	C	4 – 6	14.1 – 21.1		

Capacities

Tons • psi • °F

kW • bar • °C

CARTRIDGE TYPE	NOMINAL CAPACITY (Tons)	EVAPORATOR TEMPERATURE °F			CARTRIDGE TYPE	NOMINAL CAPACITY (kW)	EVAPORATOR TEMPERATURE °C		
		40	20	0			5	-5	-15
		PRESSURE DROP ACROSS VALVE (psi)					PRESSURE DROP ACROSS VALVE (bar)		
		160	200	200			11	14	14
AAA	1/3	0.419	0.458	0.4	AAA	1.47	1.47	1.62	1.46
AA	2/3	0.899	0.981	0.857	AA	3.15	3.15	3.48	3.14
A	1-1/2	1.92	2.09	1.83	A	6.72	6.72	7.42	6.69
B	3	3.36	3.66	3.20	B	11.8	11.8	13.0	11.7
C	5-1/2	6.23	6.80	5.94	C	21.8	21.8	24.1	21.7

LIQUID TEMPERATURE ENTERING TEV °F											
40	50	60	70	80	90	100	110	120	130	140	
CORRECTION FACTOR, CF LIQUID TEMPERATURE											
1.39	1.31	1.23	1.17	1.12	1.06	1.00	0.94	0.88	0.82	0.76	

LIQUID TEMPERATURE ENTERING TEV °C											
5	10	15	20	25	30	35	40	45	50	55	60
CORRECTION FACTOR, CF LIQUID TEMPERATURE											
1.46	1.39	1.32	1.25	1.18	1.11	1.04	0.97	0.89	0.81	0.72	0.62

EVAPORATOR TEMPERATURE °F	PRESSURE DROP ACROSS TEV (psi)							
	80	120	160	200	240	280	320	360
	CORRECTION FACTOR, CF PRESSURE DROP							
40°	0.71	0.87	1.00	1.12	1.22	1.32	1.41	1.50
20°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34
0°	0.63	0.77	0.89	1.00	1.10	1.18	1.26	1.34

EVAPORATOR TEMPERATURE °C	PRESSURE DROP ACROSS TEV (bar)								
	8	10	11	12	13	14	16	18	20
	CORRECTION FACTOR, CF PRESSURE DROP								
5°	0.85	0.95	1.00	1.04	1.09	1.13	1.21	1.28	1.35
-5°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20
-15°	0.76	0.85	0.89	0.93	0.96	1.00	1.07	1.13	1.20

Distributors and Auxiliary Side Connectors

410A

All Sporlan distributors are ready for service with R-410A. The following tables are provided for making selections based on procedure explained in Bulletin 20-10.

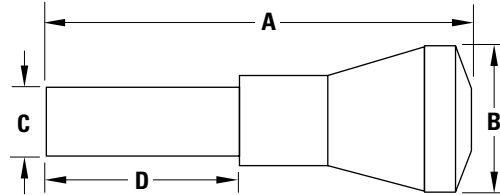
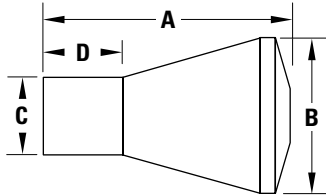


Quick Reference

CONNECTION SIZE Inches	TYPICAL TEV TYPES ①, ②	DISTRIBUTOR TYPE	MAXIMUM NUMBER OF CIRCUITS				NOZZLE TYPE	SIDE CONNECTION	MATERIAL
			3/16	1/4	5/16	3/8			
1/2 ODM	<i>BI, BBI, CBI, CBBI,</i> EBQ, R, RC, SBQ	1613	6	4	–	–	PERM.	–	#360 BRASS
		1616	8	6	4	–	PERM.	–	
		D260	6	4	–	–	L	–	
		D262	9	6	4	–	L	–	
5/8 ODM	<i>BI, BBI, CBI, CBBI,</i> EBQ, R, RC	1620	6	4	–	–	J	–	
		1622	9	7	4	–	J	–	
		1651(R)	7	5	–	–	J (R)	3/8 or 1/2 ODF	
7/8 ODM	<i>BI, BBI, CBI, CBBI,</i> EBQ, O, R	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	O, R	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	O, R	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	
1-5/8 ODM	O	1125	28	24	20	16	A	–	
		1127	37	30	26	20	A	–	
		1143	40	36	30	24	A	–	
		1659(R)	32	24	18	14	A (R)	7/8 or 1-1/8 ODF	

- ① TEV models in italics are OEM type thermostatic expansion valves.
- ② Thermostatic expansion valves used with refrigerant distributor must be externally equalized.

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 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 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 and Auxiliary Side Connectors

410A

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"												
Type 1125 Net Weight - Approximately 1 lb., 14 oz. (850 g)						3.12	3.00	1.623 1.625	1.30	79.2	76.2	41.22 41.28	33.0
25 to 28	3/16"	10 thru 50	A	1-5/8 ODM Solder									
19 to 24	1/4"												
16 to 20	5/16"												
13 to 16	3/8"												
Type 1127 Net Weight - Approximately 2 lb., 4 oz. (1.0 kg)						3.31	3.50	1.623 1.625	1.28	84.1	88.9	41.22 41.28	32.5
29 to 37	3/16"	10 thru 50	A	1-5/8 ODM Solder									
25 to 30	1/4"												
21 to 26	5/16"												
17 to 20	3/8"												
Type 1143 Net Weight - Approximately 3 lb. (1.4 kg)						3.69	4.00	1.623 1.625	1.44	93.7	102	41.22 41.28	36.6
29 to 40	3/16"	10 thru 50	A	1-5/8 ODM Solder									
31 to 36	1/4"												
27 to 30	5/16"												
21 to 24	3/8"												

Distributors and Auxiliary Side Connectors

410A

Capacities Tons - psi - °F

kW - bar - °C

NOZZLE NUMBER	DISTRIBUTOR NOZZLE CAPACITIES EVAPORATOR TEMPERATURE °F					NOZZLE NUMBER	DISTRIBUTOR NOZZLE CAPACITIES EVAPORATOR TEMPERATURE °C				
	40	20	0	-20	-40		5	-5	-15	-30	-40
1/9	0.16	0.13	0.10	0.08	0.07	1/9	0.57	0.46	0.37	0.29	0.24
1/6	0.25	0.20	0.16	0.13	0.11	1/6	0.88	0.71	0.58	0.44	0.38
1/4	0.40	0.31	0.25	0.21	0.17	1/4	1.42	1.14	0.93	0.71	0.61
1/3	0.53	0.41	0.33	0.27	0.23	1/3	1.86	1.49	1.22	0.93	0.80
1/2	0.73	0.57	0.46	0.37	0.31	1/2	2.57	2.06	1.68	1.29	1.10
3/4	1.10	0.86	0.69	0.57	0.47	3/4	3.88	3.11	2.54	1.94	1.66
1	1.47	1.15	0.92	0.76	0.64	1	5.20	4.16	3.40	2.60	2.22
1-1/2	2.14	1.67	1.34	1.10	0.92	1-1/2	7.56	6.06	4.95	3.78	3.23
2	2.93	2.30	1.84	1.51	1.27	2	10.4	8.31	6.79	5.18	4.44
2-1/2	3.66	2.86	2.30	1.88	1.58	2-1/2	12.9	10.4	8.47	6.46	5.53
3	4.39	3.44	2.76	2.26	1.90	3	15.5	12.4	10.2	7.76	6.64
4	5.88	4.60	3.69	3.02	2.54	4	20.8	16.7	13.6	10.4	8.89
5	7.25	5.67	4.55	3.73	3.13	5	25.7	20.5	16.8	12.8	11.0
6	8.69	6.80	5.45	4.47	3.76	6	30.8	24.6	20.1	15.4	13.1
8	10.5	8.19	6.57	5.39	4.53	8	37.1	29.7	24.2	18.5	15.8
10	11.7	9.18	7.36	6.04	5.07	10	41.5	33.3	27.2	20.7	17.7
12	14.5	11.3	9.09	7.46	6.26	12	51.3	41.1	33.5	25.6	21.9
15	18.0	14.1	11.3	9.25	7.77	15	63.6	50.9	41.6	31.8	27.2
17	20.1	15.7	12.6	10.3	8.69	17	71.1	57.0	46.5	35.5	30.4
20	24.2	19.0	15.2	12.5	10.5	20	85.7	68.6	56.1	42.8	36.6
25	30.5	23.8	19.1	15.7	13.2	25	108	86.3	70.5	53.8	46.1
30	34.8	27.2	21.8	17.9	15.0	30	123	98.6	80.6	61.5	52.6
35	41.9	32.8	26.3	21.5	18.1	35	148	119	96.9	74.0	63.3
40	47.0	36.8	29.5	24.2	20.3	40	166	133	109	83.0	71.0
50	60.9	47.7	38.2	31.3	26.3	50	216	173	141	108	92.1

TUBE DIAMETER Inches	DISTRIBUTOR CAPACITY PER TUBE (Tons) EVAPORATOR TEMPERATURE °F				
	40	20	0	-20	-40
3/16	0.41	0.31	0.23	0.18	0.14
1/4	1.19	0.89	0.68	0.52	0.40
5/16	2.41	1.82	1.38	1.06	0.82
3/8	4.33	3.28	2.50	1.92	1.48

TUBE DIAMETER Inches	DISTRIBUTOR CAPACITY PER TUBE (kW) EVAPORATOR TEMPERATURE °C				
	5	-5	-15	-30	-40
3/16	1.47	1.13	0.88	0.61	0.48
1/4	4.28	3.28	2.55	1.77	1.40
5/16	8.72	6.69	5.20	3.60	2.85
3/8	15.8	12.1	9.40	6.51	5.15

LIQUID TEMPERATURE CORRECTION FOR NOZZLE AND TUBES °F										
50	60	70	80	90	100	110	120	130	140	
CORRECTION FACTOR, CF LIQUID TEMPERATURE										
2.10	1.83	1.59	1.37	1.17	1.00	0.85	0.72	0.61	0.52	

LIQUID TEMPERATURE CORRECTION FOR NOZZLE AND TUBES °C												
10	15	20	25	30	35	38	40	45	50	55	60	
CORRECTION FACTOR, CF LIQUID TEMPERATURE												
2.10	1.86	1.64	1.44	1.25	1.09	1.00	0.94	0.81	0.70	0.60	0.52	

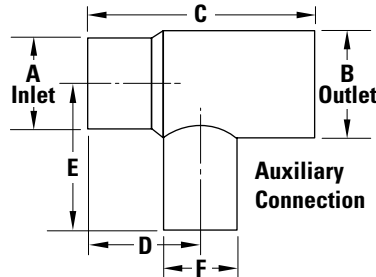
TUBE LENGTH CORRECTION FACTOR (Inches)										
12	18	24	30	36	42	48	54	60	66	72
CORRECTION FACTOR, CF PRESSURE DROP										
1.36	1.16	1.07	1.00	0.95	0.90	0.86	0.82	0.79	0.76	0.73

TUBE LENGTH CORRECTION FACTOR (cm)												
30	45	60	75	90	105	120	135	150	165	180		
CORRECTION FACTOR, CF PRESSURE DROP												
1.36	1.16	1.07	1.00	0.95	0.90	0.86	0.82	0.79	0.76	0.73		

Auxiliary Side Connectors

ASC-4-3, ASC-5-4, ASC-7-4, ASC-9-5, ASC-11-7, and ASC-13-9

For proper distributor type, order by complete Sporlan type listed below. E.g., an 1126 distributor requires an ASC-11-7 Auxiliary Side Connector. Do not use an ASC that is smaller or larger than recommended. Bushing up or down at the outlet defeats the purpose of the internal nozzle tube extension. Do not use an ASC on distributors with permanent nozzles.



TYPE	CONNECTION SIZES - Inches			USED WITH DISTRIBUTOR TYPE	NOZZLE SIZE	DIMENSIONS											
	INLET ODM SOLDER	OUTLET ODF SOLDER	AUXILIARY ODF SOLDER			Inches					mm						
						A (ODM)	B (ODF)	C	D	E	F (ODF)	A (ODM)	B (ODF)	C	D	E	F (ODF)
ASC-4-3	1/2	1/2	3/8	D260, D262	L	1/2	1/2	1.75	0.85	1.04	3/8	12.7	12.7	44.4	22	26.4	9.52
ASC-5-4	5/8	5/8	1/2	1620, 1622	J	5/8	5/8	1.88	0.95	1.25	1/2	15.9	15.9	47.8	24	31.8	12.7
ASC-7-4	7/8	7/8	1/2	1112, 1113	G	7/8	7/8	2.25	1.06	1.38	1/2	22.2	22.2	51.2	26.9	35.1	12.7
ASC-9-5	1-1/8	1-1/8	5/8	1115, 1116	E	1-1/8	1-1/8	2.81	1.47	1.62	5/8	28.6	28.6	71.4	37.3	41.1	15.9
ASC-11-7	1-3/8	1-3/8	7/8	1117, 1126, 1128	C	1-3/8	1-3/8	3.53	1.89	2.19	7/8	34.9	34.9	89.7	48.0	55.6	22.2
ASC-13-9	1-5/8	1-5/8	1-1/8	1125, 1127, 1143	A	1-5/8	1-5/8	3.85	1.95	2.75	1-1/8	41.3	41.3	94.5	46.5	69.8	28.6

Solenoid Valves

410A

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	PORT SIZE Inches	TONS OF REFRIGERATION				
"E" Series Extended Connections				PRESSURE DROP — psi*				
Without Manual Lift Stem	With Manual Lift Stem			1	2	3	4	5
Normally Closed	Normally Closed							
E2S120-HP	—	1/4	0.075	0.43	0.62	0.76	0.87	0.98
E5S130-HP	—	3/8	0.150	1.52	2.16	2.66	3.08	3.45
E6S130-HP	ME6S130-HP	3/8	3/16	2.73	3.84	4.68	5.40	6.02
E6S140-HP	ME6S140-HP	1/2						
E9S240-HP	ME9S240-HP	1/2	9/32	4.44	6.27	7.66	8.83	9.86
E9S250-HP	—	5/8						
E10S240-HP	—	1/2	5/16	6.08	8.59	10.5	12.1	13.6
E10S250-HP	—	5/8						
E14S250-HP	ME14S250-HP	5/8	7/16	8.64	12.2	14.9	17.2	19.2
E19S270-HP	ME19S270-HP	7/8	19/32	13.2	18.7	22.9	26.5	29.7
E25S270-HP	—	7/8	25/32	22.5	31.9	39.2	45.3	50.6
E25S290-HP	ME25S290-HP	1-1/8						
—	ME35S190-HP	1-1/8	1	36.7	53.5	66.8	78.1	88.2
—	ME35S1110-HP	1-3/8						
E42S2130-HP	—	1-5/8	1-5/16	69.6	98.4	120	139	156

kW • bar • °C

TYPE NUMBER		CONNECTIONS ODF SOLDER Inches	PORT SIZE mm	kW OF REFRIGERATION				
"E" Series Extended Connections				PRESSURE DROP — bar*				
Without Manual Lift Stem	With Manual Lift Stem			0.07	0.1	0.2	0.3	0.4
Normally Closed	Normally Closed							
E2S120-HP	—	1/4	1.9	1.53	1.80	2.60	3.20	3.71
E5S130-HP	—	3/8	3.8	5.37	6.44	9.16	11.3	13.0
E6S130-HP	ME6S130-HP	3/8	4.8	9.63	11.5	16.1	19.7	22.7
E6S140-HP	ME6S140-HP	1/2						
E9S240-HP	ME9S240-HP	1/2	7.1	15.7	18.7	26.4	32.3	37.2
E9S250-HP	—	5/8						
E10S240-HP	—	1/2	7.9	21.5	25.6	36.2	44.3	51.2
E10S250-HP	—	5/8						
E14S250-HP	ME14S250-HP	5/8	11	39.5	36.4	51.4	62.9	72.6
E19S270-HP	ME19S270-HP	7/8	15	46.5	55.7	79.0	97	112
E25S270-HP	—	7/8	20	79.6	95.2	135	165	191
E25S290-HP	ME25S290-HP	1-1/8						
—	ME35S190-HP	1-1/8	26	129	157	230	286	335
—	ME35S1110-HP	1-3/8						
E42S2130-HP	—	1-5/8	34	246	294	415	508	587

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

Capacities based on 100°F (38°C) liquid temperature, 40°F (5°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psid (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 bar).

LIQUID TEMPERATURE CORRECTION FACTORS °F											LIQUID TEMPERATURE CORRECTION FACTORS °C											
40	50	60	70	80	90	100	110	120	130	140	5	10	15	20	25	30	35	40	45	50	55	60
CORRECTION FACTOR, CF LIQUID TEMPERATURE											CORRECTION FACTOR, CF LIQUID TEMPERATURE											
1.45	1.38	1.30	1.23	1.15	1.08	1.00	0.92	0.83	0.74	0.64	1.45	1.38	1.32	1.25	1.18	1.11	1.04	0.97	0.90	0.82	0.74	0.64

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% (2.7%).

Discharge Gas Capacity - Tons • psi • °F

kW • bar • °C

VALVE SERIES	DISCHARGE GAS CAPACITIES – Tons						VALVE SERIES	DISCHARGE GAS CAPACITIES – kW					
	PRESSURE DROP ACROSS VALVE – psi							PRESSURE DROP ACROSS VALVE – bar					
	2	5	10	25	50	100		0.15	0.3	0.7	1.5	4	7
E2	0.15	0.24	0.35	0.55	0.86	1.08	E2	0.54	0.79	1.22	1.78	3.09	3.50
E5	0.54	0.86	1.22	2.26	3.02	3.75	E5	1.97	2.81	4.32	7.47	11.2	13.2
B6 & E6	1.00	1.57	2.20	3.86	5.06	6.04	B6 & E6	3.66	5.14	7.80	12.8	18.7	21.3
B9 & E9	1.61	2.54	3.58	5.67	7.72	10.1	B9 & E9	5.92	8.34	12.7	18.7	28.9	35.7
B10 & E10	2.19	3.46	4.89	8.7	11.7	14.6	B10 & E10	8.04	11.4	17.3	28.7	43.3	51.7
B14 & E14	3.13	4.93	6.96	11.9	16.1	20.7	B14 & E14	11.5	16.2	24.7	39.3	60.1	73.1
B19 & E19	4.71	7.47	10.6	17.6	23.9	31.0	B19 & E19	17.3	24.5	37.5	58.1	89.4	109
B25 & E25	8.07	12.8	18.1	28.1	38.2	49.5	B25 & E25	29.6	41.9	64.2	92.8	143	175
E35	12.0	19.8	28.9	49.3	67.3	88.5	E35	44.3	64.6	103	162	252	313
E42	25.1	39.6	56.0	82.1	111	144	E42	91.9	130	198	271	416	510

* Minimum operating capacity is at 1 psi (0.07 bar) pressure drop.

Capacities based on 100°F (38°C) condensing temperature, isentropic compression plus 50°F (28°C), 40°F (5°C) evaporator and 65°F (18.3°C) suction gas. For capacities at other conditions, consult Sporlan Division of Parker, Washington, MO.

Solenoid Valves

410A

Type E2 and E5 Series

The **E2 Series** are hermetic solenoid valves with direct acting construction. These valves **may be mounted horizontally, on their side or in a vertical line.**

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.

Dimensions

VALVE SERIES	TYPE	A	B	C	D	E
					FITTING DEPTH	OFFSET

Inches						
E2	E2S120-HP	4.63	0.53	2.01	0.31	0.25
E5	E5S130-HP	4.56	0.53	2.51	0.31	0.23

mm						
E2	E2S120-HP	117.6	13.5	51.0	8	6.35
E5	E5S130-HP	116	13.5	63.7	8	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

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES
				AC	DC	TONS of REFRIGERATION
						PRESSURE DROP 3 psi
E2	E2S120-HP	1/4	0.75	450	400	0.76
E5	E5S130-HP	3/8	0.150	450	400	2.66

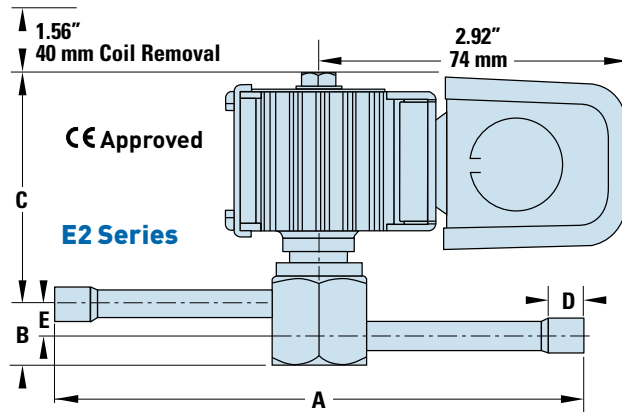
- Maximum rated pressure 700 psi (48.3 bar).
- Capacities based on 100°F (38°C) liquid temperature, 40°F (5°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psid (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 bar).

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



kW • bar • °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES
				AC	DC	kW of REFRIGERATION
						PRESSURE DROP 0.2 bar
E2	E2S120-HP	1/4	1.9	31	27.6	2.60
E5	E5S130-HP	3/8	3.8	31	27.6	9.16

- 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 13.

Solenoid Valves

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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-1 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

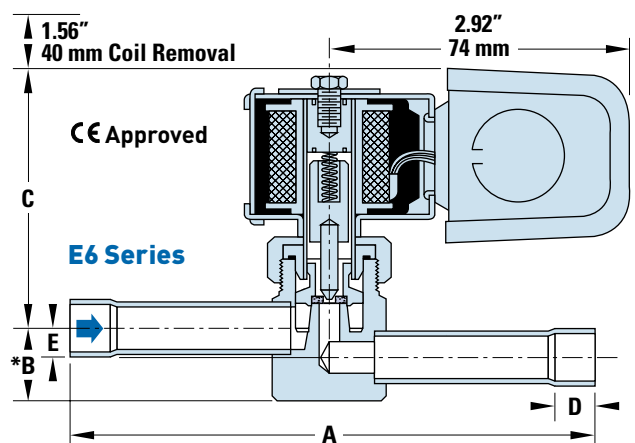
Ordering Instructions

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.**

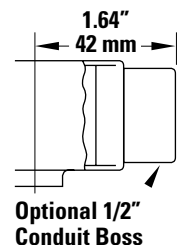
Dimensions

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

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES TONS of REFRIGERATION
				AC	DC	
				PRESSURE DROP 3 psi		
E6	E6S130-HP	3/8	3/16	450	400	4.68
	ME6S130-HP					
	ME6S140-HP	1/2				

kW - bar - °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES kW of REFRIGERATION
				AC	DC	
				PRESSURE DROP 0.2 bar		
E6	E6S130-HP	3/8	4.8	31	27.6	16.1
	ME6S130-HP					
	ME6S140-HP	1/2				

- Maximum rated pressure 700 psi (48.3 bar).
- Capacities based on 100°F (38°C) liquid temperature, 40°F (5°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psid (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 bar).

- 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 13.

Solenoid Valves

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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 can be installed without disassembly using either low or no silver content brazing alloy.

Dimensions

VALVE SERIES	TYPE	A	*B	C		E
				NORMALLY CLOSED	D FITTING DEPTH ODF	
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	6.50	0.85	3.13	0.50	0.38
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	165	9.7	80	13.0	9.7
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.

Specifications - MKC-2 and OMKC-2 Coil

Tons - psi - °F

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES TONS of REFRIGERATION
				AC	DC	
				PRESSURE DROP 3 psi		
E9	E9S230-HP	3/8	9/32	450	400	7.66
	E9 & ME9S240-HP	1/2				
	E9S250-HP	5/8				
E10	E10 & ME10S240-HP	1/2	5/16	450	400	10.5
	E10 & ME10S250-HP	5/8				
E14	E14 & ME14S250-HP	5/8	7/16	450	400	14.9
E19	E19 & ME19S270-HP	7/8	19/32			22.9
E25	E25 & ME25S270-HP	7/8	25/32			450
	E25 & ME25S290-HP	1-1/8				

- Maximum rated pressure 700 psi (48.3 bar).
- Capacities based on 100°F (38°C) liquid temperature, 40°F (5°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psid (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 bar).

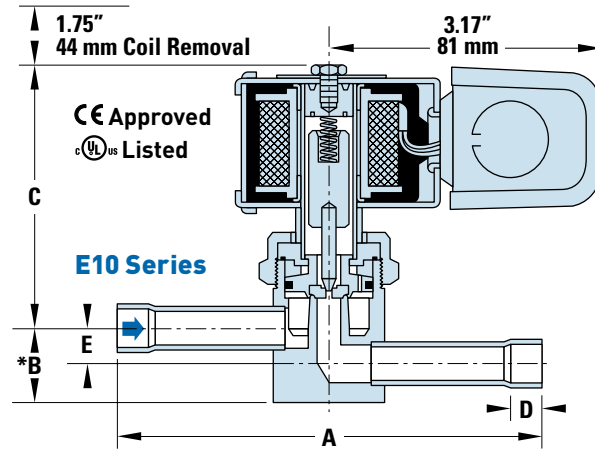
The MKC-2 and OMKC-2 coils are Class “F” temperature rated and are provided as standard, therefore a high temperature coil is not required for discharge service.



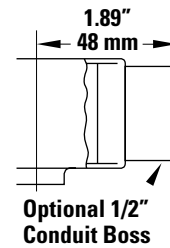
Type E14S250-HP

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.**



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		



kW - bar - °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES kW of REFRIGERATION
				AC	DC	
				PRESSURE DROP 0.2 bar		
E9	E9S230-HP	3/8	7.1	31	27.6	32.3
	E9 & ME9S240-HP	1/2				
	E9S250-HP	5/8				
E10	E10 & ME10S240-HP	1/2	7.9	31	27.6	44.3
	E10 & ME10S250-HP	5/8				
E14	E14 & ME14S250-HP	5/8	11	31	27.6	62.9
E19	E19 & ME19S270-HP	7/8	15			97.0
E25	E25 & ME25S270-HP	7/8	20			31
	E25 & ME25S290-HP	1-1/8				

- 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 13.

Solenoid Valves

410A

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

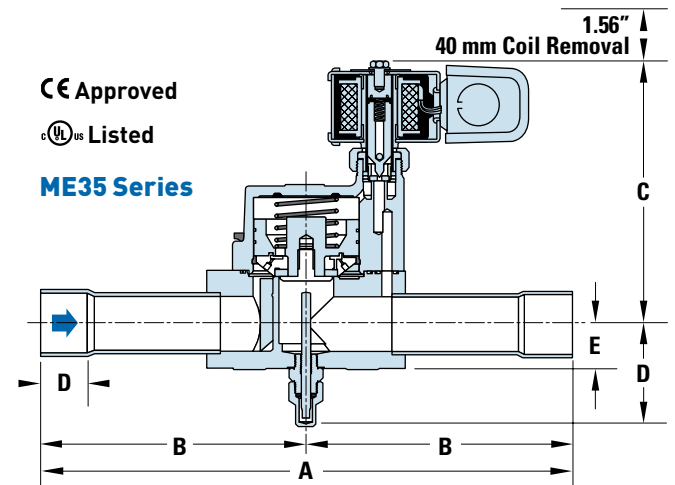
- ① 1-5/8” ODM Type L tubing may be slipped over 1-3/8” fitting, without the use of a coupling.

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

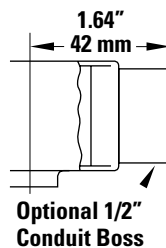
Dimensions

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

* 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

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES TONS of REFRIGERATION
				AC	DC	
				PRESSURE DROP 3 psi		
E35	ME35S190-HP	1-1/8	1	450	400	66.7
	ME35S1110-HP	①1-3/8				

kW • bar • °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES kW of REFRIGERATION
				AC	DC	
				PRESSURE DROP 0.2 bar		
E35	ME35S190-HP	1-1/8	26	31	27.6	230
	ME35S1110-HP	①1-3/8				

- Maximum rated pressure 700 psi (48.3 bar).
- Capacities based on 100°F (38°C) liquid temperature, 40°F (5°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below.
- Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psid (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 bar).

- 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 13.

Solenoid Valves

410A

Type E42 Series

Type E42 Series are large capacity, pilot operated solenoid valves designed for refrigeration and air conditioning applications. Suitable for suction service because very low pressure differential, 1 psi, is required for full operation.

The **Type E42** series may be brazed into line without disassembly as valves contain extended solder type connections. Use caution to place wet rag or chills on extensions at body to prevent excessive overheating.

The **E42 Series** may be mounted **horizontally, on their side or in a vertical line**. The E42 series is a Class “F” temperature rated coil that is provided as standard, therefore a high temperature coil is not required for discharge service.

The E42 series are steel body valves and therefore are **not** recommended for water or steam service.



Type ME42210-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		D
				NORMALLY CLOSED	NORMALLY OPEN	
						OFFSET
						ODF

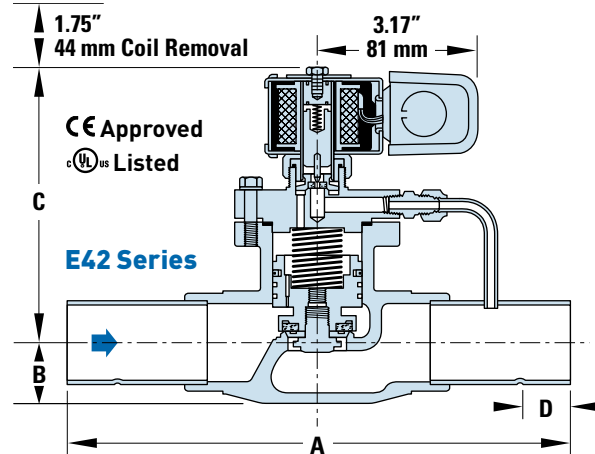
Inches

E42	E42 & ME42S2130-HP	11.06	1.40	5.70	6.31	1.09
	ME42S2170-HP					1.34

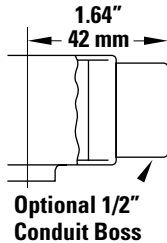
mm

E42	ME42S2130-HP	281	36	145	160	25
	ME42S2170-HP					28

* Add 2.13" (54 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	PORT SIZE Inches	MOPD psi		NOMINAL LIQUID CAPACITIES TONS of REFRIGERATION
				AC	DC	
				PRESSURE DROP 3 psi		
E42	E42 & ME42S2130-HP	1-5/8	1-5/16	450	400	120

kW • bar • °C

VALVE SERIES	TYPE	CONNECTIONS ODF - Inches	PORT SIZE mm	MOPD bar		NOMINAL LIQUID CAPACITIES kW of REFRIGERATION
				AC	DC	
				PRESSURE DROP 0.2 bar		
E42	ME42S2130-HP	1-5/8	34	31	27.6	415

- Maximum rated pressure 700 psi (48.3 bar).
- Capacities based on 100°F (38°C) liquid temperature, 40°F (5°C) evaporator temperature. For other liquid line temperatures use liquid correction factors below. Maximum Operating Pressure Differential (MOPD) for the AC coil is 450 psid (31 bar). Maximum Rated Pressure (MRP) = 700 psig (48.3 bar).

- 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 13.

Solenoid Valves

410A

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.

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

- 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.



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.

3-Way Heat Reclaim Valves

410A

Advantages

- **3-Way Pilot eliminates costly high- to low-side leaks.**
- **“B” Type reduces total installed cost by eliminating need for normally open solenoid valve on systems requiring reclaim condenser pump out.**
- **High capacity at minimum pressure drop.**
- **Tight synthetic main port seating.**
- **Easily mounted in vertical or horizontal line to simplify piping requirements.**
- **Proven performance backed by Sporlan service, engineering and technical support.**
- **Standard solenoid coil available at ANY Sporlan wholesaler.**
- **UL Listed, US and Canada File #MH4576, CE Approved**



Type B5D

removed from the heat reclaim coil. One is to maintain a proper balance of refrigerant in the system (i.e., refrigerant left in the reclaim coil could result in the remainder of the system operating short of charge). A second reason is to eliminate the potential of having condensed refrigerant in an idle coil. When an idle reclaim coil has condensed or even subcooled liquid refrigerant sitting in the tubes there is a potential for a problem. When refrigerant liquid, either saturated or subcooled, is mixed with hot gas refrigerant, the reaction of the mixing can cause severe liquid hammer. Hot gas mixed with liquid can create thousands of pounds of force and has the potential of breaking refrigerant lines and valves.

An alternate method of removing the refrigerant from a heat reclaim coil is to use a separate normally open solenoid valve and an optional fixed metering device. The separate solenoid valve allows the flexibility of pumping out the reclaim heat exchanger as a liquid instead of a vapor. There are two benefits to pumping out the reclaim coil as a liquid: (1) Removal of any oil that may be present in the reclaim heat exchanger. (2) The refrigerating effect of the liquid can be used to lower the superheat of vapor entering the compressor, instead of cooling the heat reclaim heat exchanger.

Sporlan recommends that recognized piping references be consulted for assistance in piping procedures. Sporlan is not responsible for system design, any damage resulting from system design, or for misapplication of its products.

Operation

All Sporlan's 3-Way Heat Reclaim Valves have a pilot operated design that shifts the refrigerant flow to either the normal condenser or the reclaim condenser based on the heating requirements of the application.

“B” Type

Normal (Outdoor) Condenser – De-energized

See Figure 2, page 21. With the pilot valve de-energized, high side pressure ① is prevented from entering the cavity above the piston-seat assembly ②. At the same time the upper pilot port is opened to suction pressure ③. The resulting pressure differential across the piston moves the piston-seat assembly to close the reclaim condenser port (upper main port). In this mode the system refrigerant flows to the normal condenser.

The pilot valve opens the cavity above the piston ②, to suction ③. This allows the reclaim condenser to be pumped out through a small bleed hole in the piston. The pump out process reduces the reclaim condenser to suction pressure. Once the suction pressure is reached, the flow through the bleed hole in the piston stops. There is no remaining high to low side bleed, with continued operation in the normal condenser mode. For a more efficient pump out of the reclaim condenser, a normally open solenoid valve can be added to the lowest physical location of the heat reclaim coil to remove liquid.

“C” Type

Normal (Outdoor) Condenser – De-energized

See Bulletin 30-20 for a description of C Type operation.

“B” Type

Reclaim (Reheat) Condenser – Energized

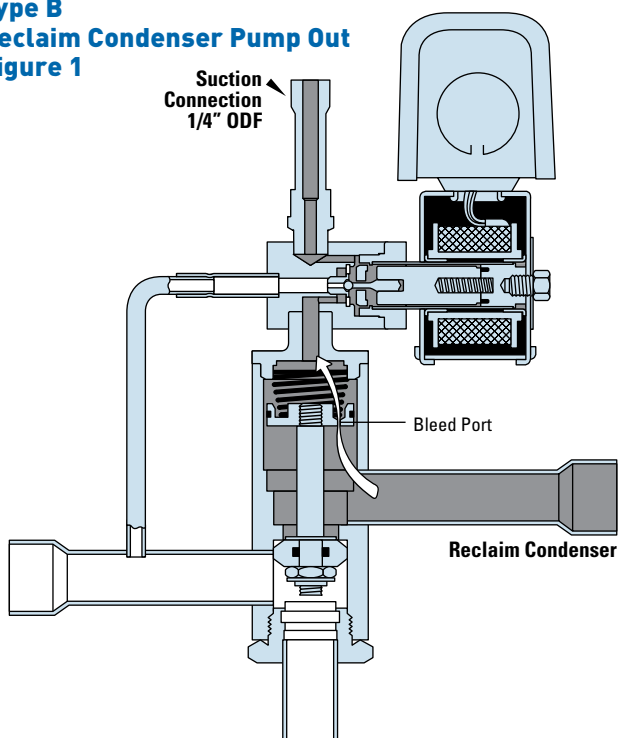
See Figure 3, page 21. When the pilot valve is energized, high side pressure ① is permitted to flow through the lower pilot port. At the same time, the upper pilot port is closed to suction E. High side pressure ①, builds up on top of the piston, moves the piston-seat assembly to close the normal condenser port, and opens the reclaim (upper) main port. With the upper pilot port closed, there is no high to low side bleed with the system in the reclaim mode.

Application

Valves may be installed in either a horizontal or vertical position. However, it should not be mounted with the coil housing below the valve body.

3-Way Heat Reclaim Valves with 3-way pilot valves are available in a variety of different sizes. These valves are available with an optional “bleed” port, see Figure 1 below. The bleed port allows the refrigerant to be removed from the heat reclaim coil or heat exchanger when it is not being used. There are two reasons why the refrigerant is

Type B Reclaim Condenser Pump Out Figure 1



3-Way Heat Reclaim Valves

410A

Figure 2
Pilot Valve
DE-ENERGIZED

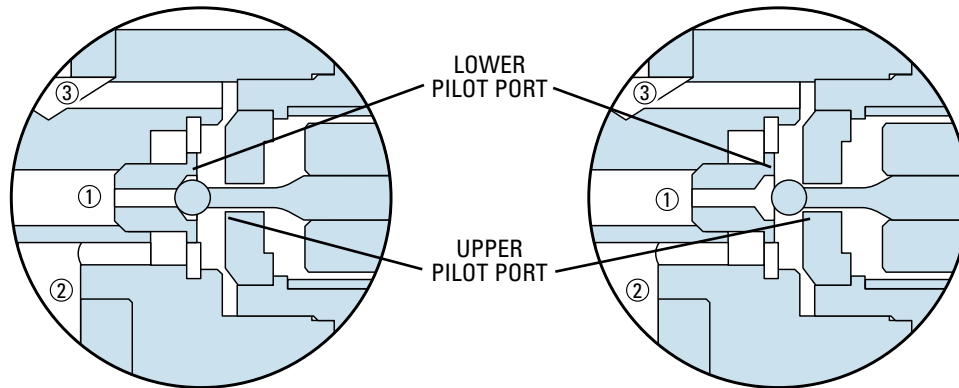


Figure 3
Pilot Valve
ENERGIZED

Specifications

VALVE SERIES	TYPE	STANDARD CONNECTIONS Inches	PORT SIZE		MOPD		MRP		STANDARD COIL RATINGS		
			Inches	mm	psi*	bar*	psi**	bar**	VOLTS/CYCLES	WATTS	COIL
SB5D	SB5D5B	5/8	0.625	16	400	27.6	650	44.8	24/50-60 120/50-60 208-240/50-60 120-208-240/50-60	10	MKC-1
	SB5D5C										
S8D	S8D7B-HP	7/8	3/4	19	400	27.6	650	44.8			
	S8D7C-HP										
	S8D9B-HP	1-1/8									
S12D	S12D11B-HP	1-3/8	1.25	32	400	27.6	650	44.8			
	S12D11C-HP										
	S12D13B-HP	1-5/8									
	S12D13C-HP										

* MOPD stands for Maximum Operating Pressure Differential.
** MRP stands for Maximum Rated Pressure.

■ Available with conduit boss, junction box, or DIN at no extra charge.
■ 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.

Selection

- For a given refrigerant, select a valve having a port size with capacity most closely matching the evaporator maximum load requirements in tons at the design evaporator temperature. Refer to the tables below. Take into account the allowable pressure drop across the valve port.
- Select the proper coil assembly for the valve type and match the voltage requirements. All standard AC voltage options are available. For voltages not listed in coil specification, consult Sporlan Division of Parker, Washington, MO.

Ordering Instructions

When ordering complete valves, specify Valve Type, Voltage and Cycles. When ordering Valve Body ONLY, specify Valve Type. When ordering Coil Assembly ONLY, specify Coil Type, Voltage and Cycles. **Example: MKC-1 120/50-60; MKC-2 120/50-60.**

Evaporator Capacities

Tons - psi - °F

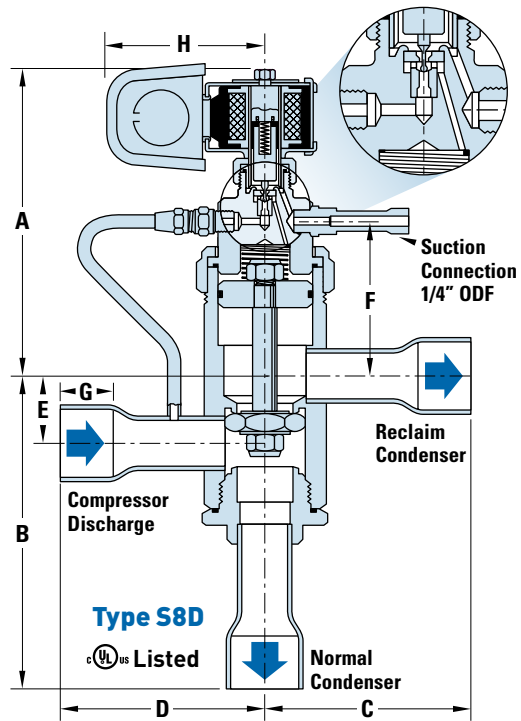
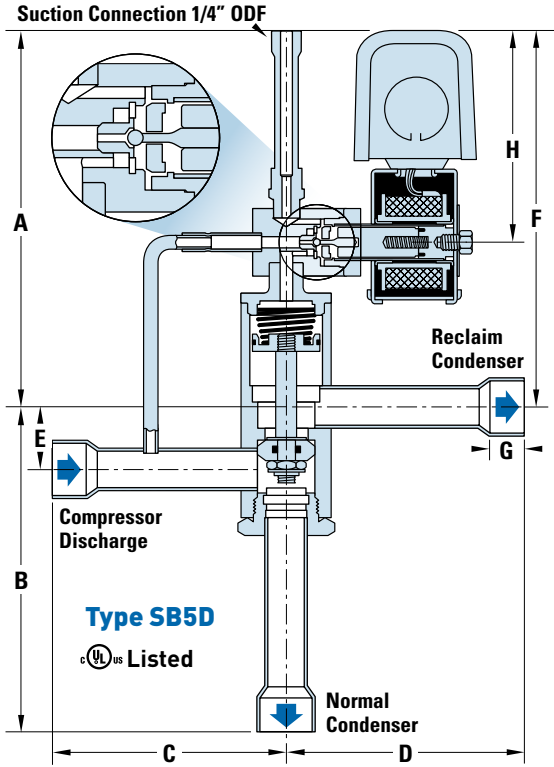
kW - bar - °C

TYPE	EVAPORATOR TEMP. °F	PRESSURE DROP - psi		TYPE	EVAPORATOR TEMP. °C	PRESSURE DROP - bar	
		2	4			0.15	0.3
SB5D	40	5.6	7.8	SB5D	4	20.5	28.4
	30	5.5	7.7		0	20.2	28.0
	20	5.4	7.5		-5	19.9	27.6
					-10	19.5	27.1
S8D	40	12.0	16.9	S8D	4	44.0	61.5
	30	11.8	16.6		0	43.3	60.7
	20	11.6	16.3		-5	42.6	59.6
					-10	41.8	58.5
S12D	40	35.0	50.3	S12D	4	124	180
	30	34.0	48.0		0	120	170
	20	33.5	47.0		-5	117	167

Capacities are based on 100°F (38°C) condensing temperature isentropic compression plus 50°F (28°C), evaporator temperature as shown plus 25°F (14°C) superheat suction gas. For capacities at other conditions, use the Sporlan Selection Program or contact Sporlan Division of Parker. All capacity ratings are in accordance with ARI Standard No. 760-80.

3-Way Heat Reclaim Valves

410A



Dimensions

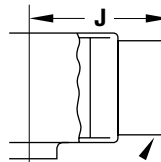
VALVE SERIES	TYPE	A	B	C	D	E	F	G	H	J
--------------	------	---	---	---	---	---	---	---	---	---

Inches

SB5D	SB5D5B	5.11	4.36	3.22	3.22	0.80	5.11	0.50	2.92	1.64
	SB5D5C									
S8D	S8D7B-HP	5.11	5.06	3.44	3.44	1.12	2.62	0.75	2.92	1.64
	S8D7C-HP		5.12					0.91		
	S8D9B-HP									
	S8D9C-HP									
S12D	S12D11B-HP	6.73	6.93	4.19	4.19	2.39	4.24	0.97	2.92	1.64
	S12D11C-HP							1.09		
	S12D13B-HP									
	S12D13C-HP									

mm

SB5D	SB5D5B	127	111	82	82	20	98	13	74	42
	SB5D5C									
S8D	S8D7B-HP	125	129	87	87	28	67	19	74	42
	S8D7C-HP		130					23		
	S8D9B-HP									
	S8D9C-HP									
S12D	S12D11B-HP	171	176	106	106	61	108	25	74	42
	S12D11C-HP							28		
	S12D13B-HP									
	S12D13C-HP									



Optional 1/2" Conduit Boss

Catch-All Filter-Driers

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

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

"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		16	6.25	5.75	
—	C-1625-S	—	5/16	—		5.94	0.44	
C-163	C-163-S	—	3/8	6.75		5.88	0.44	
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	
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	—	—	
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-437-S-T-HH	7/8	48	—	10.34	0.75	
—	—	C-439-S-T-HH	1-1/8		—	10.74	0.94	
—	—	C-4311-S-T-HH	1-3/8		—	10.94	1.00	
—	—	C-4313-S-T-HH	1-5/8		—	10.94	1.06	
—	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
<div style="background-color: #0070C0; color: white; padding: 5px; display: inline-block;">COMPACT STYLE</div>		C-144-S-TT-HH	1/2	14	—	4.14	0.50	
		C-145-S-TT-HH	5/8		—	4.38	0.66	
		C-146-S-TT-HH	3/4		—	4.83	0.66	
		C-147-S-TT-HH	7/8		—	4.97	0.75	
		C-149-S-TT-HH	1-1/8		—	4.93	0.96	

UL and UL_C Listed – Guide SMT-File No. SA-1756A & B. Maximum Rated Pressure of 650 psi, except for the C-140 Series rated at 450 psi and the C-430 Series rated at 500 psi. For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 40-10.

Catch-All Filter-Driers

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

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

"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 C-0525-S	—	1/4 5/16	82	121 —	106 111	10 11	62
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 C-0825-S	—	1/4 5/16	147	143 —	130 135	10 11	67
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 C-1625-S	—	1/4 5/16		262	159 —	146 151	
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	—	
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-437-S-T-HH	7/8	787	—	263	19	121
—	—	C-439-S-T-HH	1-1/8		—	273	24	
—	—	C-4311-S-T-HH	1-3/8		—	278	25	
—	—	C-4313-S-T-HH	1-5/8		—	278	27	
—	C-607-S C-609-S	C-607-S-T-HH C-609-S-T-HH	7/8 1-1/8	983	—	406 406	19 24	76
COMPACT STYLE		C-144-S-TT-HH	1/2	229	—	105	13	113
		C-145-S-TT-HH	5/8		111	16		
		C-146-S-TT-HH	3/4		123	18		
		C-147-S-TT-HH	7/8		126	19		
		C-149-S-TT-HH	1-1/8		125	24		

Catch-All Filter-Driers

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

Sealed Type Liquid Line Ratings and Selection Recommendations

Tons • °F • psi

kW • °C • bar

TYPE	③ SURFACE FILTERING AREA Square Inches	② RATINGS AT ARI STANDARD CONDITIONS		① REFRIGERANT FLOW CAPACITY Tons at 1 psi ΔP	SELECTION RECOMMENDATIONS (Tons)	
		WATER CAPACITY - DROPS - 50 PPM			AIR CONDITIONING	FIELD REPLACEMENT or FIELD BUILT UP SYSTEMS
		75°F	125°F			
SEALED TYPE						
C-032	9	27	20	1.4	1/2	
C-032-CAP						
C-032-S						
C-032-F						
C-032-FM						
C-033				3.4		
C-033-S				3.7		
C-052	15	63	48	2.0	3/4 thru 2	
C-052-S						
C-052-F						
C-052-FM						
C-0525-S						
C-053				3.3		
C-053-S				4.0		
C-082	21	104	78	2.0	1 thru 2	
C-082-S						
C-0825-S						
C-083						
C-083-S						
C-084				4.4		
C-084-S				5.0		
C-162	33	158	119	2.0	1-1/2 thru 5	
C-162-S						
C-1625-S						
C-163						
C-163-S						
C-164				7.9		
C-164-S				8.5		
C-165				2.0		
C-165-S				3.5		
C-303	53	302	227	4.4	4 thru 10	
C-303-S						
C-304						
C-304-S						
C-305						
C-305-S				4.4		
C-307-S				5.0		
C-414	67	407	305	9.8	7-1/2 thru 15	
C-414-S						
C-415						
C-415-S						
C-417-S						
C-419-S				10.7		
C-607-S				14.5		
C-609-S				16.4		
C-609-S				21.0		
C-414	67	407	305	11.1	7-1/2 thru 15	
C-414-S						
C-415						
C-415-S						
C-417-S						
C-419-S				12.1		
C-607-S				15.4		
C-609-S				17.1		
C-609-S				21.5		
C-609-S				23.7		
C-609-S				28.4		
C-609-S				32.4		

① Based on 86°F (30°C) liquid line temperature and a refrigerant flow of 2.8 pounds (362 grams) per minute per ton (kW) for Refrigerant 410A. Ratings in accordance with ARI Standard 710.

② 20 drops = 1 gram = 1 cc.

③ 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

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

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.



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	cm3			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
C-19217-G	2-1/8								26.22	666

UL and UL_C Listed – Guide SMGT-File No. SA-1756A & B. C-480 through C-1920 Series shells have a 650 psig (44.8 bar) rating for R-410A.

*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	③ SURFACE FILTERING AREA Square Inches	② RATINGS AT ARI STANDARD CONDITIONS		SELECTION RECOMMENDATIONS (Tons)	TYPE	③ SURFACE FILTERING AREA cm ²	② RATINGS AT ARI STANDARD CONDITIONS		SELECTION RECOMMENDATIONS (kW)
		WATER CAPACITY - DROPS - 50 PPM	① REFRIGERANT FLOW CAPACITY Tons at 1 psi ΔP				WATER CAPACITY - GRAMS - 50 PPM	① REFRIGERANT FLOW CAPACITY kW at 0.07 bar ΔP	
				75°F					125°F

REPLACEABLE CORE TYPE WITH HIGH WATER CAPACITY CORES (See page 27)					REPLACEABLE CORE TYPE WITH HIGH WATER CAPACITY CORES (See page 27)						
C-R424-G	67	407	305	—	5	C-R424-G	432	20.4	15.3	42.6	17.6
C-R425-G				—	10	C-R425-G				60.1	35.2
C-R427-G				—	10	C-R427-G				75.6	35.2
C-485-G	64	481	361	14.3	10	C-485-G	413	24.1	18.1	50.3	52.8
C-487-G				23.3	15	C-487-G				81.9	70.3
C-489-G				42.2	20	C-489-G				148	87.9
C-967-G	128	962	722	38.3	25	C-967-G	826	48.1	36.1	135	123
C-969-G				47.5	35	C-969-G				167	141
C-1449-G				57.9	40	C-1449-G				204	176
C-14411-G	192	1443	1083	65.4	50	C-14411-G	1239	72.2	54.2	230	246
C-19211-G				82.4	70	C-19211-G				290	281
C-19213-G				96.6	80	C-19213-G				340	299
C-19217-G	256	1924	1444	101	85	C-19217-G	1652	96.2	72.2	355	

① Based on 86°F (30°C) liquid line temperature and a refrigerant flow of 2.8 pounds (362 grams) per minute per ton (kW) for Refrigerant 410A. Ratings in accordance to ARI Standard 710.

② 20 drops = 1 gram = 1 cc.

③ 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.

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 40-10.

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

Suction Line Filter-Drier Ratings

for New Systems and Clean-up after Burnout

Selection Instructions

Except for the values in bold (R-410A at 40°F/5°C; 8 psi/0.55 bar pressure drop), 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 28) 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		40°F		EVAPORATOR TEMPERATURE		5°C	
PRESSURE DROP (psi)		3.0	8.0*	PRESSURE DROP (bar)		0.21	0.55*
SEALED TYPE	C-083-S-T-HH	2.7	—	SEALED TYPE	C-083-S-T-HH	9.5	—
	C-084-S-T-HH	2.7	—		C-084-S-T-HH	9.5	—
	C-144-S-T-HH	2.7	—		C-144-S-T-HH	9.5	—
	C-145-S-T-HH	4.6	—		C-145-S-T-HH	16.2	—
	C-146-S-T-HH	6.2	—		C-146-S-T-HH	21.8	—
	C-147-S-T-HH	6.8	—		C-147-S-T-HH	23.9	—
	C-149-S-T-HH	9.0	—		C-149-S-T-HH	31.7	—
	C-164-S-T-HH	3.6	—		C-164-S-T-HH	12.7	—
	C-165-S-T-HH	4.2	—		C-165-S-T-HH	14.8	—
	C-166-S-T-HH	5.2	—		C-166-S-T-HH	18.3	—
	C-167-S-T-HH	5.9	—		C-167-S-T-HH	20.7	—
	C-305-S-T-HH	4.4	—		C-305-S-T-HH	15.5	—
	C-306-S-T-HH	5.8	—		C-306-S-T-HH	20.4	—
	C-307-S-T-HH	7.0	—		C-307-S-T-HH	24.6	—
	C-309-S-T-HH	7.7	—		C-309-S-T-HH	27.1	—
	C-417-S-T-HH	7.9	—		C-417-S-T-HH	27.8	—
	C-419-S-T-HH	8.0	—		C-419-S-T-HH	28.1	—
	C-437-S-T-HH	10.4	—		C-437-S-T-HH	36.6	—
	C-439-S-T-HH	13.1	—		C-439-S-T-HH	46.1	—
C-4311-S-T-HH	14.4	—	C-4311-S-T-HH	50.6	—		
C-4313-S-T-HH	15.9	—	C-4313-S-T-HH	55.9	—		
C-607-S-T-HH	8.7	—	C-607-S-T-HH	30.6	—		
C-609-S-T-HH	9.8	—	C-609-S-T-HH	34.5	—		
REPLACEABLE CORE TYPE	RSF-487-T	12.6	21.9	REPLACEABLE CORE TYPE	RSF-487-T	44.3	77
	RSF-489-T	15.3	26.4		RSF-489-T	53.8	92.8
	RSF-4811-T	18.5	32.0		RSF-4811-T	65.1	113
	RSF-4813-T	19.9	34.4		RSF-4813-T	70	121
	RSF-4817-T	21.5	37.3		RSF-4817-T	75.6	131
	RSF-4821-T	23.3	40.3		RSF-4821-T	81.9	142
	RSF-9611-T	29.8	48.8		RSF-9611-T	105	172
	RSF-9613-T	37.1	61.3		RSF-9613-T	130	216
	RSF-9617-T	37.1	61.3		RSF-9617-T	130	216
	RSF-9621-T	37.1	61.3		RSF-9621-T	130	216
	RSF-9625-T	37.5	63.4		RSF-9625-T	132	223

*Denotes TEMPORARY INSTALLATION. Cores for system clean-up: RPE-48-BD Filter Elements should be installed after clean-up. Rated in accordance with ARI Standard 730. For a simplified “Quick Selection Guide,” request Form 40-109.

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.

Catch-All Filter-Driers

410A

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 26 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 core 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		

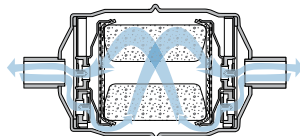
For dimensions, refer to the specifications for standard filter-driers or consult Bulletin 40-10.

Catch-All Reversible Heat Pump Filter-Driers

410A

Design Benefits

- A short overall length for easy installation.
- Drier operates in either flow direction with low pressure drop.
- Proven metal check valves used in construction – no synthetic materials.
- The Sporlan dependable molded core used for maximum filtration ability. When the flow direction



- reverses, dirt already collected remains in the filter-drier.
- A carefully engineered blend of desiccants for maximum water capacity and acid removal ability. The HPC-160 and HPC-300 series also have an HH style core with activated charcoal which offers maximum ability to remove oleoresin and other reactive chemical constituents in the lubricant.
- Same rugged construction as used in the Catch-All®.

Catch-All Reversible Heat Pump Filter-Driers

410A

Specifications - Tons • psi • °F

	TYPE NUMBER	CONNECTION SIZE Inches	SELECTION RECOMMEND. Tons	DIMENSIONS		SURFACE FILTERING AREA Sq. Inch	SPECIFICATIONS				
				OVERALL LENGTH Inches	DIAMETER Inches		FLOW CAPACITY Tons at 1 psi ΔP	WATER CAPACITY DROPS @ 50 PPM		LIQUID CAPACITY Ounces (wt.) @ 100°F	
								75°F	125°F		
FOR NEW INSTALLS	HPC-082	1/4 SAE Flare	1 thru 3	5.78	3.0	15	2.1	85	63	8.0	
	HPC-082-S	1/4 ODF Solder		5.32							
	HPC-083	3/8 SAE Flare		6.22							
	HPC-083-S	3/8 ODF Solder		5.46							
	HPC-084	1/2 SAE Flare	1 thru 5	6.48		18	18	4.0	94	70	10.6
	HPC-084-S	1/2 ODF Solder		5.58							
	HPC-103	3/8 SAE Flare		6.75							
	HPC-103-S	3/8 ODF Solder		5.88							
	HPC-104	1/2 SAE Flare	1 thru 8	6.94		26	26	4.9	158	119	12.6
	HPC-104-S	1/2 ODF Solder		6.00							
	HPC-105	5/8 SAE Flare		7.25							
	HPC-105-S	5/8 ODF Solder		6.31							
	HPC-163	3/8 SAE Flare	8 thru 20	7.78		53	53	10.6	302	227	17.2
	HPC-163-S	3/8 ODF Solder		6.92							
	HPC-164	1/2 SAE Flare		7.95							
	HPC-164-S	1/2 ODF Solder		7.07							
	HPC-165	5/8 SAE Flare	8 thru 20	8.28		53	53	8.5	302	227	17.2
	HPC-165-S	5/8 ODF Solder		7.35							
	HPC-304	1/2 SAE Flare		11.08							
	HPC-304-S	1/2 ODF Solder		10.18							
HPC-305	5/8 SAE Flare	8 thru 20	11.38	53	53	9.1	302	227	17.2		
HPC-305-S	5/8 ODF Solder		10.42								
HPC-306-S	3/4 ODF Solder		10.86								
HPC-307-S	7/8 ODF Solder		11.02								
FOR CLEAN-UP AFTER BURNOUT	HPC-163-HH	3/8 SAE Flare	1 thru 8	7.78	3.0	26	4.7	69	100	12.6	
	HPC-163-S-HH	3/8 ODF Solder		6.92							
	HPC-164-HH	1/2 SAE Flare		7.95							
	HPC-164-S-HH	1/2 ODF Solder		7.07							
	HPC-165-HH	5/8 SAE Flare	8 thru 20	8.28		53	53	10.1	123	109	17.2
	HPC-165-S-HH	5/8 ODF Solder		7.35							
	HPC-304-HH	1/2 SAE Flare		11.08							
	HPC-304-S-HH	1/2 ODF Solder		10.18							
	HPC-305-HH	5/8 SAE Flare	8 thru 20	11.38		53	53	8.6	123	109	17.2
	HPC-305-S-HH	5/8 ODF Solder		10.42							
	HPC-305-S-HH	5/8 ODF Solder		10.42							
	HPC-307-S-HH	7/8 ODF Solder		11.02							

kW • bar • °C

	TYPE NUMBER	CONNECTION SIZE Inches	SELECTION RECOMMEND. kW	DIMENSIONS		SURFACE FILTERING AREA cm ²	SPECIFICATIONS				
				OVERALL LENGTH mm	DIAMETER mm		FLOW CAPACITY kW at 0.07 bar ΔP	WATER CAPACITY GRAMS @ 50 PPM		LIQUID CAPACITY Grams (wt.) @ 38°C	
								24°C	52°C		
FOR NEW INSTALLS	HPC-082	1/4 SAE Flare	1 thru 3	147	76	97	7.4	4.3	3.2	0.23	
	HPC-082-S	1/4 ODF Solder		135							
	HPC-083	3/8 SAE Flare		158							
	HPC-083-S	3/8 ODF Solder		139							
	HPC-084	1/2 SAE Flare	1 thru 5	165		116	116	14.0	4.7	3.5	0.30
	HPC-084-S	1/2 ODF Solder		142							
	HPC-103	3/8 SAE Flare		171							
	HPC-103-S	3/8 ODF Solder		149							
	HPC-104	1/2 SAE Flare	1 thru 8	176		168	168	17.2	3.5	5.0	0.36
	HPC-104-S	1/2 ODF Solder		152							
	HPC-105	5/8 SAE Flare		184							
	HPC-105-S	5/8 ODF Solder		160							
	HPC-163	3/8 SAE Flare	8 thru 20	198		342	342	17.2	6.2	5.5	0.49
	HPC-163-S	3/8 ODF Solder		176							
	HPC-164	1/2 SAE Flare		202							
	HPC-164-S	1/2 ODF Solder		180							
	HPC-165	5/8 SAE Flare	8 thru 20	210		342	342	35.1	6.2	5.5	0.49
	HPC-165-S	5/8 ODF Solder		187							
	HPC-304	1/2 SAE Flare		281							
	HPC-304-S	1/2 ODF Solder		259							
HPC-305	5/8 SAE Flare	8 thru 20	289	342	342	37.2	6.2	5.5	0.49		
HPC-305-S	5/8 ODF Solder		265								
HPC-306-S	3/4 ODF Solder		276								
HPC-307-S	7/8 ODF Solder		280								

	TYPE NUMBER	CONNECTION SIZE Inches	SELECTION RECOMMEND. kW	DIMENSIONS		SURFACE FILTERING AREA cm ²	SPECIFICATIONS			
				OVERALL LENGTH mm	DIAMETER mm		FLOW CAPACITY kW at 0.07 bar ΔP	WATER CAPACITY GRAMS @ 50 PPM		LIQUID CAPACITY Grams (wt.) @ 38°C
								24°C	52°C	
FOR CLEAN-UP AFTER BURNOUT	HPC-163-HH	3/8 SAE Flare	1 thru 8	198	76	168	3.5	5.0	0.36	
	HPC-163-S-HH	3/8 ODF Solder		176						
	HPC-164-HH	1/2 SAE Flare		202						
	HPC-164-S-HH	1/2 ODF Solder		180						
	HPC-165-HH	5/8 SAE Flare		210						
	HPC-165-S-HH	5/8 ODF Solder		187						
	HPC-304-HH	1/2 SAE Flare	8 thru 20	281	76	342	6.2	5.5	0.49	
	HPC-304-S-HH	1/2 ODF Solder		259						
	HPC-305-HH	5/8 SAE Flare		289						
	HPC-305-S-HH	5/8 ODF Solder		265						
HPC-307-S-HH	7/8 ODF Solder	280								

HPC-100 Series – Core volume is 10 cubic inches (164 cm³). Core surface filtering area is 18 sq. inches (116 cm²). Maximum rated pressure is 650 psig (44.8 bar).
 HPC-160-HH Series – Core volume is 14 cubic inches (229 cm³). Core surface filtering area is 26 sq. inches (168 cm²). Maximum rated pressure is 650 psig (44.8 bar).
 HPC-300-HH Series – Core volume is 30 cubic inches (492 cm³). Core filtering area is 53 sq. inches (342 cm²). Maximum rated pressure is 650 psig (44.8 bar).
 UL and UL_C Listed – Guide-SMGT-File No. SA-1756A & B.
 For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 40-10.

Steel Suction Line Accumulators

410A

U-Tube Style Accumulators

The U-tube accumulator design is a result of extensive laboratory testing plus detailed investigation of the various accumulators currently available. It takes into account essential requirements such as safe holding volume (relative to the system's total charge), protected flow control for positive refrigerant and oil return, and minimum pressure drop across the accumulator.

Sporlan offers standard accumulator models designed for application on heat pump and refrigeration systems from 1/4 through 12 tons (0.88 through 42.2 kW). Liquid refrigerant holding requirements of suction accumulator may vary by application. Because of the diversity in systems, optimum performance should be determined by the system designer. Consult Sporlan for assistance if required.

Features and Benefits

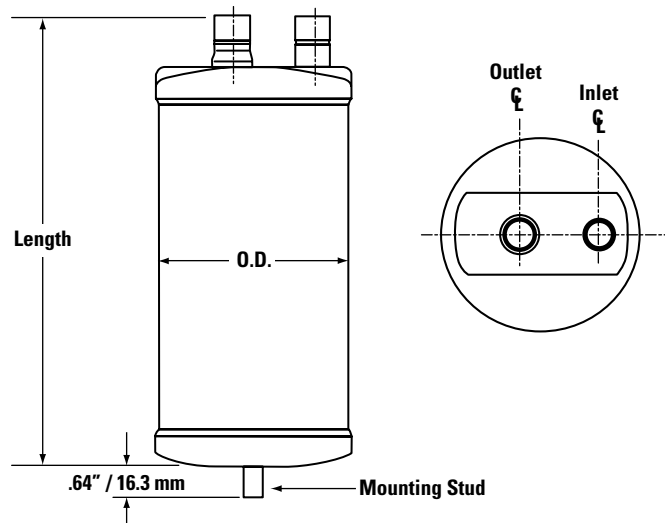
- Solid copper connections
- U-tube design for maximum flow of refrigerant and minimum oil entrapment
- Inlet flow deflector guides refrigerant toward wall for smooth tangential flow and gradual expansion
- U-tube entrance is positioned behind the inlet flow deflector to prevent unwanted liquid refrigerant from entering and damaging compressor
- Metering orifice matched to system capacity assures optimum liquid refrigerant and oil flow back to compressor
- Protective screen and orifice assembly on U-tube protects against contaminants affecting metering function
- Fittings and U-tube are matched to accumulator holding capacity and total system charge for minimum pressure drop and maximum refrigerant flow
- U.L. listed for 355 psig (24.5 bar) maximum working pressure. File No. SA5172
- Powder coating surpasses 500 hour ASTM salt spray
- Integral 430°F (221°C) fuse plugs (U.L. File No. SA5441)



Model PA6

Dimensions and Flow Data

See page 30 for dimension values and flow data.



Steel Suction Line Accumulators

410A

Dimensions and Flow Data

Tons • psi • °F

kW • bar • °C

MODEL NUMBER	CONN. Inches (ODF)	DIMENSIONS Inches		CAPACITY Ounces* (wt.)	EVAP. TEMP. °F	RECOMMENDED CAPACITY OF REFRIGERATION		MODEL NUMBER	CONN. Inches (ODF)	DIMENSIONS mm		CAPACITY Grams* (wt.)	EVAP. TEMP. °C	RECOMMENDED CAPACITY OF REFRIGERATION	
		LENGTH	O.D.			Tons @ 1 psi	Min. Tons			LENGTH	O.D.			kW @ 0.07 bar	Min. kW
PA3060-10-4 PA3060-10-5	1/2 5/8	10.35 10.35	3 3	32 32	40	1.93	1.44	PA3060-10-4 PA3060-10-5	1/2 5/8	263 263	76.2 76.2	907 907	4 -18 -29	6.79	5.06
					0	1.50	0.65							5.28	2.29
					-20	1.30	0.42							4.57	1.48
PA3060-15-5	5/8	15.05	3	50	40	2.02	1.44	PA3060-15-5	5/8	382	76.2	1417	4 -18 -29	7.10	5.06
					0	1.57	0.65							5.52	2.29
					-20	1.36	0.42							4.78	1.48
PA3060-15-6	3/4	15.05	3	49	40	2.22	1.44	PA3060-15-6	3/4	382	76.2	1389	4 -18 -29	7.81	5.06
					0	1.72	0.65							6.05	2.29
					-20	1.49	0.42							5.24	1.48
PA4065-9-5C	5/8	9.62	4	55	40	2.85	1.44	PA4065-9-5C	5/8	244	102	1559	4 -18 -29	10.0	5.06
					0	2.21	0.65							7.77	2.29
					-20	1.93	0.42							6.79	1.48
PA4065-9-6C	3/4	9.62	4	53	40	2.89	1.44	PA4065-9-6C	3/4	244	102	1503	4 -18 -29	10.2	5.06
					0	2.23	0.65							7.84	2.29
					-20	1.95	0.42							6.86	1.48
PA5083-9-6C	3/4	9.62	5	81	40	3.68	2.16	PA5083-9-6C	3/4	244	127	2296	4 -18 -29	12.9	7.60
					0	2.86	0.98							10.1	3.45
					-20	2.48	0.63							8.72	2.22
PA5083-9-7C	7/8	9.63	5	78	40	3.76	2.16	PA5083-9-7C	7/8	245	127	2211	4 -18 -29	13.2	7.60
					0	2.91	0.98							10.2	3.45
					-20	2.53	0.63							8.9	2.22
PA5083-12-7C	7/8	12.88	5	114	40	5.21	3.03	PA5083-12-7C	7/8	327	127	3232	4 -18 -29	18.3	10.7
					0	4.05	1.37							14.2	4.82
					-20	3.52	0.88							12.4	3.09
PA5083-11-7C	7/8	11.33	5	98	40	4.22	2.16	PA5083-11-7C	7/8	287	127	2778	4 -18 -29	14.8	7.60
					0	3.27	0.98							11.5	3.45
					-20	2.84	0.63							9.99	2.22
PA5083-11-6C	3/4	11.33	5	101	40	3.71	2.16	PA5083-11-6C	3/4	287	127	2863	4 -18 -29	13.0	7.60
					0	2.88	0.98							10.1	3.45
					-20	2.49	0.63							8.76	2.22
PA5083-15-7C	7/8	15.34	5	142	40	5.97	3.03	PA5083-15-7C	7/8	390	127	4026	4 -18 -29	21.0	10.7
					0	4.64	1.37							16.3	4.82
					-20	4.02	0.88							14.1	3.09
PA5083-17-7C	7/8	17.25	5	163	40	5.97	3.03	PA5083-17-7C	7/8	438	127	4621	4 -18 -29	21.0	10.7
					0	4.64	1.37							16.3	4.82
					-20	4.02	0.88							14.1	3.09
PA6125-15-9C	1-1/8	15.00	6	192	40	8.67	4.93	PA6125-15-9C	1-1/8	381	152	5443	4 -18 -29	30.5	17.3
					0	5.44	2.23							19.1	7.84
					-20	4.19	1.43							14.7	5.03
PA6125-15-11C	1-3/8	15.25	6	195	40	11.56	4.93	PA6125-15-11C	1-3/8	387	152	5528	4 -18 -29	40.7	17.3
					0	7.28	2.23							25.6	7.84
					-20	5.65	1.43							19.9	5.03
PA6125-18-9C	1-1/8	18.00	6	240	40	8.48	4.93	PA6125-18-9C	1-1/8	457	152	6804	4 -18 -29	29.8	17.3
					0	5.34	2.23							18.8	7.84
					-20	4.19	1.43							14.7	5.03
PA6125-18-11C	1-3/8	18.00	6	243	40	10.59	4.93	PA6125-18-11C	1-3/8	457	152	6889	4 -18 -29	37.2	17.3
					0	6.80	2.23							23.9	7.84
					-20	5.26	1.43							18.5	5.03
PA6125-20-11C	1-3/8	20.25	6	275	40	10.59	4.93	PA6125-20-11C	1-3/8	514	152	7796	4 -18 -29	37.2	17.3
					0	6.80	2.23							23.9	7.84
					-20	5.26	1.43							18.5	5.03

*Holding capacity of R-410A at 40°F (5°C). Divide by 0.7 to obtain recommended maximum system charge on fixed orifice systems. Consult Sporlan for availability.

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 40-10-7.

See-All Moisture and Liquid Indicator

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

8 Outstanding Benefits

- One indicator for refrigerants 12, 22, 134a, 404A, 407C, 410A, 502 and 507.** The See-All Moisture and Liquid Indicator provides a true moisture indication for Refrigerants 12, 22, 134a, 404A, 407C, 410A, 502 and 507. The See-All® is also suitable for Refrigerants 401A & B, 402 A & B, 408A and 409A. 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Disassembly of the smaller sizes not required.** The extended fittings on solder models in the smaller sizes make it unnecessary to disassemble for installation.
- 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	4.62
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	
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	
1-5/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-213	7.97
2-1/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-217	

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	117
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	
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	
1-5/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-213	202
2-1/8	—	—	—	—	—	—	—	—	—	—	—	—	① SA-217	

Moisture Content PPM

SEE-ALL SHOWS	R-410A LIQUID LINE TEMPERATURE	
	75°F	24°C
Green DRY	Below 75	
Chartreuse CAUTION	75-150	
Yellow WET	Above 150	

Note: Change or add Catch-All Filter-Drier when paper turns from green to chartreuse.

Maximum Rated Pressure for all models is 650 psig (44.8 bar). 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.

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 70-10.

Replaceable *Suction Filters*

410A

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

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.

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 3-1/8" line size
- Access valve supplied for pressure drop measurement or charging

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 27.

Flow Capacity - Tons • psi • °F

TYPE	CONNECTIONS Inches ODF SOLDER	FLOW CAPACITY			NUMBER OF FILTER ELEMENTS	FILTER AREA Square inches	OVERALL LENGTH Inches
		EVAPORATOR TEMPERATURE					
		40°F					
		PRESSURE DROP – psi					
		1	2	3			
RSF-487-T	7/8	8.0	11.3	13.8	One RPE-48-BD	388	9.30
RSF-489-T	1-1/8	12.7	18.0	22			9.37
RSF-4811-T	1-3/8	18.5	26.1	32			9.60
RSF-4813-T	1-5/8	23.7	33.5	41			9.60
RSF-4817-T	2-1/8	31.8	44.9	55			9.37
RSF-4821-T	2-5/8	41.6	58.8	72			9.75
RSF-9611-T	1-3/8	20.8	29.4	36	Two RPE-48-BD	776	15.14
RSF-9613-T	1-5/8	27.1	38.4	47			15.14
RSF-9617-T	2-1/8	34.1	48.2	59			14.96
RSF-9621-T	2-5/8	46.8	66.1	81			15.43
RSF-9625-T	3-1/8	64.1	90.6	111			15.12

kW • bar • °C

TYPE	CONNECTIONS Inches ODF SOLDER	FLOW CAPACITY			NUMBER OF FILTER ELEMENTS	FILTER AREA cm ²	OVERALL LENGTH mm
		EVAPORATOR TEMPERATURE					
		5°C					
		PRESSURE DROP – bar					
		0.07	0.14	0.21			
RSF-487-T	7/8	28.1	39.7	48.5	One RPE-48-BD	2503	236
RSF-489-T	1-1/8	44.7	63.3	77.4			238
RSF-4811-T	1-3/8	65.1	91.8	113			244
RSF-4813-T	1-5/8	83.3	118	144			244
RSF-4817-T	2-1/8	112	158	193			238
RSF-4821-T	2-5/8	146	207	253			248
RSF-9611-T	1-3/8	73.2	103	127	Two RPE-48-BD	5006	385
RSF-9613-T	1-5/8	95.3	135	165			385
RSF-9617-T	2-1/8	120	170	207			380
RSF-9621-T	2-5/8	165	232	285			392
RSF-9625-T	3-1/8	225	319	390			384

Listed by Underwriters' Laboratories, Inc. Guide SMGT File No. SA-1756A & B. RSF shells have a 500 psig (34.5 bar) 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. For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 80-10.

Acid Test Kits - Type TA-1 and AK-3

Designed to Test Mineral, Alkylbenzene and POE Lubricants

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



TA-1

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** – Both the TA-1 and AK-3 are convenient to use.

The TA-1 has pre-measured solutions supplied in bottles with screw caps for easy handling. The AK-3 has all solutions and bottles supplied in a small fitted case. Either 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 is very inexpensive, regardless of which kit is used. The TA-1 Kit is more convenient, but for repeated testing the AK-3 is less costly.

Both the TA-1 and AK-3 Kits are normally used on a "pass or fail" basis. If the user desires an indication of the relative amount of acid in the lubricant, then the AK-3 Kit should be selected.

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 40-10.

Head Pressure Control Valves

410A

High and Low Ambient Stability

The design of air conditioning systems utilizing air cooled condensing units involves two main problems that must be solved if the system is to operate reliably and economically . . . **high ambient** and **low ambient** operation. If the condensing unit is properly sized, it will operate satisfactorily during extremely high ambient temperatures. However, some units will be required to operate at ambient temperatures below their design dry bulb temperature during most of the year, the solution to low ambient operation is more complex.

Without good head pressure control during low ambient operation, the system can experience both running cycle and off-cycle problems. Since the pressure differential across the thermostatic expansion valve port affects the rate of refrigerant flow, low head pressure generally causes insufficient refrigerant to be fed to the evaporator. Failure to have sufficient head pressure will result in low suction pressure and/or iced evaporator coils.

The primary off-cycle problem is refrigerant migration to the condenser. Insufficient flow through the TEV will cause a low suction pressure.

The typical method of maintaining normal head pressure in a refrigeration system during periods of low ambient temperature is to restrict liquid flow from the condenser to the receiver, and at the same time divert hot gas to the inlet of the receiver. This backs liquid refrigerant up into the condenser reducing its capacity which in turn increases the condensing pressure. At the same time the hot gas raises liquid pressure in the receiver, allowing the system to operate normally.

Operation

LAC-4

The valve designation LAC stands for **Low Ambient Control**. The LAC-4 is a three way modulating valve that responds to discharge pressure. As shown in Figure 4, the discharge pressure bleeds around the pushrod to the underside of the diaphragm. The discharge pressure opposes the dome pressure. When the outdoor ambient falls, the condensing pressure falls. This causes the discharge pressure to

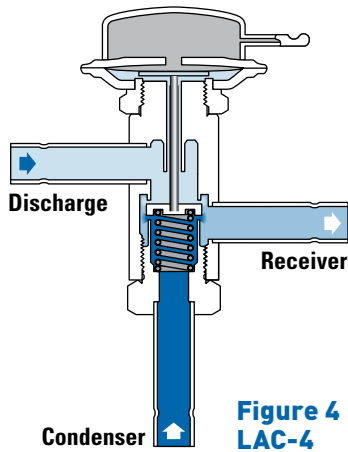


Figure 4
LAC-4

fall as well. When the discharge pressure falls below the dome pressure, the valve modulates open to the discharge port which allows discharge gas to bypass the condenser. Mixing the discharge gas with the liquid creates a high pressure at the condenser outlet, reducing the flow and causing liquid to back up in the condenser. Flooding the condenser reduces the area available for condensing. This reduction in effective condenser surface area results in a rise in condensing

pressure. During summer conditions, the discharge pressure is high thus closing the discharge port. Hence, there is full liquid flow from the condenser to the receiver.

LAC-5 and LAC-10

The LAC-5 and LAC-10 are also three-way modulating valves but they respond to receiver pressure. As shown in Figure 5, the receiver pressure acts under the diaphragm. As the receiver pressure drops below the valve setting, the seat moves away from the discharge port allowing discharge gas to bypass the condenser. This discharge gas warms the liquid in the receiver and raises the pressure to the valve setting. At the same time discharge gas is bypassing the condenser, liquid flow from the condenser is restricted, which allows liquid to back up in the condenser. Flooding the condenser reduces the area available for condensing thus raising the condensing pressure. During summer conditions, the seat closes the discharge port due to high pressure in the receiver. Therefore, there is full liquid flow from the condenser to the receiver.

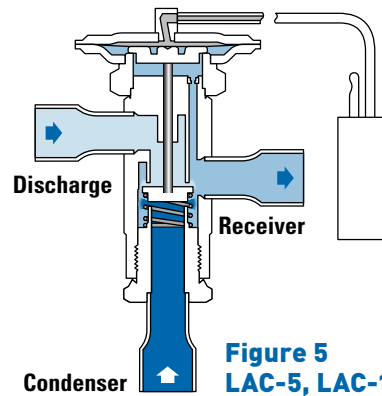


Figure 5
LAC-5, LAC-10

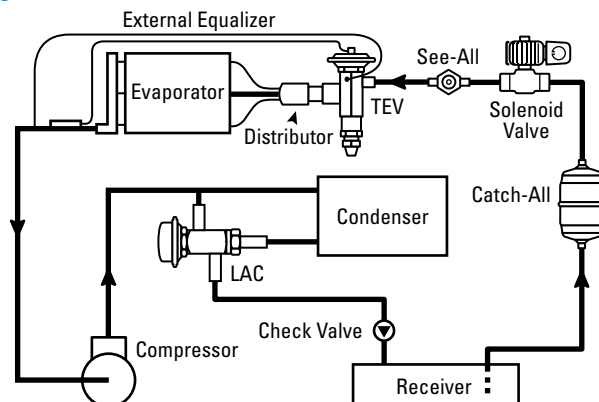
Refrigerant Migration

During an off cycle there is a potential for refrigerant to migrate from the warm receiver to the cold condenser. An auxiliary check valve should be used in the liquid line between the LAC and the receiver to prevent this from occurring. See Figure 6.

Piping Suggestions

The piping schematic shown in Figure 6 is only to illustrate the general location of the head pressure control valves in the system. Sporlan recommends that recognized piping references be consulted for assistance in piping procedures. Sporlan is not responsible for system design, any damage arising from faulty system design, or for misapplication of its products. If these valves are applied in any manner other than as describe in this bulletin, the Sporlan warranty is void.

Figure 6



Head Pressure Control Valves

410A

Special consideration needs to be taken when utilizing valves with remote bulbs. Because of the air charge, these models are affected by ambient temperatures at the remote bulb. (Although the remote bulb is affected by ambient temperature, it is strictly a pressure regulating valve and not a temperature control device.) Therefore, it is necessary to locate the remote bulb in as nearly constant ambient as possible to maintain a constant pressure setting. For example, the remote bulb located in the return air can be used. Since these models are set in 80°F (26.7°C) ambient, any appreciable variation from this temperature will cause the pressure setting to vary. The actual pressure setting change is 1 psi (0.069 bar) for every 7°F (3.9°C) increase or decrease in the ambient temperature.

When selecting these valves it is necessary to consider the valve's capacity when it is controlling at the minimum ambient design temperature. The minimum ambient design temperature is a factor because the bypassed discharge gas must heat the subcooled liquid leaving the condenser to maintain the receiver pressure. This subcooled liquid will approach the ambient temperature. It is the flow of the discharge gas and liquid mixture flowing through the valve at the minimum design ambient conditions that will determine the valve's capacity. Once the valve's capacity and pressure drop have been determined at minimum design ambient conditions, the capacity of the valve during high ambient conditions should be checked to determine the pressure drop of the valve with full liquid flow.

Selection Procedures

The actual selection of Sporlan Head Pressure Control Valves involves four basic items:

1. System capacity in tons
2. Refrigerant
3. Minimum ambient design temperature
4. Allowable pressure drop across the valve

Example: Select a LAC valve for a 10 ton (35 kW), R-410A unit with a minimum design ambient temperature of -20°F (-28°C). The LAC-10 has a capacity of 12.8 tons (47.3 kW) at a 5 psi (0.35 bar) drop across the valve according to the Low Ambient Capacity table below. The LAC-10 also has a capacity of 11.4 tons (49.6 kW) at a 2 psi (0.21 bar) drop across the valve according to the High Ambient Capacity table below. The LAC-10 is the correct selection.

Capacities

Low Ambient (Winter)

Tons - psi - °F

VALVE TYPE	MINIMUM AMBIENT DESIGN TEMP. °F	PRESSURE DROP ACROSS VALVE – psi			
		1	2	5	10
LAC-4	-20	1.74	2.46	3.85	5.40
	0	1.88	2.65	4.16	5.82
	+20	2.06	2.90	4.54	6.35
LAC-5	-20	3.09	4.37	6.90	9.74
	0	3.33	4.71	7.44	10.5
	+20	3.63	5.14	8.11	11.4
LAC-10	-20	5.83	8.18	12.8	17.8
	0	6.27	8.79	13.7	19.0
	+20	6.82	9.56	14.9	20.7

kW - bar - °C

TYPE	MINIMUM AMBIENT DESIGN TEMP. °C	PRESSURE DROP ACROSS VALVE – bar			
		0.07	0.14	0.35	0.70
LAC-4	-28	6.44	9.07	14.2	19.9
	-18	6.91	9.73	15.2	21.4
	-8	7.50	10.5	16.5	23.1
LAC-5	-28	11.4	16.1	25.5	35.9
	-18	12.2	17.3	27.3	38.5
	-8	13.2	18.7	29.5	41.6
LAC-10	-28	21.5	30.2	47.0	65.4
	-18	23.0	32.2	50.2	69.8
	-8	24.8	34.8	54.1	75.1

Based on a R-410A valve setting of 295 psig (20.3 bar).

Capacities based on 0°F (-18°C) evaporator, 94°F (35°C) condenser, 10°F (6°C) subcooled liquid.

High Ambient (Summer)

Tons - psi - °F

VALVE TYPE	PRESSURE DROP ACROSS VALVE – psi				
	1	2	3	4	5
LAC-4	2.44	3.42	4.15	4.77	5.32
LAC-5	5.22	7.38	9.04	10.4	11.7
LAC-10	8.23	11.4	13.9	15.9	17.6

kW - bar - °C

VALVE TYPE	PRESSURE DROP ACROSS VALVE – bar				
	0.07	0.14	0.21	0.28	0.35
LAC-4	8.75	12.2	14.9	17.1	19.0
LAC-5	18.7	26.4	32.4	37.4	41.8
LAC-10	29.5	40.9	49.6	56.8	63.2

Capacities based on 0°F (-18°C) evaporator, 110°F (43°C) condenser, 10°F (6°C) subcooled liquid.

Head Pressure Control Valves

410A

Dimensions

lbs. • psi • inches

kg • bar • mm

VALVE SERIES	STANDARD FACTORY SETTING (psig)	CONNECTIONS ODF SOLDER (Inches)		DIMENSIONS (Inches)					WEIGHT (lbs.)		VALVE SERIES	STANDARD FACTORY SETTING (bar)	CONNECTIONS ODF SOLDER (Inches)		DIMENSIONS (mm)					WEIGHT (kg)	
		Inlet(s)	Outlet	A	B	C	D	E	Net	Ship			Inlet(s)	Outlet	A	B	C	D	E	Net	Ship
LAC-4	295	1/2	1/2	1.78	1.87	3.02	2.38	4.73	0.82	0.90	LAC-4	20.3	1/2	1/2	45	48	77	60	120	0.37	0.41
LAC-5		1/2	1/2	1.65	1.60	3.77	2.99	5.59	2.50	2.65	LAC-5		1/2	1/2	42	41	96	76	142	1.13	1.20
		5/8	5/8	1.74	1.69	3.86	3.08	5.68	2.55	2.70			5/8	5/8	44	43	98	78	144	1.16	1.22
LAC-10		① 1-3/8	7/8	2.82	2.67	4.39	3.43	6.49	3.20	3.42	LAC-10		72	① 1-3/8	7/8	68	112	87	165	1.45	1.55
		② 7/8			65	123	98	176	1.49	1.59											
		① 1-3/8	1-1/8		2.56	4.83	3.87	6.93	3.28	3.50				① 1-3/8	1-1/8	65	123	98	176	1.49	1.59
② 1-1/8								② 1-1/8													

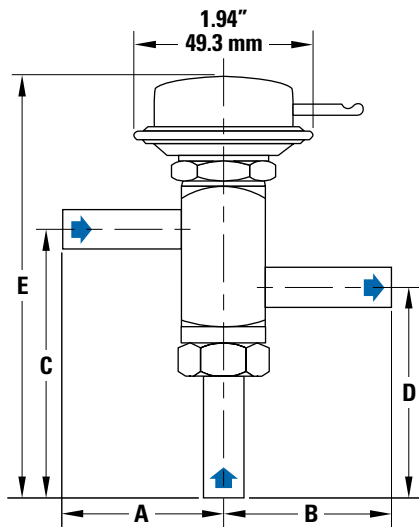
All LAC valves are U.L. Recognized and have a maximum rated pressure of 680 psig (46.9 bar). All valves are in U.L. file SA-5460-SFJQ2.

- ① Discharge connection.
- ② Condenser connection.

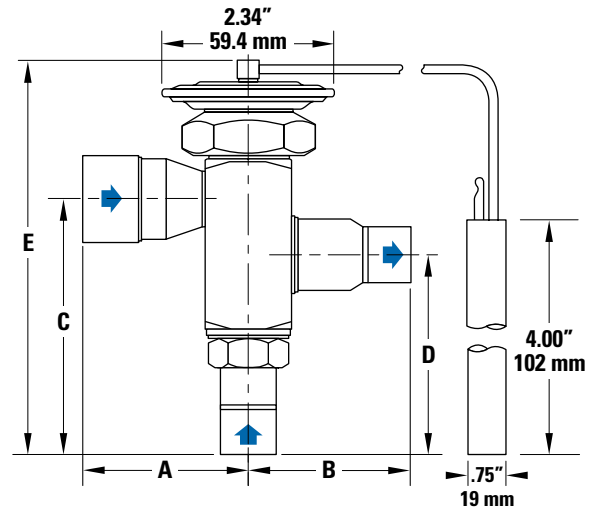
Materials and Construction Details

VALVE TYPE	ADJUSTABLE	PORT SIZE		ELEMENT TYPE	CONNECTIONS		BODY MATERIAL	SEATING MATERIAL	TYPE OF JOINTS
		Inches	mm		TYPE	MATERIAL			
LAC-4	No	1/2	12.7	Domed	Solder	Copper	Brass	Metal to Metal	Knife Edge (Metal to Metal)
LAC-5		5/8	15.9	Remote Bulb					
LAC-10		3/4	19.0						

LAC-4



LAC-5, LAC-10



Nomenclature

LAC	-	5	-	295 HP	-	5/8	x	5/8	x	5/8	x	ODF
Valve Type Low Ambient Control		Valve Size		Valve Setting(s) (psig)		Discharge Connection (Inches)		Condenser Connection (Inches)		Receiver Connection (Inches)		Solder Connections

Discharge Bypass Valves

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System Capacity Control

On many air conditioning and refrigeration systems it is desirable to limit the minimum evaporating pressure during periods of low load either to prevent coil icing or to avoid operating the compressor at a lower suction pressure than it was designed to operate.

One method that offers a practical and economical solution to the problem, is to bypass a portion of the hot discharge gas directly into the low side. This is done by a modulating control valve — commonly called a Discharge Bypass Valve (DBV). This valve, which opens on a decrease in suction pressure, can be set to automatically maintain a desired minimum evaporating pressure regardless of the decrease in evaporator load.

Application

Sporlan Discharge Bypass Valves provide an economical method of compressor capacity control in place of cylinder unloaders or the handling of unloading requirements below the last step of cylinder unloading.

On air conditioning systems, the minimum allowable evaporating temperature that will avoid coil icing depends on evaporator design and the amount of air passing over the coil. The refrigerant temperature may be below 32°F (0°C), but coil icing will not usually occur with high air velocities since the external surface temperature of the tube will be above 32°F (0°C). For most air conditioning systems the minimum evaporating temperature is 20°F to 25°F (-6.7°C to -3.9°C). However, when air velocities are reduced considerably, the minimum evaporating temperature should be 26°F to 28°F (-3.3°C to -2.2°C).

Sporlan Discharge Bypass Valves can be set so they start to open at an evaporating pressure equivalent to 32°F (0°C) saturation temperature. Therefore, they would be at their **rated** capacity at 26°F (-3.3°C) evaporating temperature.

The discharge bypass valve is applied in a branch line, off the discharge line, as close to the compressor as possible. The bypassed vapor can enter the low side at one of the following locations:

1. Evaporator inlet with distributor
2. Evaporator inlet without distributor
3. Suction line

Please refer to Bulletin 90-40 for a complete description of each of the above methods of application.

Paralleling Valves

If the hot gas bypass requirement on any system is greater than the capacity of the largest discharge bypass valve, these valves can be applied in parallel. The pressure settings of the paralleled valves should be the same to get the most sensitive performance, and the piping to each valve should be identical to keep the pressure drop across each valve the same.

Piping Suggestions

Sporlan recommends that recognized piping references, such as equipment manufacturers' literature and the ASHRAE Handbook, be consulted for assistance. Sporlan is not responsible for system design, any damage arising from faulty system design, or for misapplication of its products. Actual system piping must be done so as to protect the compressor at all times. This includes protection against overheating, slugging with liquid refrigerant, and trapping of oil in various system locations.

Sporlan recommends that a Catch-All® Filter-Drier be applied in the liquid line and suction line (if required). See Bulletin 40-10.

Operation

Direct Acting Valves — HGBE-5

Sporlan DBVs respond to changes in downstream or suction pressure. See Figure 7. When the evaporating pressure is above the valve setting, the valve remains closed. As the suction pressure drops below the valve setting, the valve responds and begins to open. As with all modulating type valves, the amount of opening is proportional to the change in the variable being controlled — in this case the suction pressure. As the suction pressure continues to drop, the valve continues to open until the limit of the valve stroke is reached. However, on normal applications there is not sufficient pressure change to open these valves to the limit of their stroke. The amount of pressure change from the point at which it is desired to have the valve closed, to the point at which it is to open, varies widely with the type of refrigerant used and the evaporating temperature. For this reason Sporlan DBVs are rated on the basis of allowable evaporator temperature change from closed position to rated opening. For direct acting valves, a 6°F (3.3°C) change is considered normal for most applications and is the basis of our capacity ratings. Multipliers for other temperature changes are given in the Selection Procedures section.

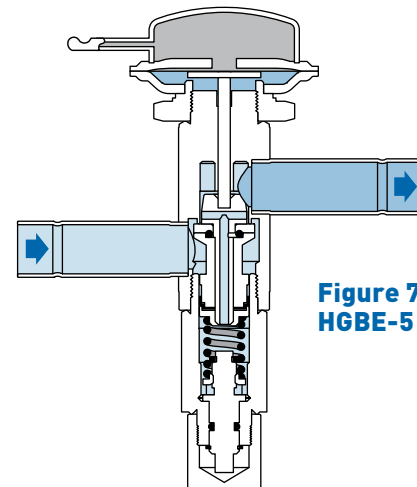


Figure 7
HGBE-5

Piloted Operated Valve — HGBE-8

As illustrated in Figure 8, the main piston of this valve is controlled by a pilot valve. The outlet pressure or suction pressure (P1) acts as a closing force on the pilot valve and is opposed by the adjustment spring which acts in an opening direction. High pressure gas (P2) bleeds into the chamber above the main piston through a restrictor in the piston. The pilot valve controls the position of the main piston by regulating the amount of gas that bleeds out of the chamber. As this pressure on top of the main piston (P3) increases and decreases, it causes the main piston to modulate closed and open.

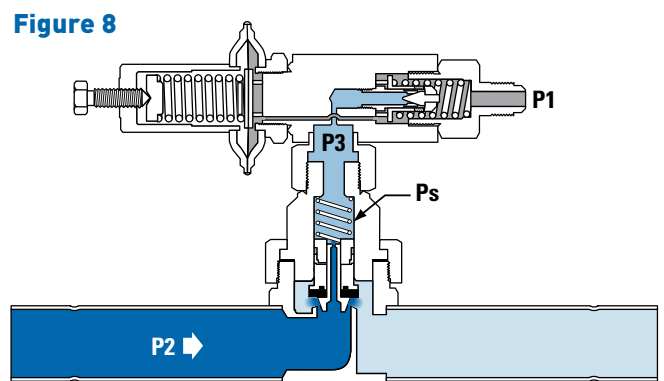


Figure 8

Discharge Bypass Valves

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As the suction pressure (P1) falls below the pilot valve's setting, the pilot port modulates open. This bleeds refrigerant from the chamber above the piston through the pilot valve at a faster rate than it is entering, so the pressure decreases. As this pressure (P3) plus the pressure from the spring (Ps) falls below the inlet pressure (P2), the inlet pressure pushes the piston up, modulating the valve open. As the suction pressure rises above the setting of the pilot valve, the pilot port modulates closed. This allows pressure to build on top of the main piston. As this pressure (P3) approaches the inlet pressure (P2), the force combined with the force from the spring (Ps) pushes the piston down, modulating the valve closed.

(6.6/7.93 bar). The standard factory setting for this valve is 105 psig (7.24 bar).

Adjustment Ranges Pressure Setting

Adjustable Spring Heads on Direct Acting Valves

The adjustable type utilizes a spring assembly which can be fixed at the desired pressure setting (opening pressure). This setting will not be affected by other factors such as ambient or hot gas temperatures. The HGBE-5 is available with an adjustment range of 95/115 psig

Pilot Operated Valves

The HGBE-8 is adjustable from 75 to 150 psi (5.2 to 10.3 bar). The standard factory setting is 120 psig (8.27 bar). Adjustment is made by turning the adjustment screw on the pilot valve. Turning this screw clockwise will increase the valve's setting and a counterclockwise rotation will decrease the valve's setting.

Adjusting these valves can be complicated because the load must be varied during the setting procedure. The load on the system must be decreased to lower the suction pressure so that the valve can control. The valve should then be adjusted to maintain the desired pressure. The load on the system should then be increased to raise the suction pressure above the valve setting to close the valve. Once this is accomplished, the valve setting can be checked by slowly decreasing the load until the discharge bypass valve begins to open (a hissing sound and/or an accompanying pressure rise at the outlet connection will indicate that the bypass valve has opened).

Specifications

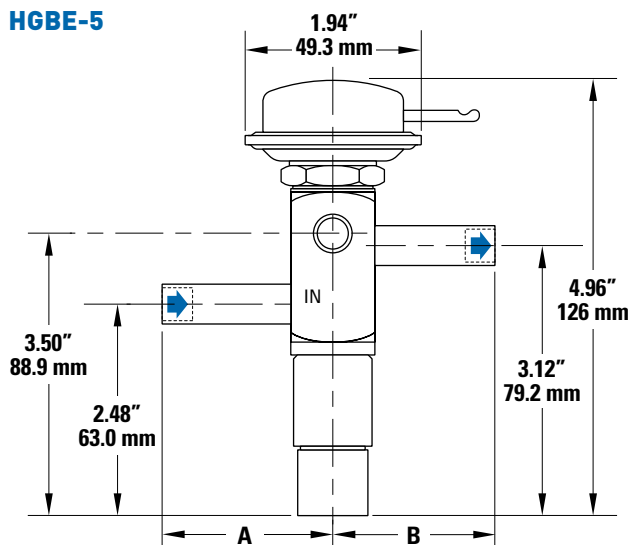
VALVE TYPE	STANDARD COPPER CONNECTIONS ODF - Inches	PORT SIZE		ADJUSTMENT RANGE		BODY MATERIAL	SEATING MATERIAL	SOCKET DEPTH		EXTERNAL EQUALIZER ODF Inches	NET WEIGHT	
		Inches	mm	psi	bar			Inches	mm		lbs.	kg
HGB-5	3/8, 1/2, 5/8	1/2	13	95/115	6.6/7.93	Brass	Synthetic Metal	0.31	7.9	1/4	1.25	0.57
HGBE-5								0.37	9.4			
	0.50	12.7										
HGB-8	7/8, 1-1/8	0.43	11	75/150	5.2/10.3			0.75	19	1/4	3.0	1.4
HGBE-8								0.91	23			

Both the HGB-8 and HGBE-8 are U.L. Recognized valves. They have a maximum rated pressure of 700 psig (48.3 bar). Both valves are in U.L. file SA-5460-SFJQ2.

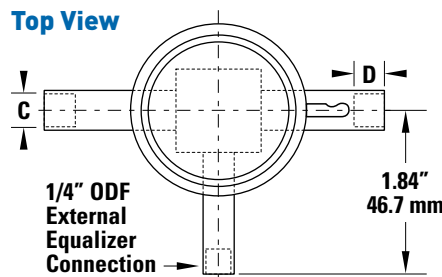
- Maximum Fluid Temperature of 240°F (116°C).
- Maximum Ambient Temperature of 120°F (48.9°C).

Dimensions

HGBE-5



Top View



Connections

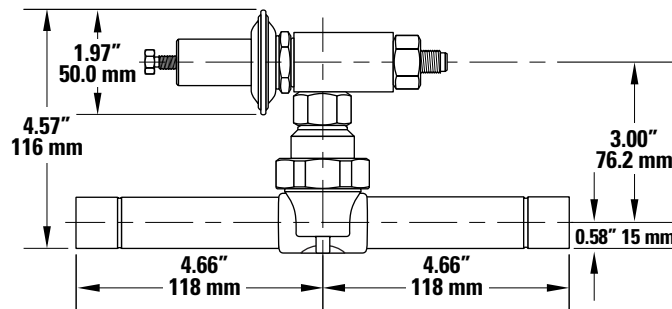
ODF SOLDER Inches	Inches				mm			
	A	B	C	D	A	B	C	D
3/8	1.87	1.78	0.38	0.31	47.5	45.2	9.65	7.9
1/2	2.12	2.03	0.50	0.37	53.8	51.6	12.7	9.4
5/8	2.43	2.34	0.63	0.50	61.7	59.4	16.0	12.7

Discharge Bypass Valves

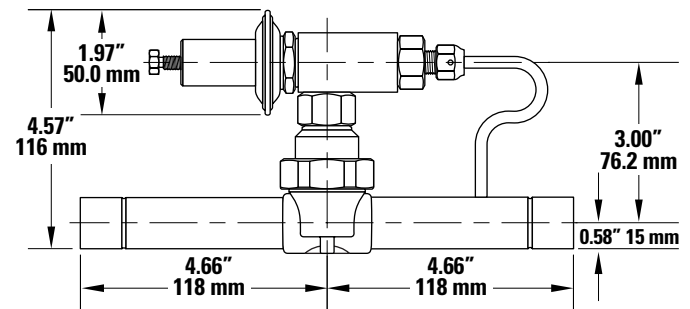
410A

Dimensions

HGBE-8 Externally Equalized



HGB-8 Internally Equalized



Selection Procedures

The selection of a discharge bypass valve, and the necessary companion devices, is simplified **if complete system information is available**. This will result in the most economical selection because the components will match the system requirements.

Besides the discharge bypass valve, a specific application may require a hot gas solenoid valve, an auxiliary side connection distributor or ASC adapter, and a desuperheating TEV with a companion liquid line solenoid valve. Once the type of application (review Application Section on page 37) is determined, the necessary valves can be selected from the information discussed in this section.

Discharge Bypass Valves

The selection of a Sporlan Discharge Bypass Valve involves five basic items:

- 1. Refrigerant** – valve capacities vary considerably for different refrigerants.
- 2. Minimum allowable evaporating temperature at the reduced load condition** – depending on the system, this value must be set to prevent coil icing and/or compressor short cycling. For example, this may be 32°F to 34°F (0°C to 1.1°C) for a water chiller; 26°F to 28°F (-3.3°C to -2.2°C) for a normal air conditioning system.
- 3. Compressor capacity (tons/kW) at minimum allowable evaporating temperature** – consult compressor capacity ratings for this value.
- 4. Minimum evaporator load (tons/kW) at which the system is to be operated** – most systems are not required to operate down to zero load but this value will depend on the type of system. For example, most air conditioning systems only need to operate down to 15-25% of full load. However, air conditioning systems for data processing and “white” rooms, and most refrigeration systems may be required to bypass to zero load conditions.

- 5. Condensing temperature when minimum load exists** – since the capacity ratings of the bypass valves are a function of condensing temperature, it is vital that proper head pressure is maintained, especially during low load operation. As the capacity table indicates, a condensing temperature of 80°F (27°C) is considered the minimum allowable for satisfactory system operation. See Bulletin 90-30 for information on Sporlan’s Head Pressure Control Valves.

The discharge bypass valve must be selected to handle the difference between items 3 and 4 above. If the minimum evaporator load (item 4) is zero, the hot gas bypass requirement is simply the compressor capacity at the minimum allowable evaporating temperature (item 3). The following discussion on Capacity Ratings, and the example, show how these factors affect a selection on a typical air conditioning system.

Capacity Ratings – As the Discharge Bypass Valve Capacity Table indicates, valve ratings are dependent on the evaporating and condensing temperature **at the reduced load condition** and the refrigerant used. Therefore, once this information and the hot gas bypass requirement in tons/kW is determined, a discharge bypass valve can be selected.

As the capacity table heading indicates, these are **valve capacities, not** the system capacity on which the valve is applied. The ratings are the sum of the hot gas bypassed and the liquid refrigerant for desuperheating, regardless of whether the liquid is fed through the system TEV or the auxiliary desuperheating TEV. The capacities are based on an evaporator temperature change of 6°F (3.3°C) from a closed position to the rated opening. This is a nominal rating value based on years of application experience. Since a discharge bypass valve is actually a **pressure** regulating valve, it should be pointed out that the capacity ratings based on a 6°F (3.3°C) evaporator temperature change takes into account that a 6°F (3.3°C) change @ 40°F (4.4°C) on R-410A is a 14.2 psi (0.98 bar) change. The 6°F (3.3°C) nominal change is

Capacity Multipliers

For Evaporator Temperature Changes Other Than 6°F (3.3°C) Nominal Change

Tons - psi - °F

kW - bar - °C

EVAPORATOR TEMPERATURE CHANGE °F	EVAPORATOR TEMPERATURE °F			EVAPORATOR TEMPERATURE CHANGE °C	EVAPORATOR TEMPERATURE °C		
	40	26	20		5	-3	-10
2	0.45	0.40	0.38	1	0.41	0.35	0.31
4	0.82	0.78	0.76	2	0.77	0.72	0.67
8	1.08	1.11	1.13	3	0.96	0.95	0.94
10	1.11	1.17	1.20	4	1.05	1.08	1.10
				5	1.09	1.14	1.20
				6	1.11	1.18	1.25

Discharge Bypass Valves

410A

used so all the various pressure changes do not need to be shown in the table. If additional capacity is required and a greater evaporator temperature change can be tolerated, these valves are capable of opening further. The table on page 39 lists various capacity multipliers for this purpose. For example, an HGBE-5 rated for 5.46 tons (19.2 kW) at a 26°F (-3.3°C) evaporating temperature will start to open at 32°F (26°F + 6°F) or 0°C (-3.3°C + 3.3°C); and, when the evaporating temperature has dropped to 26°F (-3.3°C), the valve will be open far enough to bypass 5.46 tons (19.2 kW) of hot gas. If a temperature change of 8°F (4.4°C) can be tolerated, the valve would start opening at 34°F (26°F + 8°F) or 1.1°C (-3.3°C + 4.4°C) and be open far enough to bypass 4.94 X 1.11 or 5.48 tons (18.0 kW X 1.1 or 20.0 kW) of hot gas.

Occasionally, a bypass valve is selected for an evaporator temperature change of less than 6°F (3.3°C). Multipliers for those situations are also given in the tables on page 39.

Desuperheating Thermostatic Expansion Valves

For information on desuperheating thermostatic expansion valves visit our website at www.sporlan.com and reference Bulletin 90-40 or consult Sporlan Division of Parker, Washington, MO.

Direct Acting Discharge Bypass Valve Capacities

Tons - psi - °F

kW - bar - °C

VALVE TYPE	ADJUSTMENT RANGE (psig)	MINIMUM ALLOWABLE EVAPORATOR TEMPERATURE AT REDUCED LOAD °F									VALVE TYPE	ADJUSTMENT RANGE (bar)	MINIMUM ALLOWABLE EVAPORATOR TEMPERATURE AT REDUCED LOAD °C								
		40			26			20					5			-3			-10		
		CONDENSING TEMPERATURE °F											CONDENSING TEMPERATURE °C								
		80	100	120	80	100	120	80	100	120			30	40	50	30	40	50	30	40	50
HGBE-5	95/115	4.27	5.43	6.76	4.29	5.46	6.80	4.30	5.47	6.81	HGBE-5	6.6/7.93	16.2	20.0	24.2	16.2	20.1	24.3	16.3	20.2	24.5

Capacities based on discharge temperatures 50°F (28°C) above isentropic compression, 25°F (14°C) superheat at the compressor, 10°F (5°C) subcooling, and includes both the hot gas bypassed and liquid refrigerant for desuperheating, regardless of whether the liquid is fed through the system thermostatic expansion valves or an auxiliary desuperheating thermostatic expansion valve.

Pilot Operated Discharge Bypass Valve Capacities

Tons - psi - °F

kW - bar - °C

VALVE TYPE	ADJUSTMENT RANGE (psig)	MINIMUM ALLOWABLE EVAPORATOR TEMPERATURE AT REDUCED LOAD °F									VALVE TYPE	ADJUSTMENT RANGE (bar)	MINIMUM ALLOWABLE EVAPORATOR TEMPERATURE AT REDUCED LOAD °C								
		40			26			20					5			-3			-10		
		CONDENSING TEMPERATURE °F											CONDENSING TEMPERATURE °C								
		80	100	120	80	100	120	80	100	120			30	40	50	30	40	50	30	40	50
HGB-8	75/150	18.9	25.2	31.9	19.8	25.8	32.2	20.2	25.9	32.3	HGB-8	5.2/10.3	72.5	92.6	114	75.5	94.5	115	76.9	95.3	116
HGBE-8		HGBE-8																			

Capacities based on discharge temperatures 50°F (28°C) above isentropic compression, 25°F (14°C) superheat at the compressor, 10°F (5°C) subcooling, and includes both the hot gas bypassed and liquid refrigerant for desuperheating, regardless of whether the liquid is fed through the system thermostatic expansion valves or an auxiliary desuperheating thermostatic expansion valve.

Electronic Temperature Control Systems

410A

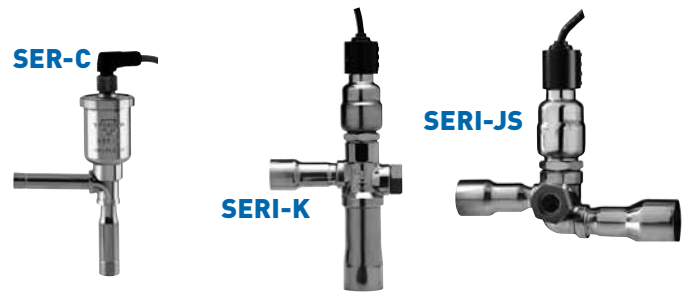
Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507, 744

Electric Expansion Valves

Sporlan Electric Expansion Valves (EEVs) are currently available in nominal R-410A capacities from 2.5 to 210 tons (8.9 to 735 kW). Therefore, they are applicable on all the same types of systems found in the air conditioning and refrigeration industry as thermostatic expansion valves.

Sporlan electric valves are designed for compatibility with all current halocarbon refrigerants, including CFCs, HCFCs and HFCs, R-410A and R-744. Specific system conditions will dictate which product is necessary to control the application. Details can be reviewed with the Sporlan Sales Engineer.

The SER, SERI and SEH 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 SEH valves are easily interfaced with microprocessor based controllers, including Sporlan supplied controllers.



All Sporlan SER and SERI valves are rated for at least 700 psig (48 bar) MRP. The SEH(I) 175 is rated for 620 psig (43 bar) MRP.

viding improved flow resolution and performance. The SER and SEH valves are easily interfaced with microprocessor based controllers, including Sporlan supplied controllers.

Specifications

VALVE TYPE	INLET – Inches (ODF)	OUTLET – Inches (ODF)	CONFIGURATION	CABLE LENGTH	
				Feet	Meters
SER-B*	1/4, 3/8	3/8, 1/2, 5/8	Angle	10, 20	3, 6
SER-C*	1/4, 3/8	3/8, 1/2, 5/8	Angle	10, 20	3, 6
SER-D*	3/8, 1/2, 5/8	1/2, 5/8, 7/8, 1-1/8	Straight Through Offset	10, 20	3, 6
SERI-G*	5/8, 7/8	1/2, 5/8, 7/8, 1-1/8	Angle or Straight Through Offset	10, 40	3, 12
SERI-J*	7/8, 1-1/8	7/8, 1-1/8, 1-3/8		10, 40	3, 12
SERI-K**	1-1/8	7/8, 1-1/8, 1-3/8, 1-5/8		10, 40	3, 12
SERI-L**	1-1/8, 1-3/8	1-1/8, 1-3/8, 1-5/8		10, 40	3, 12
SEH(I) 175	1-1/8, 1-3/8, 1-5/8	2-1/8	Straight Through Offset	10, 20, 30, 40	3, 6, 9, 12

*Suitable for bi-directional applications.

**Bi-sealing, reduced flow in reverse direction.

Capacities Tons • psi • °F

VALVE TYPE	NOMINAL CAPACITY (Tons)	40°F																												20°F												0°F											
		PRESSURE DROP ACROSS VALVE (psi)																												PRESSURE DROP ACROSS VALVE (psi)												PRESSURE DROP ACROSS VALVE (psi)											
		80	120	160	200	240	280	320	360	80	120	160	200	240	280	320	360	80	120	160	200	240	280	320	360																												
SER-B	2.5	1.78	2.19	2.52	2.82	3.09	3.34	3.57	3.79	1.75	2.14	2.47	2.76	3.02	3.27	3.49	3.70	1.70	2.08	2.40	2.69	2.94	3.18	3.40	3.61																												
SER-C	6.8	4.84	5.93	6.84	7.65	8.38	9.05	9.68	10.3	4.73	5.80	6.70	7.49	8.20	8.86	9.47	10.0	4.61	5.65	6.52	7.29	7.98	8.62	9.22	9.78																												
SER-D	14	9.84	12.1	13.9	15.6	17.0	18.4	19.7	20.9	9.63	11.8	13.6	15.2	16.7	18.0	19.3	20.4	9.38	11.5	13.3	14.8	16.2	17.5	18.8	19.9																												
SERI-G	27	19.1	23.4	27.0	30.2	33.1	35.8	38.3	40.6	18.7	22.9	26.4	29.5	32.3	34.9	37.3	39.6	18.1	22.2	25.6	28.7	31.4	33.9	36.3	38.5																												
SERI-J	49	34.4	42.2	48.7	54.4	59.6	64.4	68.8	73.0	33.6	41.1	47.5	53.1	58.2	62.8	67.2	71.2	32.6	40.0	46.1	51.6	56.5	61.0	65.2	69.2																												
SERI-K	88	62.4	76.4	88.2	98.7	108	117	125	132	60.9	74.6	86.1	96.3	105	114	122	129	59.1	72.4	83.6	93.5	102	111	118	125																												
SERI-L	119	83.8	103	119	133	145	157	168	178	82.0	100	116	130	142	153	164	174	79.9	97.8	113	126	138	149	160	169																												
SEH(I) 175	210	148	182	210	234	257	277	296	314	145	177	204	229	250	271	289	307	140	172	199	222	243	263	281	298																												

kW • bar • °C

VALVE TYPE	NOMINAL CAPACITY (kW)	5°C												-10°C												-20°C											
		PRESSURE DROP ACROSS VALVE (bar)												PRESSURE DROP ACROSS VALVE (bar)												PRESSURE DROP ACROSS VALVE (bar)											
		5	8	11	14	17	20	23	26	5	8	11	14	17	20	23	26	5	8	11	14	17	20	23	26												
SER-B	8.9	5.98	7.56	8.86	10.0	11.0	12.0	12.8	13.6	5.85	7.40	8.67	9.78	10.8	11.7	12.5	13.3	5.69	7.20	8.44	9.53	10.5	11.4	12.2	13.0												
SER-C	24	16.2	20.5	24.0	27.1	29.9	32.4	34.8	36.9	15.9	20.1	23.5	26.5	29.2	31.7	34.0	36.2	15.4	19.5	22.9	25.8	28.5	30.9	33.1	35.2												
SER-D	49	33.0	41.7	48.9	55.1	60.8	65.9	70.7	75.2	32.3	40.8	47.8	54.0	59.5	64.5	69.2	73.5	31.4	39.7	46.6	52.5	57.9	62.8	67.3	71.6												
SERI-G	95	63.9	80.8	95.2	107	118	128	137	145	61.8	78.1	91.8	104	114	123	133	141	60.1	76.1	89.3	100	111	120	129	137												
SERI-J	171	115	145	171	192	212	230	247	263	111	140	165	186	205	223	238	253	108	137	161	181	200	217	232	247												
SERI-K	309	208	264	309	349	384	417	447	475	201	255	299	337	371	403	433	460	196	248	291	328	361	392	421	447												
SERI-L	416	281	355	416	470	518	561	602	640	275	347	407	460	506	549	589	626	267	338	397	447	493	535	573	610												
SEH(I) 175	735	495	626	735	829	913	990	1062	1129	479	605	710	801	883	957	1027	1091	466	589	691	779	859	932	999	1062												

CORRECTION FACTOR, CF LIQUID TEMPERATURE °F														CORRECTION FACTOR, CF LIQUID TEMPERATURE °C															
0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	-18	-12	-7	-1	4	10	16	21	27	32	38	43	49	54	60
1.79	1.71	1.63	1.55	1.47	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.73	0.62	1.79	1.71	1.63	1.55	1.47	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.73	0.62

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 100-20.

Electronic Temperature Control Systems

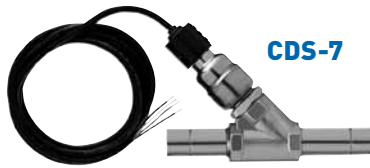
410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507, 744

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 less than 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.

CDS-4, CDS-7, CDS-9 and CDS-17 valves may be applied as heat reclaim, head pressure control, or liquid line differential valves for R-410A. Contact Sporlan for more information. All Sporlan CDS valves are rated at least 680 psig (47 bar) 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

TYPE	CONNECTIONS ODF SOLDER – Inches	CONFIGURATION	CABLE LENGTH		CABLE ENDS
			Feet	Meters	
CDS-4	1/2, 5/8, 7/8	Straight Through	10 20	3 6	S-Stripped and Tinned
CDS-7	5/8, 7/8, 1-1/8, 1-3/8	Straight Through			
CDS-9	5/8, 7/8, 1-1/8, 1-3/8	Straight Through			
CDS-16	1-3/8	Angle			
CDS-17	1-3/8, 1-5/8, 2-1/8	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	0.06	0.2	0.4	0.7
CDS-4	40	1.37	1.93	3.30	4.23	5.94	CDS-4	5	4.55	6.39	11.5	16.2	21.3
	20	1.13	1.59	2.73	3.50	4.97		-10	3.51	4.93	8.88	12.5	16.4
	0	0.92	1.29	2.22	2.85	3.92		-20	2.90	4.07	7.34	10.3	13.2
	-20	0.74	1.03	1.77	2.24	2.97		-30	2.36	3.31	5.97	8.17	10.2
CDS-7	40	3.87	5.35	8.95	11.4	15.7	CDS-7	5	12.9	17.8	31.2	43.2	56.2
	20	3.22	4.46	7.45	9.47	13.6		-10	10.0	13.9	24.3	33.7	44.7
	0	2.64	3.65	6.11	7.76	10.5		-20	8.34	11.5	20.3	28.3	35.2
	-20	2.12	2.94	4.91	6.08	7.75		-30	6.84	9.46	16.6	22.0	26.4
CDS-9	40	5.78	8.02	13.5	17.2	23.9	CDS-9	5	19.2	26.7	47.2	65.6	85.5
	20	4.80	6.67	11.2	14.3	20.5		-10	14.9	20.7	36.7	50.9	67.8
	0	3.92	5.45	9.18	11.7	16.1		-20	12.4	17.2	30.5	42.6	54.2
	-20	3.15	4.37	7.36	9.23	12.2		-30	10.1	14.1	24.9	33.6	41.8
CDS-16	40	9.90	13.8	23.4	30.0	41.8	CDS-16	5	32.9	45.9	81.8	114.2	149.4
	20	8.21	11.5	19.4	24.8	34.7		-10	25.5	35.5	63.4	88.4	113.9
	0	6.70	9.34	15.9	20.3	26.7		-20	21.1	29.4	52.5	72.3	88.8
	-20	5.36	7.48	12.7	15.5	19.3		-30	17.2	24.0	42.9	55.8	65.6
CDS-17	40	10.3	14.4	24.3	31.0	43.1	CDS-17	5	34.3	47.8	84.8	118.0	154.1
	20	8.58	11.9	20.2	25.7	37.0		-10	26.6	37.1	65.8	91.6	122.4
	0	7.01	9.75	16.5	21.0	29.1		-20	22.1	30.8	54.6	77.1	97.5
	-20	5.62	7.82	13.2	16.7	21.9		-30	18.1	25.1	44.6	60.6	74.9

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	0.06	0.2	0.4	0.7
CDS-4	2.88	7.65	10.7	18.4	23.6	33.1	CDS-4	2.49	25.0	35.1	63.2	88.7	117
CDS-7	7.28	20.0	27.7	46.3	58.8	81.3	CDS-7	6.30	65.5	90.6	159	220	286
CDS-9	11.2	30.5	42.4	71.4	91.0	126	CDS-9	9.72	99.9	139	246	341	445
CDS-16	17.9	53.6	74.7	127	162	226	CDS-16	15.5	175	244	436	608	796
CDS-17	20.4	55.1	76.7	130	165	230	CDS-17	17.6	180	251	446	620	810

CORRECTION FACTOR, CF LIQUID TEMPERATURE °F											CORRECTION FACTOR, CF LIQUID TEMPERATURE °C										
0	10	20	30	40	50	60	70	80	90	100	-18	-12	-7	-1	4	10	16	21	27	32	38
1.28	1.24	1.19	1.14	1.10	1.05	1.00	0.95	0.90	0.85	0.80	1.28	1.24	1.19	1.14	1.10	1.05	1.00	0.95	0.90	0.85	0.80

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 100-40.

Electronic Temperature Control Systems

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

Electric Discharge Bypass Valves

SDR-3, -3X and -4

SDR series valves are Step Discharge Regulators, or electrically operated discharge gas bypass valves. Unlike previous mechanical discharge gas bypass valves that only control a downstream pressure, the SDR series offers direct temperature control of air or liquid. The valves use the same 12 DC bipolar step motor as all other Sporlan step motor operated valves, including the CDS valves above. Balanced pistons and ports, uniquely characterized for hot gas flow, have been incorporated into the design. Seating materials, motors and gears have all been laboratory and field proven in high temperature gas applications.

With capacities up to 30 tons (140 kW) nominal R-410A, the SDR series is suitable for use in small process chillers and environmental chambers, as well as large direct expansion air conditioning applications. The valves may be controlled by third party controllers or by the Sporlan TCB interface/controller shown below. SDR valves are normally installed in the same manner as mechanical discharge gas bypass valves; in a bypass branch of the discharge gas line. The valves may be piped to feed into the evaporator at the distributor, downstream of the evaporator, or at the compressor suction. Contact Sporlan for additional piping recommendations. When applied with a third party controller or DDC building management system, the SDR can be used with the IB or TCB as an interface to the existing system. For stand-alone

control, the SDR and TCB with sensor will allow close temperature control of the air or liquid stream. See the section below for information on the TCB and IB.

The SDR valves are tight seating and will act as solenoid valves for shut off.

All Sporlan SDR valves are rated at 700 psig (48 bar) MRP.



Specifications

TYPE	CONNECTIONS Inches	CONFIGURATION	CABLE LENGTH		CABLE ENDS
			Feet	Meters	
SDR-3	3/8, 1/2, 5/8 ODF	Angle	10 20 30 40	3 6 9 12	S-Stripped and Tinned
SDR-3X	3/8, 1/2, 5/8 ODF	Angle			
SDR-4	7/8, 1-1/8 ODF	Straight Through			

Capacities

Tons • psi • °F

VALVE TYPE	MINIMUM ALLOWABLE EVAPORATOR TEMPERATURE AT REDUCED LOAD °F																	
	40°F			26°F			20°F			0°F			-20°F			-40°F		
	CONDENSING TEMPERATURE °F																	
	80	100	120	80	100	120	80	100	120	80	100	120	80	100	120	80	100	120
SDR-3	9.1	11.3	13.6	9.1	11.3	13.6	9.1	11.3	13.6	9.1	11.3	13.6	9.1	11.3	13.6	—	—	—
SDR-3X	16.3	20.3	24.5	16.4	20.3	24.5	16.4	20.3	24.5	16.4	20.3	24.5	16.4	20.3	24.5	—	—	—
SDR-4	29.7	39.9	49.7	32.3	41.8	51.2	33.1	42.5	51.8	35.0	44.0	53.1	36.1	45.0	54.0	—	—	—

kW • bar • °C

VALVE TYPE	MINIMUM ALLOWABLE EVAPORATOR TEMPERATURE AT REDUCED LOAD °C																	
	5°C			-3°C			-7°C			-18°C			-29°C			-40°C		
	CONDENSING TEMPERATURE °C																	
	26	38	49	26	38	49	26	38	49	26	38	49	26	38	49	26	38	49
SDR-3	31.9	39.6	47.7	31.9	39.6	47.7	31.9	39.6	47.7	31.9	39.6	47.7	31.9	39.6	47.7	—	—	—
SDR-3X	57.0	71.1	85.6	57.3	71.1	85.6	57.3	71.1	85.6	57.3	71.1	85.6	57.3	71.1	85.6	—	—	—
SDR-4	104	140	174	113	147	179	116	149	183	122	154	186	126	158	189	—	—	—

Note: Capacities are based on discharge temperature 50°F (28°C) above isentropic compression, 100°F (55°C) condensing temperature, 0°F (0°C) subcooling, 25°F (13°C) superheat at the compressor and includes both the hot gas bypassed and the liquid refrigerant for desuperheating, regardless of whether the liquid is fed through the system thermostatic expansion valve or auxiliary desuperheating expansion valve.

For complete information see your Sporlan Wholesaler, our website at www.sporlan.com, or write Sporlan and request Bulletin 100-60.

Electronic Temperature Control Systems

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

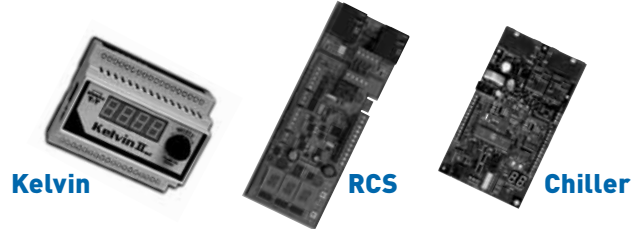
Controller Packages

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 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.



CONTROLLER PACKAGES	DISPLAY	COMMUNICATION	RELAYS	INPUTS*	VALVES
Kelvin	Optional	RS-485	One	1 Press, 2 Temp.	1 SER, SEI, ESX or SEHI
RCS	3 Alphanumeric	RS-485	Four	1 Press, 4 Temp.	1 SER, SEI, ESX or SEHI
Subcooler	2 Numeric	None	None	1 Press, 2 Temp.	1 SER, SEI, ESX or SEHI
Chiller	2 Numeric	None	Three	1 Press, 4 Temp.	2 SER, SEI, ESX or SEHI
Chiller European	2 Numeric (C°/Bar)	None	Three	1 Press, 4 Temp.	2 SER, SEI, ESX or SEHI
Pressure	2 Numeric	None	None	1 Press	1 CDS or 1 SDR
Dual Pressure Control	2 Numeric	None	None	2 Press	2 CDS or 2 SDR or 1 of each
Temperature Control	2 Numeric	None	None	1 Temperature	1 CDS or 1 SDR
Dual Temp. Control	2 Numeric	None	None	2 Temperature	2 CDS or 2 SDR or 1 of each
Superheat	2 Numeric	None	None	1 Press, 2 Temp.	1 SER, SEI, ESX, or SEHI
Superheat Low Temp. Refrigeration	2 Numeric	None	None	1 Press, 2 Temp.	1 SER, SEI, ESX, or SEHI
SELF CONTAINED EQUIPMENT					
Unistat – Med. Temp.	Optional	None	One	Temperature**	N/A
Unistat – Low Temp.	Optional	None	Two	Defrost**	N/A
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 45, only Sporlan approved sensors may be used.
 ** All products control temperature, other functions not available on all models.

Electronic Temperature Control Systems

410A

Also Compatible with Refrigerants 12, 22, 134a, 404A, 407C, 502, 507

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 or SDR 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 SEI and SEH 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 or SDR 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	SDR, CDS
TCB with Potentiometer	Temperature Sensor	SDR, CDS
IB-ESX	4-20 ma, 0-10 VDC	ESX
IB-1	4-20 ma, 0-10 VDC	SDR-3
IB-3	4-20 ma, 0-10 VDC	SDR-3, 3X
IB-6	4-20 ma, 0-10 VDC	SDR-4, CDS-9, -16, -17, Y1177

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

ACCESSORIES	ITEM NUMBERS	APPLICATION
0-150 psig (0-10.34 bar) Pressure Transducer 5.6' (2 m) Cable (Green Color Code)	953091	RCS and Kelvin except R-410A
0-300 psig (0-20.7 bar) Pressure Transducer 5.6' (2 m) Cable (Black Color Code)	952740	All except TCB, IB, UniStat, and OmniStat
0-150 psig (0-10.34 bar) Pressure Transducer 16.4' (5 m) Cable (Green Color Code)	953092	RCS and Kelvin except R-410A
0-300 psig (0-20.7 bar) Pressure Transducer 16.4' (5 m) Cable (Black Color Code)	952503	All except TCB, IB, UniStat, and OmniStat
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 except RCS and Kelvin
Surface Sensor - 3K (White Color Code)	952551	RCS and Kelvin
Well Sensor	952795	All except IB, TCB less Potentiometer, RCS, and Kelvin
Air Sensor	952669	All except IB, TCB less Potentiometer, RCS, and Kelvin
UniStat Sensor	952886	UniStat only
Omnistat Sensor	952899	Omnistat only
Metal Jacketed Sensor	952962	Omnistat only

Pressure Temperature Chart

410A

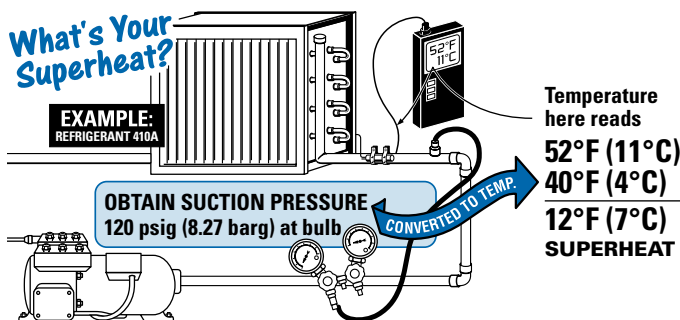
Refrigerant 410A - Sporlan Code Z - Color Designation Rose (PMS 507)

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
		5*	-0.17			-67	-55			70	4.83			15	-9
4*	-0.14	-66	-54	72	4.96	16	-9	4*	-0.14	-73	-58	72	4.96	15	-10
3*	-0.10	-64	-53	74	5.10	17	-8	3*	-0.10	-71	-57	74	5.10	16	-9
2*	-0.07	-63	-53	76	5.24	19	-7	2*	-0.07	-70	-57	76	5.24	17	-8
1*	-0.03	-62	-52	78	5.38	20	-7	1*	-0.03	-68	-56	78	5.38	18	-8
0	0.00	-61	-51	80	5.52	21	-6	0	0.00	-67	-55	80	5.52	19	-7
1	0.07	-58	-50	85	5.86	24	-5	1	0.07	-64	-53	85	5.86	22	-5
2	0.14	-56	-49	90	6.21	26	-3	2	0.14	-62	-52	90	6.21	25	-4
3	0.21	-54	-48	95	6.55	29	-2	3	0.21	-59	-51	95	6.55	28	-2
4	0.28	-52	-47	100	6.89	31	0	4	0.28	-57	-49	100	6.89	30	-1
5	0.34	-50	-45	105	7.24	34	1	5	0.34	-55	-48	105	7.24	33	0
6	0.41	-48	-44	110	7.58	36	2	6	0.41	-53	-47	110	7.58	35	2
7	0.48	-46	-43	115	7.93	38	4	7	0.48	-51	-46	115	7.93	37	3
8	0.55	-44	-42	120	8.27	41	5	8	0.55	-49	-45	120	8.27	40	4
9	0.62	-43	-42	125	8.62	43	6	9	0.62	-47	-44	125	8.62	42	5
10	0.69	-41	-41	130	8.96	45	7	10	0.69	-45	-43	130	8.96	44	7
11	0.76	-40	-40	135	9.31	47	8	11	0.76	-44	-42	135	9.31	46	8
12	0.83	-38	-39	140	9.65	49	9	12	0.83	-42	-41	140	9.65	48	9
13	0.90	-37	-38	145	10.0	51	10	13	0.90	-40	-40	145	10.0	50	10
14	0.97	-35	-37	150	10.3	53	11	14	0.97	-39	-39	150	10.3	52	11
15	1.03	-34	-36	155	10.7	55	13	15	1.03	-37	-38	155	10.7	54	12
16	1.10	-32	-36	160	11.0	56	14	16	1.10	-36	-38	160	11.0	55	13
17	1.17	-31	-35	165	11.4	58	15	17	1.17	-34	-37	165	11.4	57	14
18	1.24	-30	-34	170	11.7	60	15	18	1.24	-33	-36	170	11.7	59	15
19	1.31	-28	-34	175	12.1	62	16	19	1.31	-32	-35	175	12.1	61	16
20	1.38	-27	-33	180	12.4	63	17	20	1.38	-30	-35	180	12.4	62	17
21	1.45	-26	-32	185	12.8	65	18	21	1.45	-29	-34	185	12.8	64	18
22	1.52	-25	-32	190	13.1	66	19	22	1.52	-28	-33	190	13.1	66	19
23	1.59	-24	-31	195	13.4	68	20	23	1.59	-27	-33	195	13.4	67	20
24	1.65	-22	-30	200	13.8	70	21	24	1.65	-25	-32	200	13.8	69	20
25	1.72	-21	-30	205	14.1	71	22	25	1.72	-24	-31	205	14.1	70	21
26	1.79	-20	-29	210	14.5	73	23	26	1.79	-23	-31	210	14.5	72	22
27	1.86	-19	-28	220	15.2	75	24	27	1.86	-22	-30	220	15.2	75	24
28	1.93	-18	-28	230	15.9	78	26	28	1.93	-21	-29	230	15.9	78	25
29	2.00	-17	-27	240	16.5	81	27	29	2.00	-20	-29	240	16.5	80	27
30	2.07	-16	-27	250	17.2	84	29	30	2.07	-19	-28	250	17.2	83	28
31	2.14	-15	-26	260	17.9	86	30	31	2.14	-18	-28	260	17.9	86	30
32	2.21	-14	-26	275	19.0	90	32	32	2.21	-17	-27	275	19.0	89	32
33	2.28	-13	-25	290	20.0	94	34	33	2.28	-16	-26	290	20.0	93	34
34	2.34	-12	-25	305	21.0	97	36	34	2.34	-15	-26	305	21.0	97	36
35	2.41	-11	-24	320	22.1	100	38	35	2.41	-14	-25	320	22.1	100	38
36	2.48	-10	-24	335	23.1	104	40	36	2.48	-13	-25	335	23.1	103	40
37	2.55	-9	-23	350	24.1	107	42	37	2.55	-12	-24	350	24.1	106	41
38	2.62	-9	-23	365	25.2	110	43	38	2.62	-11	-24	365	25.2	109	43
39	2.69	-8	-22	380	26.2	113	45	39	2.69	-10	-23	380	26.2	112	45
40	2.76	-7	-22	400	27.6	117	47	40	2.76	-9	-23	400	27.6	116	47
42	2.90	-5	-21	420	29.0	120	49	42	2.90	-7	-22	420	29.0	120	49
44	3.03	-3	-20	440	30.3	124	51	44	3.03	-5	-21	440	30.3	123	51
46	3.17	-2	-19	460	31.7	127	53	46	3.17	-4	-20	460	31.7	127	53
48	3.31	0	-18	480	33.1	130	55	48	3.31	-2	-19	480	33.1	130	54
50	3.45	1	-17	500	34.5	134	56	50	3.45	-1	-18	500	34.5	133	56
52	3.59	3	-16	520	35.9	137	58	52	3.59	1	-17	520	35.9	136	58
54	3.72	4	-15	540	37.2	140	60	54	3.72	2	-16	540	37.2	139	60
56	3.86	6	-15	560	38.6	143	61	56	3.86	4	-16	560	38.6	142	61
58	4.00	7	-14	580	40.0	145	63	58	4.00	5	-15	580	40.0	145	63
60	4.14	8	-13	600	41.4	148	65	60	4.14	7	-14	600	41.4	148	64
62	4.27	10	-12	625	43.1	152	66	62	4.27	8	-13	625	43.1	151	66
64	4.41	11	-12	650	44.8	155	68	64	4.41	9	-13	650	44.8	154	68
66	4.55	12	-11	675	46.5	158	70	66	4.55	11	-12	675	46.5	158	70
68	4.69	14	-10	678c	46.8	158	70	68	4.69	12	-11	681c	46.9	158	70

* Includes inches of mercury below one atmosphere.
c = critical point



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1. **Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is expressly conditioned on Buyer's assent to these Terms and Conditions and to the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional term or condition of Buyer's order or any other document issued by Buyer.

2. **Price Adjustments; Payments.** Prices stated on the reverse side or preceding pages of this document are valid for 30 days. After 30 days, Seller may change prices to reflect any increase in its costs resulting from state, federal or local legislation, price increases from its suppliers, or any change in the rate, charge, or classification of any carrier. The prices stated on the reverse or preceding pages of this document do not include any sales, use, or other taxes unless so stated specifically. Unless otherwise specified by Seller, all prices are F.O.B. Seller's facility, and payment is due 30 days from the date of invoice. After 30 days, Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. **Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon tender to the carrier at Seller's facility (i.e., when it's on the truck, it's yours). Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's changes in shipping, product specifications or in accordance with Section 13, herein.

4. **Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. This warranty is made only to Buyer and does not extend to anyone to whom Products are sold after purchased from Seller. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. **Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the warranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. **LIMITATION OF LIABILITY.** UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. **IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN**

IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. **Contingencies.** Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. **User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product 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 and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. **Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. **Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. **Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. **Improper use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. **Cancellations and Changes.** Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. **Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. **Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior

or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. **Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. **Termination.** This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. **Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. **Indemnity for Infringement of Intellectual Property Rights.** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. **Taxes.** Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. **Equal Opportunity Clause.** For the performance of government contracts and where dollar value of the Products exceed \$10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRRA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.



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